

ANTON WILHELM AMO LECTURES

EDITED

BY

MATTHIAS KAUFMANN, RICHARD ROTTENBURG

AND REINHOLD SACKMANN

MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG

HALLE (SAALE)

2021

ANTON WILHELM AMO LECTURES

VOLUME 7

EDITED

BY

MATTHIAS KAUFMANN, RICHARD ROTTENBURG

AND REINHOLD SACKMANN

MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG

HALLE (SAALE)

2021

Gedruckt mit finanzieller Unterstützung des Ministeriums für Wissenschaft und Wirtschaft des Landes Sachsen-Anhalt.



SACHSEN-ANHALT

Ministerium für
Wissenschaft und Wirtschaft



MARTIN-LUTHER-UNIVERSITÄT
HALLE-WITTENBERG

Bibliographische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliographie; detaillierte bibliographische Daten sind im Internet über <http://dnb.d-nb.de> abrufbar.

© 2021 Martin-Luther-Universität Halle-Wittenberg, Halle (Saale)

Das Werk ist urheberrechtlich geschützt. Jede Verwertung außerhalb der Grenzen des Urheberrechts ist ohne Zustimmung der Martin-Luther-Universität Halle-Wittenberg urheberrechtswidrig und strafbar. Das gilt auch für Vervielfältigungen, Übersetzungen, Mikroverfilmungen und für die Verarbeitung mit elektronischen Systemen.

Die Abbildung auf dem Umschlag zeigt einen Ausschnitt aus dem Eintrag Anton Wilhelm Amos in das Stammbuch eines anonymen Studenten, Jena, 2. März 1746, Thüringer Universitäts- und Landesbibliothek (ThULB), St. 83, Bl. 110v. Der Abdruck erfolgt mit freundlicher Genehmigung der ThULB Jena und mit freundlicher Unterstützung von Monika Firla (Stuttgart).

Umschlaggestaltung: Débora Ledesma-Buchenhorst

Übersetzung aus dem Französisch: Heather Allen

Satz und Lektorat: Daniele Cantini

Printed in Germany

ISBN 978-3-96670-063-4

Druck: DRUCKWERK, Halle (Saale)

QUANTITATIVE MARBLING

VON

EMMANUEL DIDIER

Centre Maurice Halbwachs – CNRS/ENS/EHESS, Paris

MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG

HALLE (SAALE)

2021

Inhalt / Table of Contents

Vorwort

Matthias Kaufmann, Richard Rottenburg, Reinhold Sackmann | 10

Quantitative Marbling

Emmanuel Didier | 14

About the Author | 48

Vorwort

In der Schriftenreihe „Amo Lectures“ des Forschungsschwerpunkts „Gesellschaft und Kultur in Bewegung“ werden seit 2013 an der Martin Luther Universität gehaltene Gastvorlesungen bedeutender Wissenschaftlerinnen und Wissenschaftler publiziert, die unter diesem Titel von den beiden Forschungsschwerpunkten „Gesellschaft und Kultur in Bewegung“ und „Aufklärung, Religion, Wissen“ gemeinsam veranstaltet werden und Anton Wilhelm Amo gewidmet sind.

Im Jahr 1727 kam Anton Wilhelm Amo – als Kind im heutigen Ghana versklavt, dann 1707 von der Holländisch-Westindischen Gesellschaft an den Wolfenbüttler Hof Herzogs Anton Ulrich von Braunschweig und Lüneburg-Wolfenbüttel verschenkt – nach einer umfassenden Ausbildung an die Universität Halle zum Studium der Philosophie und der Rechtswissenschaften. 1729 verfasste Amo die Disputation „De iure Maurorum in Europa“, in der er die Frage erörterte, inwieweit die Freiheit oder Dienstbarkeit der von Christen gekauften „Mohren“ in Europa nach dem damals geltenden Recht gerechtfertigt sei. (Diese Schrift gilt als verschollen)

In Wittenberg wurde Amo im Jahr 1734 mit der Inauguraldissertation „De humanae mentis apatheia. Die Apatheia der menschlichen Seele“ zum *philosophiae ac liberalium artium Magister* promoviert und wurde als Magister legens zugelassen. Anders als der im stoischen Umfeld prominent gewordene Terminus Apatheia vermuten lässt, geht es dabei nicht um Gelassenheit oder Gleichmut der Seele. Mit dieser Schrift leistete Amo vielmehr einen eigenständigen Beitrag zur Debatte zu dem, was man im 20. Jahrhundert das Leib-Seele-Problem nannte, indem er der menschlichen Seele Empfindungen und überhaupt die Fähigkeit des Empfindens aufgrund ihrer Immaterialität radikal abspricht. Wie wir im gleich anzusprechenden Hauptwerk erfahren, befasst sich die Seele mit intentionalen Repräsentationen der vom Körper sinnlich erfassten Dinge. In ausdrücklicher Wendung gegen

Descartes, der ja den „*Passions de l'âme*“ ein ganzes Werk gewidmet hatte, betont er, dass die Seele nicht leiden könne, was bei lebendigen Dingen das selbe wie empfinden sei (*pati et sentire in rebus vivis sunt synonyma*) und stellt sich in seiner Psychologie somit eher in eine scholastische, wolffianische Tradition (zu den lokalen Kontroversen, die aufgegriffen werden vgl. Edeh 2003, 53f., Dauvois 2020).

Dass er indessen keineswegs ein schlichter Gefolgsmann Wolffs ist, zeigt sich in der wesentlich umfangreicheren Schrift „*De arte sobrie et accurate philosophandi. Traktat von der Kunst, nüchtern und sorgfältig zu philosophieren*“ von 1738 (vgl. u.a. Edeh 2003, 57ff.). Dort entfaltet Amo nach einem Überblick über die traditionellen Felder des Wissens, wie Jurisprudenz, Theologie und Mathematik und einer Warnung vor Pedanterie sowohl als Vielwisserei, v.a. soweit es sich um Unnützes handelt (er bezieht sich dabei auf Thomasius), seine Lehre, die der Philosophie die Aufgabe des kontinuierlichen Erkennens der Dinge und der Vervollkommnung des Menschen auf allen Gebieten, von der natürlichen Existenz bis hin zur ewigen Glückseligkeit, zuweist (*Partis Generalis Cap. II, Membrum II §§ 4-6*) und kritisiert diejenigen, die in ihr „heutzutage“ nur einen Verstandesakt ohne Verbindung zu ihrer pragmatischen Seite sehen. Philosophie ist Weisheit als Tugend und diese beweist ihren Wert in der Handlung (ebd. § 1). Nicht allein durch die Bezugnahme auf Ciceros „*De Officiis*“ in diesem Kontext zeigt sich eine Nähe zu stoischen Prinzipien (vgl. auch *Partis Generalis Cap. V Membrum I § 11*, wo als gute Wirkungsweise der Seele die Mäßigung der natürlichen Instinkte und des sinnlichen Begehrens identifiziert wird). Im umfangreicheren speziellen Teil des Werkes erläuterte der „schwarze Philosoph in Halle“ seine Auffassung von den Aktivitäten der menschlichen Seele beim Vorgang des Erkennens, von der Begriffsbildung über die Reflexion, bis hin zur Logik mitsamt den Regeln der Syllogistik, der Kritik und Hermeneutik. Er befindet sich dabei trotz einiger deutlicher Abweichungen – etwa seiner religiösen Fundierung der Ethik – im Umfeld der Wolffschen Schule (Edeh 2003, S. 164).

Nach einigen Jahren der Lehre als Magister legens der Philosophie und der freien Künste in Halle und Jena sah sich Anton Wilhelm Amo, von seinen Gönnern verlassen (Ludewig war gestorben) und rassistischen Repressalien ausgesetzt, die ihn dazu veranlassen, im Jahr 1747 nach Afrika zurückzukehren. 1747 wird er noch als Bürger Jenas erwähnt, doch dann verschwindet seine Spur, bis auf den Bericht eines schweizer Schiffsarztes, der im Dienst der niederländischen Westafrika Companie den „*beroemden Heer Anthonius Guilielmus Amo Guinea Afer, Philosophiae Dr. et Artium Liberalium Magister*“ 1753 in Axim im heutigen Ghana

besuchen ging (vgl. Brentjes 1976, S. 66 u. 69, Firla 2012, Dokumente, Halle 1968, 297).

Anton Wilhelm Amo hat sich mit seiner Kritik an dunklen, rational nicht zu begründenden Gesetzen, an Rechtsauslegungen, die sich allein am Wohl der Gesetzgeber ausrichten, und der Mahnung zur Humanität in der Jurisprudenz, die im Zweifelsfall immer Vorrang vor dem strengen Recht haben soll, als ein Humanist und früher Verfechter der Menschenrechte erwiesen.

Anton Wilhelm Amo, *De humanae mentis apatheia*, in: Antonius Guilelmus Amo Afer, aus Axim in Ghana: Student, Doktor der Philosophie, Magister legens an den Universitäten Halle, Wittenberg, Jena, 1727-1747, Dokumente, Autographe, Belege, Halle (Saale): Martin-Luther-Universität Halle-Wittenberg 1968, S. 12-50

Ders., *Tractatus de arte sobrie et accurate philosophandi*, in: ebd., S. 60-275.

