Rules, A Short History Of What We Live By A book by Lorraine Daston

Seminar [EN+FR]
22/05/2024
09AM- 05PM
Laboratoire AllCe, FL.1.4

Organizers:
Myriem Saoud (AllCe Lab.)
Julien Rippinger (AllCe Lab.)
Jérémy Grosman (CRIDS)

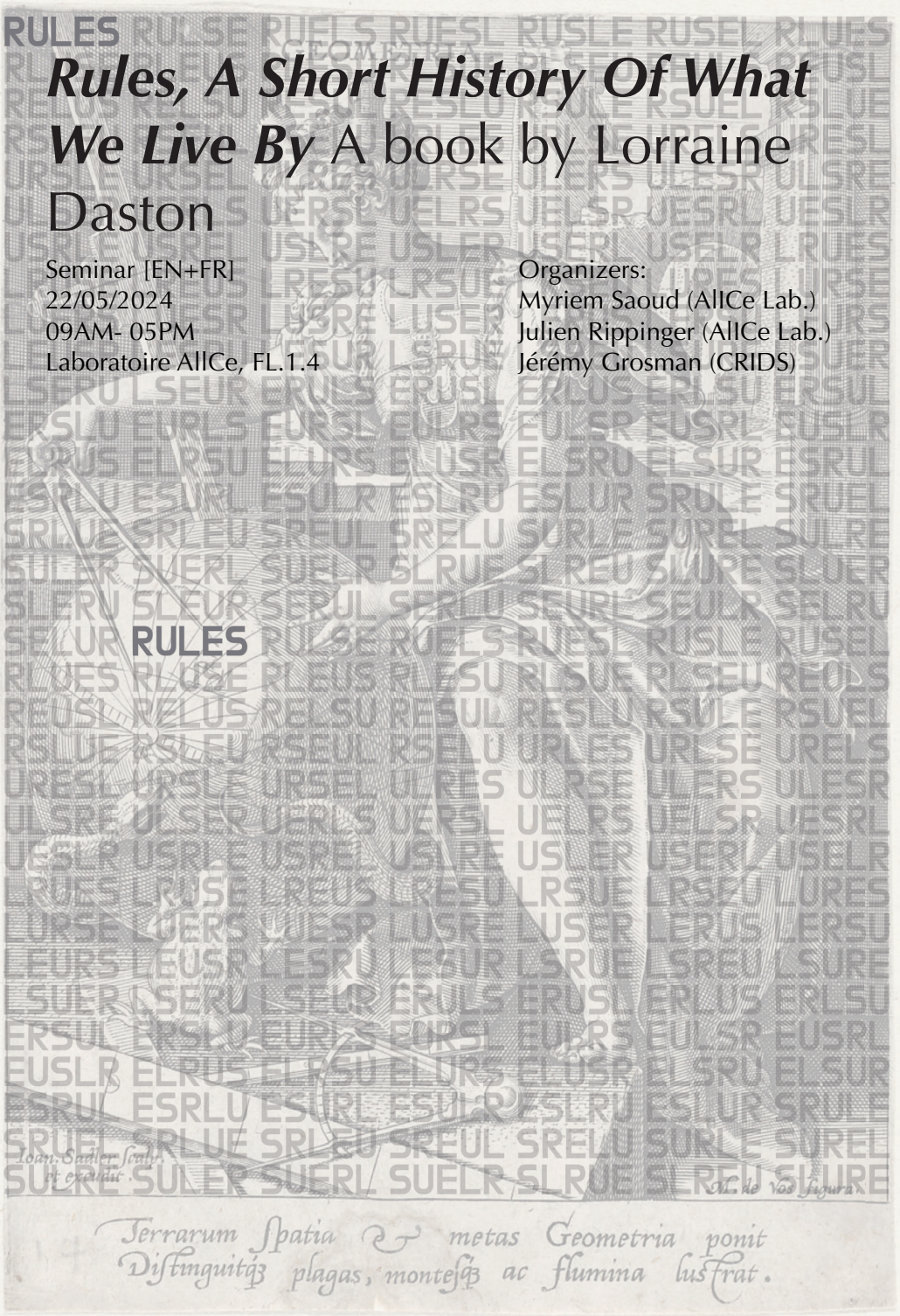


Image modified from © Johann Sadeler, Geometria, (c.1570-1600) Metropolitan Museum of Art, New York