Antoine Guillaume Amo, *De Humanae mentis apatheia - Tractatus de arte sobrie et accurate philosophandi*, Textes originaux traduits par Simon Mognol, Paris: L'Harmattan 2010.

Burchard Brentjes, Anton Wilhelm Amo. Der schwarze Philosoph in Halle, Leipzig: Koehler und Amelang 1976.

Daniel Dauvois, *Amo: une philosophie de l'implicite*, Paris : Présence Africaine 2020.

Yawovi Emmanuel Edeh, Die Grundlagen der philosophischen Schriften von Amo. In welchem Verhältnis steht Amo zu Christian Wolff, daß man ihn als „einen führenden Wolffianer“ bezeichnen kann? Essen: Die blaue Eule 2003.

Monika Firla, Ein Stammbucheintrag des schwarzen Philosophen Anton Wilhelm Amo aus dem Jahr 1746, Stuttgart: AfriTüDe 2012.

QUANTITATIVE MARBLING

New Conceptual Tools for the Socio-History of
Quantification

VON

EMMANUEL DIDIER

Centre Maurice Halbwachs – CNRS/ENS/EHESS, Paris

Abstract

Socio-history of quantification is not a simple sub-domain of Science and Technology Studies. On the contrary, it can provide tools for investigating a wide range of social situations from a new and interesting perspective. We begin by providing a new definition of quantification. Next we consider the way numbers permeate society to its very core, forming rich veins of data for social science research. From this process, referred to here as “quantitative marbling,” three distinct categories emerge: data veins produced by governments, those produced by social activists (often contesting the former), and lastly, those produced by non-governmental global networks. We conclude by suggesting that social processes aiming to free certain social aggregates of quantitative analysis are also worthy of attention.

1. New Pathways to Capture Quantification

Nineteen. Nineteen is the number of France Telecom employees who took their own lives at the workplace in 2007. The spate of suicides would raise questions over corporate culture and would bring the telecoms group and its former CEO, Didier Lombard, to trial earlier this year on charges of moral harassment. Among the many figures put forward during the proceedings – total company debt, number of employee resignations, and so on – one number above all others, the number 19, which we will expound upon later, played a critical role. The figure, initially compiled by trade unionists, would shock the nation and force French officials to publicly distance themselves from the group’s corporate policy. In other words, the number would infiltrate myriad layers of French society to influence ordinary workers and decision-makers alike. Ultimately, the figure itself played a key role in bringing a corporate policy into the public arena.

This number, “19,” perfectly illustrates the impact of quantification within social contexts: not only do numbers travel within society, they shape it over time. Based on this premise, we contend that numbers infiltrate society to its very core, to form a network of veins of varying shape, depth and size, referred to here as “marbling”. This article proposes to develop the concept of *marbling* and to expand upon both the underlying meanings and the consequences associated with its use to convey the powerful influence of numbers in society.

To do this, we will not have to start from scratch. It is commonly acknowledged today that statistics, and quantification methods in general, can be instruments of both information and power. To put it differently, quantification processes do not emerge within society “naturally” but materialize through social and political processes¹, and in this respect, they deserve to be approached as an object of sociology *in and of itself* – and not just as a means for producing knowledge.

A growing body of compelling research confirms this premise from two distinct perspectives. One school of research has focused on analyzing the relationship between quantification and objectivity by examining in detail the way quantification has shaped science and, consequently, our daily lives (Daston 1988; Gigerenzer 1989; Hacking 1984; T. M. Porter 1995). The other has shown how statistics

¹ Many thanks to Isabelle Bruno, Sophie Cras, Fabian Muniesa, Christophe Prieur, Aurélie Slonina, Florence Weber and the participants of the EpiDaPo Symposium, whose comments and contributions greatly improved the manuscript.

have radically altered our modes of governance and, more specifically, how quantification methods have been used to justify public policy (Brian 1994; Desrosières 2000; Foucault et al. 2004). The two traditions of research – an American approach largely from the historical perspective, and a French approach mainly from the sociological – are nowadays accepted as standard. These two schools even appear to be structuring themselves into a sub-discipline in its own right, that of the socio-history of quantification (Bruno, Jany-Catrice, and Touchelay 2016; Diaz-Bone and Didier 2016), which adopts a transdisciplinary approach and is chiefly concerned with power relations and precise empirical inquiry.

Yet, there are two particularly striking limitations to this body of research. First, it mainly addresses expert quantification practices, be they scientific or administrative. Other than a few rare counterexamples (Weber 2013), a bottom-up perspective is rarely used when looking at the pyramid, i.e. from the position of ordinary quantification processes. Yet our daily lives are subject to an increasingly powerful and often problematic flow of quantities.

Second, the socio-history of quantification has yet fully to evaluate the mass arrival of “big data.” Up to now, it has mainly focused on quantitative forms that pre-existed this “flood” of new data (surveys, accounting, indicators...). There is of course a body of literature on the subject of big data but, excluding a few exceptions (Cardon 2015; T. Porter 2018), the literature in question is by and large ignorant of the socio-history of quantification (Mayer-Schönberger and Cukier 2013; O’Neil 2016).

This book aims to build on the tradition of the socio-history of quantification to explore new pathways, via the concept of marbling, to allow us to recapture these objects – ordinary quantification and big data. It is not a question of opposing different approaches to quantification, but rather of considering these as a continuum allowing for the analysis of a wide range of interrelated practices.

We will not focus on specific empirical fieldwork but will suggest ways of furthering various areas of existing research to demonstrate the descriptive and organizational benefits of the notion of marbling. In other words, our article offers both a program and an analysis. In this regard, we are laying the groundwork for a general sociological approach involving the exploration of social phenomena through the heuristic device of marbling. Thus, the socio-history of quantification is no longer limited to a mere sub-discipline of science and technology studies (STS) but can be seen as a comprehensive method for the accurate study of almost any social object.

Our premise will be structured as follows. First, for ordinary social quantification practices to be captured through marbling, we will start by proposing a new definition of quantification itself. Next, we will see how the new definition enables us

to develop the concept of marbling as a tool for capturing quantities within social contexts, by looking at three distinct examples. We will go on to determine different marbling categories according to the social aggregates they infiltrate. Lastly, we will consider various unquantified social contexts seemingly impervious to marbling.

2. Defining Quantification

Socio-historians of quantification commonly define the activity of quantifying from the perspective of the expert. Though this top-down approach is admittedly useful, it nevertheless limits our insight into how numbers circulate between everyday and official contexts. It is therefore necessary to provide a broader definition than the one customarily given.

According to Desrosières, quantification is the act of expressing in numbers that which was originally stated in words. This definition is rooted in mathematical theory, in which a measure is a function between any set of elements (with a Boolean structure) and real numbers. Each element in the initial set is associated to a number, in other words to its measure. Desrosières insisted that, in real life, these transformations are part of a two-step process. First, the actors need to *agree* on what deserves to be quantified, which requires determining equivalences and categories. Next, they need to *measure* them, i.e. to transform the agreed upon entities into numbers (Desrosières 2008). For example, it took several decades of conventional groundwork to define the category of “unemployed” (as differentiated from the independently wealthy, the sick, or inactive populations), which ultimately made it possible to measure unemployment rates (by conducting a complex national population survey) (Topalov 1994).

Though the accuracy and relevancy of this definition is undeniable, it places the emphasis on expert practices. To establish initial conventions, like the notion of unemployment, and subsequent measurement tools, like the employment survey in France, one must have significant cognitive, economic and institutional resources. Since Desrosières was chiefly interested in the work of his colleagues at INSEE, the National Institute of Statistics and Economic Studies, his top-down view of quantification is not surprising and offers, what is more, a fascinating account of the processes we are interested in. But it also makes it difficult to demonstrate the key but often overlooked role of ordinary quantitative processes in the production of numbers in society, including when experts use ordinary numbers.

We must insist here on the fact that quantities are omnipresent in our daily lives, and not just in aspects related to official business. Of course, some figures do emerge from a substantial amount of “investment in forms” (Thévenot 2006), as with the official unemployment numbers we chat about over coffee; others, however, are basically straightforward, when I mention picking up a dozen eggs at the store, for example, or going on vacation for a couple of weeks. Expressions like these may merely provide an approximate count—a couple of weeks could mean either precisely fourteen days or roughly fourteen days—but they do in fact count.

Social sciences have corroborated the direct role of numbers in everyday social contexts. Historians, for one, seem never to have encountered a society devoid of numbers (Ifrah 1976; Peiffer and Dahan 1986). Furthermore, according to specialists of ethnomathematics, a sub-branch of anthropology that emerged in the 1970s specializing in the study of mathematical practices, there are no known societies without a counting system (Vandendriessche 2016). The only differences lie in the complexity of the systems used. Some groups, such as the Iqwaye people of Papua New Guinea, associate numerical concepts with the body, in direct relationship with their cosmogony, in systems that allow them to represent very large numbers (Mimica 1988). Other societies with oral traditions, such as that of Mundurucu living along the Amazon basin in Brazil, have “small number” counting systems that include words for numbers only up to five. The Mundurucu count “1, 2, 3, 4, 5, many.”