FACULTÉ D'ARCHITECTURE LA CAMBRE HORTA
AlICe
crids
UNIVERSITÉ DE NAMUR

Program and Chapter Breakdown:

9:00 - 9:15: General Introduction: Jérémy Grosman
9:15 - 10:00: *1. Introduction: The Hidden History of Rules:* Myriem Saoud
10:00 - 10:45*: 2. Ancient Rules: Straightedges, Models, and Laws*: Myriem Saoud

10:45 - 11:00: Coffee Break

11:00 - 11:45: *3. The Rules of Art: Head and Hand United:* Shana Riethof
11:45 - 12:30: *4. Algorithms before Mechanical Calculation:* Julien Rippinger

12:30 - 13:30: Lunch Break

13:30 - 14:15: *5. Algorithmic Intelligence in the Age of Calculating Machines:* Marine Spor Ceccaldi
14:15 - 15:00: *6. Rules and Regulations:* Mélusine Le Brun

15:00 - 15:15: Coffee Break

15:15 - 16:00: *7. Natural Laws and Laws of Nature:* Jérémy Grosman
16:00 - 16:45: *8. Bending and Breaking Rules:* Antoine Renzo
16:45 - 17:00: Discussions

Introduction: The Hidden History of Rules

Excerpts Selected by Myriem Saoud

Clues to a Hidden History

«Rules fix the beginning and end of the working day and the school year, direct the ebb and flow of traffic on the roads, dictate who can be married to whom and how » p1

« Since Greco-Roman Antiquity, three principal semantic clusters have mapped out the meanings of rules (Chapter 2) tools of measurement and calculation; models or paradigms and laws. » p2

«Three oppositions structure this long history of rules. Rules can be either thick or thin in their formulation, flexible or rigid in their application, and general or specific in their domains.» p3

«[...]one big contrast: a world of high variability, instability, and unpredictability versus one in which the future can be reliable extrapolated from past, standardization insures uniformity, and averages can be trusted.» p5

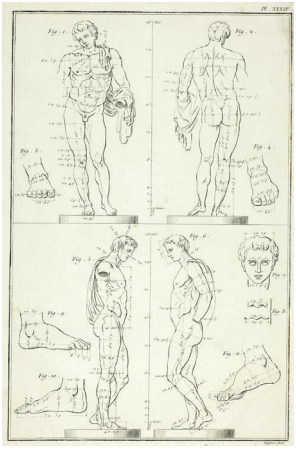
Rules as Both Paradigms and Algorithms

«The most ancient and enduring problem inspired by rules is how universals can be made to fit a potential infinity of particulars that cannot be foreseen by the rule-maker » p5-6

« Algorithms and laws are still central to our understanding of rules, but whatever happened to the third member of the ancient trio, models or paradigms? » p6

«One aim of this book is to throw light on a crucial earlier episode in this rags to riches history : how mathematical algorithms intersect with political economy during the Industrial Revolution, a story that is as much about the history of work and machines as it is about the history of calculation» p7

«A second aim of this book is to reconstruct the lost coherence of the category of rule that could for so long and apparently without any sense of contradiction embrace meanings that now seem antonymical to each other» p14



Measured proportions of the statue of Antinous (article "Dessein"), Encyclopédie, ou Dictionnaire raisonné des sciences, des arts et des métiers [Encyclopedia, or systematic Dictionary of sciences, arts, and trades], ed. Jean d'Alembert and Denis Diderot, vol. 3(1763).