Similarly, linguists are not aware of any languages lacking names for either numbers or number categories, though, again, these latter may greatly differ from one another: alongside our system opposing the singular and the plural, languages may include a dual form, used to refer to two entities, as does Arabic, or a paucal, used to refer to some or a few items (often between ‘3’ and ‘5’), as does Mavea, spoken on Mavea Island in Vanuatu (from a conversation with Pr. Lopocararo).

Lastly, cognitive scientists specialized in the ontogenesis of numbers and numeracy, i.e. the way mathematical concepts are acquired, argue that “all humans have a well-developed sense of ‘numbers,’ even during their first year of life” (Dehaene 2011).

Therefore, numbers are entwined with our everyday practices, the language we speak, and even our consciousness, which obviously cannot be discarded. All healthy societies have numbers in common. Emigh (2002) argues that “numeracy,” the ability to produce and manipulate numbers, emerges first on the social level, and only afterwards do interactions between the general population and the state produce more expert numbers. This direct presence of numbers can be accounted for by our determining of categories that allow us to identify subsets of individuals within a same category. Wherever there is a series, names and numbers are inextricably intertwined (Didier 2009)².

These numbers constitute an immediate resource for everyday actors. They can use them to present arguments without needing to do the heavy groundwork of establishing expert equivalences and carrying out subsequent investigations. Often the work is already done and the results readily available. We don’t need to be

² Perhaps the best example of this is poetry, in which language and measure are intimately bound. (Ernst 2003).

experts to count different cases, to evaluate quantities, and to make numerical comparisons of entities. These operations are similar to, and are as readily available as, other non-quantitative language devices. We quantify individuals by saying “2” just as naturally as we qualify them by saying “children.” In other words, nouns have no primacy over numbers. They are both resources at the same elementary level.

Quantification, seen from this perspective, is not exactly a question of transforming nouns into numbers, but of choosing from the linguistic, practical and cognitive resources of a given society, resources that are numerical rather than literal but that co-exist, nonetheless. Quantification is first and foremost a matter of opportunity contingent on a set of possible resources, easily and equally accessible to all individuals of society.

This definition of quantification is easy to use for any socio-history of quantification study. We see quantification occur whenever we see actors put forward a number-based line of reasoning. Therefore, anytime we read, see, or hear “2,” “6,” GDP, a credit card number, or any other number form, the numerical argument meets our definition. In keeping with the principles of pragmatic linguistics, we view it as part of a set of practices that interests us as a whole (Grice 1989). However, it is the easily identifiable symbols of the number figures that triggers our interest³.

This definition calls into question the difference between specialized and ordinary quantifying processes. Clearly, professionals do not systematically start by transforming words into numerical entities. On the contrary, in the very early stage of their operations, they also use ordinary numbers, which they gradually consolidate through aggregation, hybridization, operationalization (take, for example, the INSEE statistical category “homeless,” which initially relies on the non-specialist contributions of community actors (Brousse 2005)). Therefore, ours is simply a broader definition than the one previously put forward. It enables us to include *more actors* and *more actions* in the quantification process. It allows us to better capture the bigger marbling picture. It is therefore a reversal of the Cartesian worldview based on mathematical reasoning. In one sense we are saying that the world is in fact comprised of numbers. However, numbers are not at its origin, nor are they obscured by nature. On the contrary, they are highly visible and easy to

³ The number “1” is a problematic case because, ironically, it is both an element of a sequence of numbers and a unity that opposes the multiple. We will address it only in specific cases in which the English word “one” can be applied, as opposed to the word “a.” The fate of the 0 figure, though it literally means “nothing,” is easier to settle. Zero is, as semiotics rightly reminds us, a number in its own right (Rotman 1993).

grasp. They surround us and rub shoulders with us, day in day out, and the trail they leave provides a means for understanding the societies in which we live. What we are proposing, therefore, is a kind of sociological *mathesis universalis*, stood upright, at last.

We will now consider three examples and provide a definition of marbling.

3. Marbling in the Making

Numeric information employed by an individual may be taken up in society by someone else to set off on an autonomous course, the length of which depends on the number of times the information gets passed on. This movement of entities is described by Latour as a “trajectory” (Latour 2010). The word in fact designates the movement of a mobile through a given environment, but it also evokes an unbroken straight line or a parabola traced by the movement. Yet, the movement of numbers is generally unpredictable and prone to collisions, since their trajectories are contingent on the play of local forces. By following these moving quantities, it is possible to discern *marbling* veins traced into the foundations of society, the bedrock itself being an aggregation of countless elements. What do we mean by this?

One particularly enlightening answer is found in the essay *Statactivism* (Bruno, Didier, and Prévieux 2014) that examines cases in which quantification processes are used by militant activists to challenge institutions perceived as unjust. In most cases, the actors are not specialists but are, on the contrary, individuals who make ordinary use of figures. Yvan du Roy (du Roy 2014) explains how the enumeration of suicides at France Télécom, presented in our introduction, made its way through layers of French society in a compelling example of marbling. During the 2000s, following the partial privatization of the national telecoms company, a hardline policy, based partly on benchmarking instruments (Bruno Didier 2013), was implemented by top executives with the aim of increasing staff productivity and mobility.



Figure 1: Picture of a protest in front of a France Telecom Shop in 2009. © MAX PPP

The malaise over these new managerial methods was so deep that two trade union movements created what they called the in-house Monitoring Center for Stress and Mandatory Transfers Group in 2007. They teamed up with doctors, psychiatrists, and sociologists, including several statisticians. The first thing they did was to launch a methodical online survey for employees on questions of stress at work. The results were devastating: two-thirds of employees reported stress at the workplace; one in six said they were suffering from acute anxiety. Alarmed by accounts of suicide at the workplace, members of the group decided to count them. A list based on numbers reported by local union branches was compiled for 2009. The count came to 15 attempted suicides, and the notorious figure of 19 for actual suicides. The number 19 was a bombshell that ripped through society and was deployed by media outlets to prove that the tragedies “were the appalling result of the major overhaul that had begun with the gradual privatization of the historic national carrier” (du Roy 2014).

The number also prompted a reaction from an expert statistician, René Padieu, an INSEE inspector general. In an interview with the press, he was quoted as saying that “the suicide rate for the working age population (age 20 to 60) was 19.6 suicides per 100,000 people in 2007,” concluding that “24 suicides over a 19-month period meant the France Telecom rate was 15 suicides per year, since the company counted about 100,000 employees. In other words, workers at France Telecom were less likely to commit suicide than other people”⁴.

His statement set off a heated debate with the trade unions, for whom the suicide rate of the general population could not be compared with that of a company. In any case, the number created enough of a stir to be heard by France Télécom CEOs. In late 2009, the company replaced its executive team, organized meetings with trade unions on managerial practices, and froze its policy of mandatory transfers. The government ultimately responded, too: given that some FT employees were still civil servants, the case was referred to the General Inspection of Social Affairs (IGAS), which conducted an investigation into each of the suicides.

The affair is a textbook example of numeric marbling. It clearly shows how a simple number, in this case the number 19, can infiltrate various social strata (another geological metaphor used in sociology) and transform society. The number 19 itself emerges from earlier counts compiled by various institutions (the watchdog group); it is established by ordinary individuals, unskilled in quantification techniques (national and local union leaders), then passed on from one actor to the next, some experts, some not, to form a chain that can be quite long at times, since

⁴ http://www.lemonde.fr/societe/article/2009/10/19/pas-de-vague-de-suicides-a-francetelecom-selon-un-statisticien_1256048_3224.html#cdgXLVcuSR1Vw1Y5.99

in our case, it goes from the “ordinary” worker at France Télécom to high-level government officials. Every time the number is taken up, it alters the relations between the actors involved. Here, it allowed trade unions to establish a link to the press, the press to organize debates with the experts and, lastly, the unions to get the employers to hear them.

Thus, these myriad reuses burrow a series of modifications that are produced by quantification and are interconnected to one another. They form tracks that are comparable to marbled veins traced into rock over millennia through processes of oxidation, the meanderings of which tell the fascinating story of societal transformations in relation to the displacement of numbers. In our case, they tell of a profound shift in a major French company. In other words, to put it simply, the number “19” marbled its way into the bedrock of society to change France entirely.

In this regard, the study of marbling is comparable to what Chateauraynaud defined as a “sociology of ballistics,” which, according to him, “aims to describe, compare and analyze the trajectories of either dissimilar causes in similar contexts or, inversely, identical causes in different contexts, while taking into consideration the progression of the aims or purposes of the protagonists.” (2011, 174). One striking feature shared by the two approaches is their common goal of analyzing a given “cause” as it makes its way through “a field occupied by forces,” in other words, through a set of constraints that are either resistant to the inter-arena movement of a given cause or are capable of changing its trajectory – in the same way we are interested in the movement of numbers within a context of resistance. Chateauraynaud also remarks, the way we have with numbers, that the trajectories of causes are shaped by unforeseen developments and are consequently very seldom linear.

However, Chateauraynaud’s work consists of proposing a sociology based on “ballistics” that could also be considered a *logos*, that is a scientific discipline for the study of the movement of causes. On the other hand, marbling is a phenomenon; what it shares with our colleague’s model is the *trajectory of the cause* itself, and not the study of ballistics that is its “meta” argument. Our efforts here are not directed at the founding a science of marbling, since a field of social history of quantification (see above) is currently being defined through the collective efforts of social scientists, but we will attempt to discuss what constitutes the fact, the phenomenon, of numeric marbling. In this regard, the sociology of ballistics proposed by Chateauraynaud is of little use to us, as it doesn’t identify any of the features specific to numerical arguments⁵.

⁵ Chateauraynaud only considers “calculation” in terms of “strategy” (see pp. 165-167).

Yet these quantitative arguments are governed by specific rules, including calculation, in the operational sense of the term, which plays of course a critical role. Special consideration must therefore be given to the question of calculation to understand the movement and modifications associated with the quantitative reasoning.

How then does calculation fit into our theory of marbling? Florence Weber showed that ordinary calculation processes take place within the framework of “social stages” (Goffman 1971) that determine many of their characteristics (Coquery, Menant, and Weber 2006; Weber 2013). She gives the example of a housekeeper who works for her neighbor, who is also a friend. She points out that the housekeeper records the hours spent cleaning in a notebook, to differentiate them from time spent at her neighbor’s as a friend. Without it, the two contexts could get entangled, which would be harmful to both the business relationship and the friendship. Considering the similar theory of Callon and Muniesa on calculations made by leading “experts,” for example stock market quotes (Callon and Muniesa 2003), one could argue, more generally, that calculations occur *only* in social stages that determine the method of calculation used. Thus, the nature of marbling, as carved by calculation, is largely dependent on the social framing in which it occurs.

The question of calculation is likewise addressed in Leonelli’s work on “data journeys” (2016), in which she examines the conditions and the price that enables data to be transferred from one user to another, without losing scientific value. She considers, for example, the growing role of “data curators” and “meta-data.” However, her research is only of partial interest to us as it is specific to the field of STS and limited to cases involving scientists alone. Our aim, on the contrary, is understand how these elements capture and modify social aggregates well beyond those used solely by experts.

Let’s finish with this case of numerical marbling in the making by insisting on one of its key properties – that it at once *holds together* and *is held by* the various unveined elements that constitute the calcite block. The marbling concept holds together both operations specific to quantification, such as calculation and categorization, as well as other, less overtly quantitative elements of the social aggregates to which they are attached. To fully grasp the social and political repercussions of the above described “19,” we need to first examine how the count came about, and to then give a picture of Didier Lombard and France Telecom. Our description of marbling follows the movement of numbers by focusing at once on both purely quantitative debates and on the issues and political tensions that run through society.

4. Establishing a Marbling Method

While it is possible to observe the process of marbling in the making, as we've discussed above, marbling can also be observed after the fact, *a posteriori*, by examining the veins most frequently followed by numbers. Such an approach allows us to identify what is commonly called a method, in other words a series of procedures or mechanisms whose interactions are regulated with the aim of quantifying a given object over time. The method is the stabilization of marbling vein over time.

The remarkable success of the Quantified Self movement is a good example of such stabilized marbling veins (Nafus et Sherman 2014; Dudhwala 2016). Initiated in San Francisco in 2007, the movement involves show-and-tell style meetings where self-tracking participants share personal data.

Such processes of self-quantifying are nothing new (Maas, publication forthcoming), but what sets the current movement apart is that, for one thing, data can be collected automatically by using wearable sensors, such as watch bands that measure biological signals and connected bicycles (Swan 2012), and for another, public meetings can be organized during which participants share self-tracking experiences.

For example, self-trackers interested in sleep quality may use sleep tracking devices which allow them to share information on dedicated databases. The data entered on a daily basis plots an individual marbling curve that can be shared during "meetups." These shared self-tracking experiences, which are generally concerned with health, have been criticized by some as having an undeniable element of navel-gazing and voyeurism. Even so, Quantified Self meetups have developed all over the world.

Quantified Self Meetup Groups



Figure 2: Quantified Self meetup group distribution worldwide. Source: <http://healthstandards.com/blog/2013/08/15/self-trackers-growth-of-quantified-self-part-i/>

Routines produced by *self-quantifiers* can therefore be seen as a marbling process comprised of extremely stable social aggregates (artifacts, rhythms, individuals), which methodically express a set of figures that describe changes in measured objects over time. The marbling veins thus produced are doubly personal in that they measure the sleep pattern, say, of a given participant, as well as their *approach*. In other words, the uniqueness of a marbling vein lies not only in the spikes and dips traced by individual statistical curves, but also in the *choice* of what is to be measured, in other words, what participants perceive to be the object most suited to quantification.

And yet the data produced are commensurate to that of other fellow self-quantifiers since standardized self-tracking technologies such as wrist wearable devices, sensors, and collective databases enable users to rate themselves against the group's overall average, and then discuss their ratings publicly. Each of these fine veins of marbling merge to form a mother lode of interconnecting individual strands.

In doing so, the primary marbling vein provides an instrument for greater individual awareness of and control over physiological cycles. This is an obvious moralizing element to quantification through self-analysis in that the data produced can be used to establish life norms. Given that the figures in question infiltrate and transform different layers of society, the geographical location of Quantified Self groups takes on a completely different meaning: it is representative of the societies

that partake in creating the norms. We immediately notice that the groups' distribution is anything but homogeneous, chapter locations being by and large concentrated in the major global urban areas.

This kind of marbling came about through the radical miniaturization of the bureaucratic quantification techniques of the first half of the 20th century, whose huge rows of coders and punching machines (Gardey 2008) gave way to today's sensors and computers that allow quantities to be produced in an equally stable and consistent manner but at a completely reallocated organizational cost.

It is important to note that while marbling can proceed from a method, in the sense that it stabilizes operations, it is by no means a methodology, as the latter would be normative. On the contrary, marbling consists of operations that actually produce numbers and that therefore shape social aggregates.

Finally, stabilized marbling veins and those still in the making have singularity in common. A method is nothing more than a marbling vein in the making, which through repeated use will gradually consolidate the social aggregate that it is both holding together and being held by. Each marbling vein is unique. There is no *uniform* impact of quantification. In arguing so, we differ from the position espoused by Supiot (2015). His work is entirely devoted to demonstrating that, on the one hand, "governance by numbers" is increasingly prevalent throughout the Western world and, on the other hand, that "governance by law," in other words the laws society freely confer upon itself, has been made "subservient" it (2015, 22). For him, quantification *in general* swallows up all forms of democratic government and in doing so dangerously curtails public freedoms.

But Supiot neglects to define quantification, which means he brings together a wide array of quantities, out of which only the benchmarking methods in agreement with his investigations are used to support his argument (Bruno, Didier 2013). Therefore, his argument is only convincing within the framework of a small number of quantitative methods. It can be shown that other methods (marblings) have an entirely different impact. Admittedly, Supiot does describe various other methods, from antiquity and other distant eras, for example, and even some from the first half of the 20th century (as in chapter five). But he does so only from the historical standpoint, failing to explain their political repercussions, probably because they are unlike the ones he stigmatizes – and even harmless at times. (See the impact of sample surveys, (Didier 2009)).

On the other hand, he ignores the fact that governance by law requires quantities too. A good example of this is criminal law, which establishes most sentences quantitatively: length of incarceration, amount of fine, etc. These quantities are

therefore fundamental to law; they do not call into question the notions of “governance” associated with it. (See research on the interrelations of law and quantification (Chappe 2011)).

So, it is not a question of a legal governance different from and antagonistic to a form of numerical governance, but of two sets of social aggregates that are intricately intertwined, each containing veins of quantitative marbling. These latter may or may not aggregate legal elements in addition to others, but each vein makes its own singular impact, whose repercussions, whether positive or negative, are most often subject to uncertainty and social debate⁶. It is therefore very risky to attribute general consequences to “quantification” as a whole. This would obliterate the fact that marbling veins are singular and thus have singular effects.

Marbling is therefore a concept that captures either a mechanism (marbling in the making), or a consolidated result of the mechanism (the marbling method) through which quantification acts upon society. It furthermore makes it possible to capture often overlooked social phenomena – those that emerge from the symbolic utilization of numbers.

⁶ Note that marbling is also a medical term that designates a pathological skin condition. Numerical marbling can therefore have a positive connotation, for example with sculpture, or a negative one, in the case of the illness.

5. Symbolic Marbling

As we saw in the introduction, the methods and repercussions of quantification used as a tool for governing or providing evidence have been widely studied. The problem is, though the interest of such associations is undeniable, a substantial part of socio-historical quantification research focuses exclusively on those two areas of inquiry, to the detriment of other quantities, which may constitute marbling veins in fields far removed from science and government but with significant social implications all the same. Consider the example dealing with an aggregate that would appear to have nothing to do with quantification but that is marbled with numbers nonetheless: the art world.

Aesthetic theory since Kant has tended to view works of art as perfectly singular objects presenting infinite possibilities of imitation and interpretation. To quantify art, under such terms, that is to say to categorize works into series of units sharing various identical characteristics, is to either deny or disrespect that which makes a work artistic.

Still, art has been quantified in the past. There is no need to give details on one kind of marbled veins, those traced by a series of quantitative tools that financialized the world of fine arts at the turn of the 19th and 20th centuries and by doing so transformed artworks, initially indicators of the collector's good taste, into financial assets. Much has been written on the subject (Cras 2018; Verger 1987; Velthuis and Coslor 2012).

Let us focus instead on a second way of quantifying art that the artists themselves have contributed to, namely by choosing the quantification of their own environment as the subject of their works and a source of visual inspiration. Yamey (1989) examines the surprising spread of account books in European painting between 1300 and 1800. This period would see the development of accountancy and finance and would inspire a new category of professionals to want portraits representing their skills. Artists would therefore begin to show an interest in these expert quantitative techniques as attributes of power.

One compelling case is *The Census at Bethlehem* by Peter Bruegel the Elder, painted in 1566, which interprets the theme of the census in a highly original manner. The painting is a classical representation of a biblical scene transformed into a scene from everyday life in Brabant during the Renaissance. Mary is pregnant, wearing blue and seated on a donkey. She is accompanied by Joseph. Figured in the center of the painting, the two are nearing a building where the villagers have gathered to be counted, in accordance with the Gospel of Luke (2, 1-7). It is therefore a representation of the arrival in Bethlehem, a classical theme in painting,

although depicting the census is rare. Since the census agent is clearly collecting money, the painting is often interpreted as a criticism of the heavy taxes imposed on the Protestant Netherlands by the Catholic Habsburg emperor, Phillip II of Spain.



Figure 3: Bruegel the Elder *The Census at Bethlehem*. © Royal Museums of Fine Arts of Belgium, Brussels

But Meganck (2018) came up with an altogether different and perfectly convincing interpretation. By focusing on the gabled house in the center of the landscape toward the back that she succeeds in identifying and localizing, she suggests that the painting was commissioned by Jan Vleminck, a wealthy mine owner who had just been granted a domain and therefore a knighthood on which the house was sitting. The painting, she argues, is therefore the depiction of Vleminck's loyalties to the Habsburg administration as a tax collector on his domain (taxes were not only monetary but consisted of goods in kind – pigs, barrels, and so on). Vleminck was a staunch Catholic with close ties to the monarchy. Bruegel therefore placed the Virgin, the source of the religious conflicts of 1566 (unlike the Catholics, the Protestants were against Marian devotions), in the center of the painting.

The painting therefore is not a criticism of the heavy taxes but is rather a “narrative for worship most likely painted at the request of a merchant banker from Anvers.” The subject represented is the professional activity of his client. Bruegel is not criticizing him. Instead, he is addressing him as “the new rural lord, financier of

the King and Catholic” (2018, 120). The painting can therefore be seen as a reinterpretation, not just a simple portrait but a representation of the power conferred on accountants and bankers by numbers during the Renaissance⁷.

A giant leap forward allows us to take up that same question – of how the power of financial quantification is represented in visual arts – by following the marbling vein into the second half of the 20th century. Cras (2013) shows that a group of artists during the 1960s and 1970s explored the question visually, but this time by focusing on the question of how numbers had transformed the field of art. Thus, Les Levine, in *Profit System I*, made works that consisted in his investing money in the stock market and then sharing the details of his investment portfolio and his earnings (which were substantial) with art magazines. The significance of his artistic gesture was threefold: he was short-circuiting the material production of the artwork, bypassing the actual artmaking process that he considered laborious and illusory, and summing up art as a financial flow. By doing this, he was stating, on the one hand, that artists should stage their own means of subsistence, and on the other hand, that contrary to the stereotypical image of the selfless artist they, like so many others, were driven by greed. His artistic gesture was therefore an atypical self-portrait as an investment banker. Cras concludes by saying that Levine, together with other “promoters of art as an investment form [...] transformed qualities into quantities, the subjective into the objective, and pleasure into business” (2013, 20).

Thus, quantification, and especially the tangible instruments of its potential power, is a theme that has been repeatedly explored by artists since as early as the 13th century. This visual exploration of quantities central to the work of many artists would gradually inscribe marbling veins into the bedrock of the artworld, the further study of which could possibly lead to an unprecedented re-quantification of the field today.

At the same time this example forces us to reconsider the potential of quantification. Neither Bruegel nor Levine used quantification as either a demonstration, in the scientific sense of the word, or as a direct exercise of power. Aesthetic considerations aside, it was the symbolic power of quantification that interested them. They weren’t so much concerned with the empirical qualities of figures, which makes the enumeration of concrete objects possible, as with the capacity of figures to evoke abstractions and the unseen. This function, which can also be seen in Israel where streets are named with numbers of dead or heroes (Krauel-Tovi and Moore 2016), builds on a long Pythagorean tradition, the theology of which was

⁷ It should be noted that Meganck’s argument is based not only on solid art history scholarship but also on the history of enumeration and tax collection in Brabant at that time, recalled in the same volume by Aerts (2018).

based on numerical symbols. Thus, does numeric marbling give new symbolic potential to the role of numbers⁸.

Artists also work on the affect of quantities, meaning on the way they stir up our sensations and emotions. They remind us that quantification acts not only conceptually and politically but also affectively.

Looking at numeric marbling in fields that are a far cry from those usually prescribed by the history of statistics – science and politics – allows us not only to approach these disciplines from a new angle, but also to refresh the socio-historical results on the social powers of quantification. Our illustration of how numbers are used in art is only one example among many of the potential for our approach. Recent literature, for example, has explored topics such as relations between quantification and violence (Samuel 2014) and emotional attachment to numbers (Espeland 2016).

Having considered the three above examples of marbling, we can now offer a definition. Marbling: a sequence of unique and often unexpected social transformations caused by the movement of numbers within society, numbers that can be singular, repeated (in the form of a method), or symbolic in nature. All of these numerical veins are of varying length - meaning that each vein connects small or large numbers of individuals. The color of each vein differs too – seen that they are produced by different kinds of numbers. They run through society like those in a block of marble and intersect and interact with each other to form a dense yet distinct path that allows us to describe internal tensions within society.

Having uncovered various quantitative marbling veins, even in the seemingly unlikely field of art, we can infer that similar veins are to be found in any social aggregate, provided we are willing and able to identify them. However, keeping our marble metaphor in mind, obviously it's not just any kind of marbling vein that appear in any limestone block. Do specific social conditions facilitate the appearance of certain kinds of marblings?

⁸ The symbolic nature of numbers is far more engrained than one might think. This could explain, for example, the appeal of round numbers and rare numbers.

6. Marbling Vein Configurations and Social Aggregates

We now have a definition of marbling and three typical examples. But we would be remiss if we were to stop here, after simply remarking on the singular nature of individual marbling veins, as the notion of marbling is supposed to help clarify and differentiate between different social situations. Therefore, the next question that inevitably arises is whether particular types of social aggregates are marbled with particular types of veins.

To elaborate a typology of marbling, we drew on Deleuze and Guattari's treatise on "nomadology" (1980). We often forgot that in the renowned essay, in which they put forward the concept of the "war machine," the authors demonstrate that different number usages correlate to different social organizations, and vice versa. They point out, more specifically, that "stateless" societies do have "numerical organizations," as well, that could be qualified as marbling. They have the tremendous advantage, what is more, of making it possible to build a correspondence between certain types of social organizations and types of numeric marbling above and beyond the state.

Deleuze and Guattari first briefly describe how societies, that they refer to as "State societies," have specific number uses – "census, property taxes, and elections" – which amount to the dividing up, or "striating" of space (484). This argument, only partially developed by them, can be further elaborated in two ways. For one thing, with regards to marbling in the making, by looking with (Didier 2009) at how a liberal State, namely the United States, developed statistical practices in the late 19th century to stabilize markets. For another, with regards to the marbling method, by examining the fundamental contributions of Desrosières, who established how different quantitative methods are co-produced with different "forms of State," called respectively the "engineering, liberal, welfare, Keynesian, and neoliberal State" (Desrosières 2003). These latter employ different strategies when it comes to economic interventions – intercessions that *produce* and are *produced by* various quantitative methods (marblings). For example, a Keynesian State, mindful of regulating economic crises, requires national accounts to be kept, whereas the neo-liberal State, driven by economic performance and investment, makes use of incentive statistics such as benchmarking, two numerical veins with almost nothing in common except quantification. Of course, the study of a society at a given time shows the coexistence of different "forms of States" and different marbling veins: Keynesian measures are still in place in today's increasingly neo-liberal world, but this does not detract from the heuristic value of such distinctions.

Deleuze and Guattari add that “stateless” bodies also have numeric uses, organizations that the authors call the “war machine,” referring not to the machine’s destructive capacity (as Bouaniche (2006) points out), but to the its constant challenging of spaces stabilized by the State. Nomadism constitutes the condition of possibility for the war machine, which has an autonomous arithmetic organization. (The authors wrote “nomad existence necessarily implies the numerical elements of a war machine.” (1980, 482)).

The examples they had in mind, according to Zurabishvili (2003) were the emergent Palestine Liberation Organization, and the cases they mention in the essay the Hebrew bible’s Book of Numbers, in which Moses organizes each of the tribes numerically while the Jews were still desert nomads, and the armies of Genghis Khan, which were organized into numerical groups to establish an order of displacement. The social aggregate constitutes itself into arithmetic sets of individuals who are therefore ready to move. “The number becomes a subject” (484) the authors write. In other words, it is the enumerated aggregate that self-organizes itself into arithmetic sets. This is how the repeated expression “the numbering number” must be understood: the aggregate is a number that enumerates itself. This “autonomous arithmetic organization” implies neither a superior degree of abstraction nor quantities larger than those within the State. The difference is “the number is no longer a means of counting or measuring but of moving” (484). The aggregate self-organizes itself into numerical groupings (independent of “lineages” and “territories”) to establish an order of displacement or battle formation. Numeration does not simplify social composites, on the contrary, their mode of existence is rich – “movable, autonomous, directional, rhythmic, ciphered” (486).

Thus, numbers move through the war machine producing marbling veins, i.e. at once holding the composites together and altering them. But in this case the agency that produces the marbling vein belongs to the marbled aggregate, it is not external to it (contrary to the State in relation to society). In addition, the number is a stimulus that creates movement, militant action for example; it is not an agent of stabilization.

The authors identify two characteristics specific to the numbering number. First, “it is always complex, that is, articulated”. (486) The arithmetic base unit is therefore a unit of assemblage, for example, “man-horse-bow.” There is therefore no base unit akin to the individual enumerated by the State. Second, “for the social body to be numerized, the number must form a special body” (487). The arithmetic composition is accompanied by a secondary composition that constitutes a distinct formation comparable to a general staff. “Power in the war machine is defined according to this double series” (488, 1980). The authors give the example of the Levites in the Book of Numbers, who “perform the service in the Tabernacle,”

and of Genghis Khan who extracted from each arithmetized lineage a small number of men who were to constitute his personal guard.

Thus, marbling occurs in stateless aggregates according to the following process: “the numerical composition, or the numbering number, implies several operations: the arithmetization of the initial aggregates or sets (the lineages); the assembling of the extracted subsets (the constitution of groups, of dozens, one hundred, etc.); and the formation by substitution of another set in correspondence with the united set (the special body) (488).

Now that the arithmetic nature of the war machine has been established, one might rightly wonder about relations between the war machine and State societies. In the authors’ view, these relations are complex, comprised of evasion, clashing, and mutual-capture. In other words, relations are political and play out “in two directions: huge worldwide machines [...] and local mechanisms of band, margins, minorities” (445). Ultimately the war machine is fated to be conquered by the State – but only to “expand into thinking, loving, dying, or creating machines that have at their disposal vital or revolutionary powers capable of challenging the conquering State” (441). The war machine opposes the State but is ultimately absorbed into it and disseminated.

These analyses allow us to organize the marbling veins into three distinct but related types of quantification methods and social aggregates. In the center, is the widely studied figure of the State organization, illustrated by the cross table of Desrosière. Above and below are two distinct rhizomatic bodies applying political pressure to the central figure. Below the State organization, we find small militant groups, who locally challenge the striated space of State societies. One such example are the stactivists, who utilize enumeration as weapon for bringing about change, and not as a tool for stabilization – the principal affair of the State. Militancy at France Télécom is in many ways one such war machine. The methods used are often, but not exclusively, counts, rules of three, geometric calculations, and processes of self-counting. Often a “General Staff” (to use term employed by Deleuze and Guattari) emerges – for example, local trade union leaders.

Above the State organization, global networks are a second challenge, but via very different processes that could be placed in the category of “data,” which also need to be studied as is, but also in relation to the two other categories of marbling veins. One example of this type of vein is the huge global network of connected chapters that constitutes the Quantified Self movement. Other veins, emanating from capitalism and challenging the State, are being traced by GAFA (Google,

Amazon, Facebook, Apple), mainly in the form of tax evasion⁹ but also through more direct channels. For example, in 2016 Apple challenged a sovereign State (the American government) by refusing in the name of privacy rights to assist the FBI in unlocking a cryptographically protected cell phone recovered from one of the shooters following the San Bernardino California terrorist attack. Other examples of such networks, such as the transnational sharing of scientific data in fields including genomics (Didier 2018), the natural sciences (Leonelli 2017), astronomy and climatology, deserve consideration insofar as they generally emanate from supra-national and intra-State (and non-capitalist) organizations (Aronova, Oertzen and Sepkoski 2017).

We have now laid out a typology of the linkages between numerical marblings and social aggregates. The categories are nevertheless rather loose, as the three sets of marbling veins are interconnected and apply political pressure to each other. Yet now that we have shown the full reach of the concept of marbling, we may justifiably ask ourselves if any limits apply to it. Are we truly witnessing a growing numerization of the world, as we are so often told with either enthusiasm or concern?

⁹ The United States' fierce opposition to the French proposal to tax GAFAs in 2019 has exacerbated the situation. The federal American government would appear to be a trusted ally of the big four tech companies. Relations between GAFAnomics and the different States complex.

7. Quantitative Purification

The social history of quantification traditionally investigates the ways in which quantities appear. For example, Porter, in his rightly celebrated *Trust in Numbers* (1995), demonstrates that numbers are produced when decision-makers find themselves *in a position of relative weakness*. In such cases, they are unable to rely on a position of authority, on the goodwill and interpersonal trust, that are characteristic of interactions among elite groups. To gain legitimacy, they take a roundabout approach by producing figures to make their arguments appear more objective and hence stronger.

This point has been corroborated many times since. And yet, if numbers are in fact used to strengthen the position of the weak, how did elite groups keep the upper hand in the first place, i.e. prior to the emergence of quantifiers? Was some other non-numerical means used to do this? And if numbers were in fact part of the solution, then which ones were used? More generally, however, Porter's book raises the opposite question, viz., how social aggregates truly devoid of quantities emerge.

Our collective experience could lead us to believe, of course, that non-quantified situations exist naturally, although with the definition offered here, they would be far less prevalent than we tend to believe they are. But we are going to demonstrate that the existence of purely qualitative arguments does not emerge from situations that have yet to be quantified but, on the contrary, from the process of what we call numbers "purification," which may be initiated for political, philosophical, or artistic reasons, each of which deserves our attention. In other words, actors who consider quantification to be harmful may very well criticize it and even reject it. We are not interested in the passive agents waiting to gain access to global networks presupposed by the expression "*digital divide*", but in the *agency* of the agents who resist the quantitative. Inquiry into how society is marbled by numbers is not only about examining the way numbers infiltrate various social aggregates. It is also about the pressures to which numbers are subject.

One example is the notion of *agape*, studied by Luc Boltanski (1990). Within Christianity the term designates the love of God for humans, as well as the human reciprocal love for God; the term also extends to what is called the love of one's fellow man. This regime of love is one that humans can fully engage in, whose principal properties can be summarized as follows: "a preference for the present, a rejection of comparison and equivalence, the silence of desires, and the absence of anticipation in interactions" (223). All of these properties converge toward the rejection of calculation, whether strategic (when immersed in the state of *agape*, man does not anticipate the behavior of his fellow man because he is living in the

present moment) or literal (man does not count either the things or the beings surrounding him because he does not categorize them).

To illustrate the world under the law of agape, Boltanski refers to the *Little Flowers* by Saint Francis of Assisi, which “make it possible to identify its most lasting features.” (186) The *Little Flowers* are a series of stories published in the 13th century illustrating the life of the Community of St. Francis in the early days (and from the militant viewpoint of defending a doctrine). An excerpt from the very first chapter exemplifies this absence of calculation. In it, Saint Francis is solicited by the miser Sylvester, who asks him to buy back an old debt by giving him a share of the money earned by Brother Bernard. Francis “refusing to discuss it and giving to anyone who asked him[...], put his hand in lord Bernard’s pocket and then placed it full of money in Sylvester’s saying, if he wanted more, he would give it to him” (Le Huërou 2013, 23). Francis gives “without counting the cost.” He doesn’t want to deepen the marbling vein of debt.

Yet, staying in such a regime of action without shifting into another more calculatory system requires great efforts. As Boltanski writes, the brothers, and all the actors in the state of agape, work “on themselves and on each other, to ensure the repression of the calculating capacities naturally present in all human beings” (228). Agape is a regime of action from which humans may or may not want to escape, but by choosing to stay with it they must work towards a world purified of calculation and equivalences, no mean feat given that these are naturally present. Marbling veins under the law of agape are kept in check owing not to the failure to conquer certain social aggregates, but on the contrary, owing to the decision of certain actors to purify their own world of various quantitative methods.

However, it is important to note that no aggregate entirely devoid of numerical marbling has ever been identified. There is always some residual trace of quantification even in those worlds that are supposedly purified. The number “two,” for example, appears repeatedly in the *Little Flowers*. First we learn that Francis’ conversion began after the entire city of Assisi covered him in ridicule for two whole years (19), and then that the brothers (43, 50) often appear in twos (56). The number three is even more prevalent in the account. For example, when Anthony tells Bernard, who has just converted and is wondering about his future role, that they should open the Gospel together, at random, three times in a row, to discover the will of God (21-22); or when, immediately after receiving the money from Francis in the above-mentioned scene, Sylvester is overcome with remorse and has visions on “a first night, a second and a third” that lead to his conversion (23). In addition to two and three, other numbers appear throughout the text: Francis, like Christ, initially had twelve companions (18); he fasted for forty nights and forty days (41); he is led to the mountain that a wealthy citizen wishes to confer on the order,

together with some “fifty armed men” (51); he says Mass in the presence of “more than five thousand brothers” (89)¹⁰.

In short, numbers clearly abound in the state of agape, as numerous other examples could prove as well. However, in the text we have chosen, they trace the specific marbling vein that links Francis to Christ. Since myriad measures and quantities qualify Christ in the Gospel, the *Little Flowers* perpetuates the tradition in the account of the life of Saint Francis. The numbers have the great advantage of being both measurements that can be understood as actual facts (why would one doubt that Francis initially had twelve apostles, or that the monks preached in pairs) and symbols that they recall the source of faith (in this case the Gospels). We are witnessing in this case the symbolic function of numbers in action.

That said, there is obviously no mention of the contemptible practices of counting money or measuring property. Marbling involves only certain kinds of quantified objects, not all of them, and this is where purification starts. Therefore, number purification operations do exist and can successfully rid specific areas or institutions of quantities considered harmful. Some marbling veins are proscribed because they are the matrix of others thought to be abhorrent¹¹. But only some numbers, not all of them, are rejected. There is no good reason to want to abolish all forms of digital technology. Things are never so cut and dry¹².

Each purification process deserves to be studied separately, insofar as it is carried out, as we have just seen, in very specific ways for very specific purposes. Thus, criticisms leveled at digitalization and big data need to be carefully examined. Each instrument of criticism contributes to the shaping of the marbling vein by blocking a path, by preventing it from moving through a given space. Purification acts like a string of limestone molecules that resist the passage of an oxidizing reagent and force it to borrow another path. the role of purification, though symmetrical, is just as important as that of the numbers themselves. But resistance to one component does not necessarily imply resistance to all others – hence the constancy of the presence of numbers in social aggregates, even in the case of an opposition to a method.

¹⁰ Closer to home, we may observe in passing that certain rituals, such as wedding anniversaries, are tantamount to practices of quantifying love without destroying it. The same could be said of the appropriate number of roses to offer in a given circumstance (yet to be studied by sociologists!).

¹¹ It should be noted that there are symmetric situations in which actors decide to purify the world of literal reasoning. A good page of mathematic calculations illustrates this with eloquence. Purification does not necessarily involve the same objects.

¹² A young youtuber makes an entertaining case of how difficult life would be without numbers in “A World Without Numbers.” <https://www.youtube.com/watch?v=cNz0feswke4>

Conclusion

In this paper, we have redefined quantification as the utilization of quantitative resources, available to everyone, including ordinary individuals, or within global data networks. This definition is more comprehensive than those generally put forward until now. We went on to show how power relations between things and agents determine the way quantities move through society, tracing nonlinear, unpredictable trajectories that we suggest calling “marbling.” As these numbers marble society, they also redefine and reorganize it, forming veins found not only in scientific or governmental aggregates—where literature has a tendency to confine them—but also in a wide range of social activities, for example in art, where marbling’s enormous potential based on symbolic power deserves further study.

Next we identified three types of marbling processes that interact with each other. First, there are the veins created by different State forms; secondly, those made by small activist groups, or “statactivists,” who challenge the state in order to change it; thirdly, the “global” marbling veins, which also contest the State but through global networks, which may be capitalist, supra-state or scientific, and are composed of data. And finally, to soften a picture that might otherwise appear imperialistic, we explored the limits that marbling veins may come up against, owing not to non-quantified social aggregates but to actors who, for political or moral reasons, actively engage in processes to purify aggregates of certain quantities considered contaminated.

The perspective presented here has the advantage of bringing together in a single, organized framework a wide variety of social science contributions exploring issues of quantification in social contexts. It furthermore makes it possible to shift our study from the analysis of small groups to that of global networks, including of national States, passing continuously from one to another, since we simply follow the numbers, a possibility we have already explored, as it happens, in previous works (Didier 2009). Finally, it indicates innovative and highly relevant avenues for socio-historical investigations of quantification, particularly regarding the unexplored potential of quantification (mainly in the field of statactivists and data), interactions between different types of marbling categories, and processes of quantitative purification.

Bibliography

- Aronova, Elena, Christine von Oertzen, et David Sepkoski. 2017. « Introduction: Historicizing Big Data ». *Osiris* 32 (1): 1-17. <https://doi.org/10.1086/693399>.
- Boltanski, Luc. 1990. *L'Amour et la justice comme compétences : trois essais de sociologie de l'action*. Collection Leçons de choses. Paris: Métailié.
- Bouaniche, Arnaud. 2006. *Gilles Deleuze, une introduction*. 1 vol. Agora 240. Paris: Pocket.
- Brian, Éric. 1994. *La mesure de l'Etat : administrateurs et géomètres au XVIIIe siècle*. L'évolution de l'humanité. Paris: A. Michel. <http://catalogue.bnf.fr/ark:/12148/cb35696091j>.
- Brousse, Cécile. 2005. « Définir et compter les sans-abri en Europe : enjeux et controverses ». *Geneses* no 58 (1): 48-71.
- Bruno, Isabelle, et Emmanuel Didier. 2013. *Benchmarking: l'État sous pression statistique*. 1 vol. Paris: Zones.
- Bruno, Isabelle, Emmanuel Didier, et Julien Prévieux. 2014. *Statactivisme: comment lutter avec des nombres*. Paris: Zones, 2014.
- Bruno, Isabelle, Florence Jany-Catrice, et Béatrice Touchelay, éd. 2016. *The Social Sciences of Quantification*. Vol. 13. Logic, Argumentation & Reasoning. Cham: Springer International Publishing. <http://link.springer.com/10.1007/978-3-319-44000-2>.
- Callon, Michel, et Fabian Muniesa. 2003. « Les marchés économiques comme dispositifs collectifs de calcul ». *Réseaux* no 122 (6): 189-233. <https://doi.org/10.3917/res.122.0189>.
- Cardon, Dominique. 2015. *À quoi rêvent les algorithmes : nos vies à l'heure des big data*. 1 vol. La République des idées. Paris: la République des idées Seuil.
- Chappe, Vincent-Arnaud. 2011. « La preuve par la comparaison : méthode des panels et droit de la non-discrimination ». *Sociologies pratiques* n° 23 (2): 45-55.
- Coquery, Natacha, François Menant, et Florence Weber, éd. 2006. *Écrire, compter, mesurer : vers une histoire des rationalités pratiques*. 1 vol. Paris: Éd. rue d'Ulm.
- Cras, Sophie. 2013. « Art as an Investment and Artistic Shareholding Experiments in the 1960s ». *American Art* 27 (1): 2-23. <https://doi.org/10.1086/670682>.

- . 2018. *L'économie à l'épreuve de l'art : art et capitalisme dans les années 1960*. 1 vol. Oeuvres en sociétés. Paris: Les Presses du réel.
- Daston, Lorraine. 1988. *Classical probability in the Enlightenment*. Princeton, N.J: Princeton University Press.
- Dehaene, Stanislas. 2011. *The Number Sense : How the Mind Creates Mathematics*. Rev. and Updated ed. 1 vol. New York: Oxford university press. <http://catalogue.bnf.fr/ark:/12148/cb425730494>.
- Deleuze, Gilles, et Félix Guattari. 1980. *Mille plateaux*. Capitalisme et schizophrénie , 2; Collection "Critique. Paris: Éditions de Minuit.
- Déloye, Yves. 2007. *Sociologie historique du politique*. 3e éd. 1 vol. Repères 209. Paris: la Découverte.
- Desrosières, Alain. 2000. *La politique des grands nombres : histoire de la raison statistique*. La découverte-poche. Paris: la Découverte. <http://catalogue.bnf.fr/ark:/12148/cb37205012w>.
- . 2003. « Managing the Economy: the State, the Market and Statistics ». In *The Cambridge History of Science*, édité par Theodore M. Porter et Dorothy Ross, vol.7: Modern Social and Behavioral Sciences:553-64. Cambridge: Cambridge University Press.
- . 2008. *L'argument statistique*. 2 vol. Collection Sciences sociales. Paris: Mines ParisTech, les Presses.
- Diaz-Bone, Rainer, et Emmanuel Didier. 2016. « Introduction: The Sociology of Quantification - Perspectives on an Emerging Field in the Social Sciences ». *Historical Social Research / Historische Sozialforschung* 41 (2 (156)): 7-26.
- Didier, Emmanuel. 2009. *En quoi consiste l'Amérique ? : les statistiques, le New Deal et la démocratie*. 1 vol. Textes à l'appui. Paris: Éd. la Découverte.
- . 2018. « Open-Access Genomic Databases: A Profit-Making Tool? » *HIST STUD NAT SCI* 48 (5): 659-72. <https://doi.org/10.1525/hsns.2018.48.5.659>.
- Dudhwala, Farzana. 2016. « Doing the Self: An Ethnographic Analysis of the "Quantified Self" ». Oxford: University of Oxford.
- Emigh, Rebecca Jean. 2002. « Numeracy or Enumeration? The Uses of Numbers by States and Societies ». *Social Science History* 26 (4): 653-98.
- Ernst, Wolfgang. 2003. « Telling vs. Counting? A Media-Archeological Point of view ». *Intermédialités: Histoire et théorie des arts, des lettres et des techniques*, n° 2: 31-44.
- Espeland, Wendy. 2016. « Reverse Engineering and Emotional Attachments as

- Mechanisms Mediating the Effects of Quantification ». *Historical Social Research / Historische Sozialforschung* 41 (2 (156)): 280-304.
- Foucault, Michel, Michel Senellart, François Ewald, et Alessandro Fontana. 2004. *Sécurité, territoire, population : cours au Collège de France, 1977-1978*. Paris: Gallimard/Seuil.
- Gardey, Delphine. 2008. *Écrire, calculer, classer : comment une révolution de papier a transformé les sociétés contemporaines, 1800-1940*. 1 vol. Textes à l'appui. Paris: Éd. la Découverte. <http://catalogue.bnf.fr/ark:/12148/cb41177574v>.
- Gigerenzer, Gerd, éd. 1989. *The Empire of chance: how probability changed science and everyday life*. Ideas in context. Cambridge [Cambridgeshire]; New York: Cambridge University Press.
- Goffman, Erving. 1971. *Relations in Public: Microstudies of the Public Order*. New York: Basic Books.
- Grice, H. P. 1989. *Studies in the Way of Words*. Cambridge, Mass.: Harvard University Press.
- Hacking, Ian. 1984. *The Emergence of Probability: A Philosophical Study of Early Ideas about Probability, Induction and Statistical Inference*. 1st pbk. ed. Cambridge [Cambridgeshire]; New York: Cambridge University Press.
- Ifrah, Georges. 1976. *Le Chiffre à travers les âges et les civilisations*. Ivry: G. Ifrah. <http://catalogue.bnf.fr/ark:/12148/cb34576637p>.
- Kravel-Tovi, Michal, et Deborah Dash Moore. 2016. *Taking Stock: Cultures of Enumeration in Contemporary Jewish Life*. Bloomington: Indiana University Press.
- Latour, Bruno. 2010. « Tarde's Idea of Quantification ». In *The Social After Gabriel Tarde*, Routledge, 147-64. London: Matéi Candea. <http://hal-sciencespo.archives-ouvertes.fr/docs/00/97/30/04/PDF/116-tarde-candea.pdf>.
- Le Huërou, Armelle, trad. 2013. *Les « Fioretti » de saint François d'Assise : les actes du bienheureux François et de ses compagnons*. [Nouvelle éd. 1 vol. Épiphanie. Paris: Éd. franciscaines Éd. du Cerf. <http://catalogue.bnf.fr/ark:/12148/cb436958873>.
- Maas, Harro. A paraître. « Letts Calculate: Moral Accounting in the Victorian Period ». *HOPE*.
- Mayer-Schönberger, Viktor., et Kenneth. Cukier. 2013. *Big Data: A Revolution That Will Transform How We Live, Work, and Think*. Boston: Houghton

- Mifflin Harcourt.
- Mimica, Jadran. 1988. *Intimations of Infinity: The Mythopoeia of the Iqwaye Counting System and Number*. Explorations in Anthropology. Oxford [England] ; New York : New York: Berg ; Distributed exclusively in the US and Canada by StMartin's Press.
- Nafus, Dawn, et Jamie Sherman. 2014. « Big Data, Big Questions| This One Does Not Go Up To 11: The Quantified Self Movement as an Alternative Big Data Practice ». *International Journal of Communication* 8 (0): 11.
- Noiriel, Gérard. 2008. *Introduction à la socio-histoire*. Repères. Paris: La Découverte. <https://www.cairn.info/introduction-a-la-socio-histoire--9782707147233.htm>.
- O'Neil, Cathy. 2016. *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*. First edition. New York: Crown. http://nrs.harvard.edu/urn-3:hul.ebook:EBSCO_9780553418828.
- Peiffer, Jeanne, et Amy Dahan. 1986. *Une Histoire des mathématiques : routes et dédales*. Collection Points 49. Paris: Éd. du Seuil.
- Porter, Theodore. 2018. *Genetics in the Madhouse: The Unknown History of Human Heredity*. Princeton: Princeton University Press.
- Porter, Theodore M. 1995. *Trust in numbers: the pursuit of objectivity in science and public life*. Princeton, N.J.: Princeton University Press.
- Rotman, B. 1993. *Signifying Nothing: The Semiotics of Zero*. Stanford, Calif.: Stanford University Press.
- Roy, Ivan du. 2014. « Peut-on quantifier la souffrance au travail ». In *Statactivisme. Comment lutter avec des nombres*, édité par Isabelle Bruno, Emmanuel Didier, et Julien Prévieux, 169-82. Zones. Paris: La Découverte.
- Samuel, Boris. 2014. « Statistics and Political Violence: Reflections on the Social Conflict in 2009 in Guadeloupe ». *PARTECIPAZIONE E CONFLITTO* 7 (2): 237-57. <https://doi.org/10.1285/i20356609v7i2p237>.
- Supiot, Alain. 2015. *La gouvernance par les nombres : cours au Collège de France, 2012-2014*. 1 vol. Poids et mesures du monde. Nantes] [Paris: Institut d'études avancées de Nantes Fayard. <http://catalogue.bnf.fr/ark:/12148/cb442983062>.
- Swan, Melanie. 2012. « Sensor Mania! The Internet of Things, Wearable Computing, Objective Metrics, and the Quantified Self 2.0 ». *Journal of Sensor and Actuator Networks* 1 (3): 217-53. <https://doi.org/10.3390/jsan1030217>.

- Thévenot, Laurent. 2006. *L'action au pluriel : sociologie des régimes d'engagement*. 1 vol. Textes à l'appui. Paris: Éd. la Découverte. <http://catalogue.bnf.fr/ark:/12148/cb40098972m>.
- Topalov, Christian. 1994. *Naissance du chômeur : 1880-1910*. Paris: A. Michel.
- Vandendriessche, Eric. 2016. « Variabilité culturelle de la numératie - Quelques points d'entrée dans la littérature ethnomathématique ». *Statistique et Société* 4 (1): 51-56.
- Velthuis, Olav, et Erica Coslor. 2012. « The Financialization of Art ». In *The Oxford Handbook of the Sociology of Finance*, édité par Karin Knorr Cetina et Alex Preda, 1^{re} éd., 471-86. Oxford University Press. <http://oxfordhandbooks.com/view/10.1093/oxfordhb/9780199590162.001.0001/oxfordhb-9780199590162>.
- Verger, Verger. 1987. « L'art d'estimer l'art [Comment classer l'incomparable?] - Persée ». *Actes de la recherche en sciences sociales* 66 (1): 105-21.
- Weber, Florence. 2013. « Le Calcul économique ordinaire ». In *Traité de sociologie économique*, édité par Philippe Steiner et François Vatin, 2e éd. Quadrige. Paris: PUF.
- Yamey, Basil S. 1989. *Art & Accounting*. New Haven: Yale University Press.
- Zourabichvili, François. 2003. *Le vocabulaire de Deleuze*. Vocabulaire de. Paris: Ellipses.

About the Author

Emmanuel Didier is a full professor (directeur de recherche CNRS) at the Centre Maurice Halbwachs (École Normale Supérieure, Paris) and a member of the Center for the Study of Invention and Social Process (Goldsmiths University of London). He taught at the University of Chicago and at the University of California at Los Angeles (UCLA) and now teaches at Ecole Normale Supérieure (Paris), Ecole Nationale de la Statistique et de l'Administration Economique (ENSAE Paris) and École Polytechnique (Paris-Saclay). He is a member of the French National Advisory Council on Ethics. Originally trained as a statistician (ENSAE Paris), Emmanuel Didier very soon specialized in the sociological study of statistics as a tool of government. His first book – revised and updated for the recent English edition – entitled *America by the Numbers. Quantification, Democracy and the Birth of National Statistics*, bore on the relationship between the invention of random sampling in the US and State interventionism and State planning during the New Deal. His second book, written with Isabelle Bruno, is on *Benchmarking*. The book shows how management by number, imported in government from private companies, changed the meaning and practice of the French State. His third book, *Statactivism*, is an edited volume (with Isabelle Bruno and Julien Prévieux), dedicated to analyze ways in which ordinary people use statistics to enhance their power against institutions. Furthermore, he edited the last book of the late Alain Desrosières, entitled *Prouver et gouverner, une analyse politique des statistiques publiques*, who deceased before he had a chance to finish it. Recently he has been working on a project on big data in the domain of health and especially in genomics.