Universals and Particulars

«Rules raly judgment because their application must bridge universals and particulars.» p15

« The third aim of this book si to examine how rules were framed ni order to anticipate and facilitate bridge-building between universal and particulars. » p18

«We will need a more refined taxonomy of both universals and particulars in order to understand the differences between the bridges that span them, some as simple and supple as rope bridges and others as rigid and sturdy as a steel-girdered monument to modern engineering.» p18

«My position is that even if the historians and anthropologists are correct in their claim that the efficacy of rules that purport to transcend context and interpretation is an illusion it is undeniably a mighty and widespread illusion » p19

A History of the Self-evident

«This book is a history in both ancient and modern senses of the word.? It si an inquiry, in the far-ranging sense in which Herodotus used the term historia. Moreover, despite the universal pretensions of its subject matter, it teems with particulars, as in Aristotle's (384-322 BCE) sense of historia, which he opposed to the universals of philosophy (and poetry). Finally, it is a history in the more familiar sense of a narrative that unfolds in time. But it si an incomplete history on al three counts.» p21

«Only by taking a panoramic view can I sharpen contrasts, pinpoint moments of transition, and, most important, use the resources of history to query the self-evidence of our contemporary habits of thought.» p22

« between the universal and the uniform, the specific and the rigid, the algorithmic and the mechanical, the mechanical and the mindless, the discretionary and the subjective.» p22

Ancient Rules, Straightedges, Models, and Laws

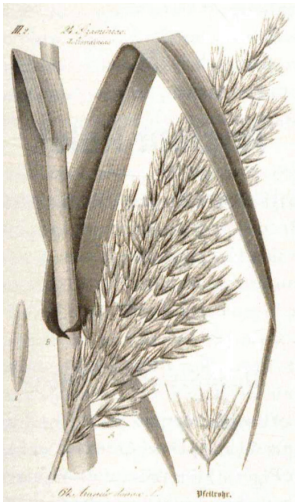
Excerpts Selected by Myriem Saoud

Three Semantic Clusters

« meticulous and often mathematical exactitude; models or patterns for imitation; and laws or decrees. » p24

«In these contexts, paradeigma (example) often shadows kanon: paradeigmata could simply be «examples»» the sense ni which Aristotle uses the word ni the Rhetoric,» but they could also be physical models, especially ni the context of architecture. » p27

« The first and third semantic clusters that in Greco-Roman antiquity connected rules with exactitude and laws, respectively, are still recognizable in broad outline to denizens of the twenty-first century. [...]Similarly, rules and laws still flock together in modern law and administration [...] Only the second cluster, connecting rules with imitation, models, and paradigms, mystifies us » p30



Giant cane plant (Arundo donax). Otto Wilhelm Thoma, Flora von Deutschland, Österreich und der Schweiz [Plants of Germany, Austria, and Switzerland] (1885).

The Rule Is the Abbot

«The abbot does not simply enforce the Rule; he exemplifies it, just as the Doryphoros statue exemplifies the canon of male beauty. » p36

Following Models

«Discretion, the ability to distinguish, tweaks the universal law or rule to the particular case, the classical exercise of judgment. » p40

«But the emulation of a model mobilizes judgment in a different way than honoring a principle does. The principle is abstract and general; the model is concrete and specific.» p42

«Transparency is a lesser value than the integrity of the system. » p42

«But in the case of emulating a model, Judgment hops from particular to particular, charting its path by analogy. » p42

Saint Benedict eating with the monks (Giovanni Antonio Bazzi [Il Sodoma], detail of fresco Life of Saint Benedict at the Benedictine abbey of Monte Oliveto Maggiore, Abbazia, Italy, 1505).

«Specificity does not imply rigidity; exceptions can be part of rules; and emulation and discretion are not identical. » p44

Conclusion: Rules between Science and Craft

« Whereas epistêmê in Greek (scientia in Latin) dealt with universal and necessary truths, the arts could never escape the realm of the particular and the contingent. » p45

« Aristotle was exquisitely sensitive to the in-between predicament of the arts. His discussions of the distinctions between epistêmê and technê in various works suggest that he regarded these pursuits as points along a continuum rather than as watertight compartments. Ideally, epistêmê deals with unchanging forms governed by necessary universals (identifying those axioms, however, returns the investigation oto experience). [...] Just as he dilutes the certainty of epistêmê, Aristotle fortifies that of technê. Although it cannot avoid contingency and accident, technê nonetheless involves reasoning from causes and achieving some degree of generality » p46

The Rules of Art: Head and Hand United

Excerpts selected by Shana Riethof

«A 1583 engraving of Ars et Usus (Art and practice) by artistHendrik Goltzius (1558–1617) allegorizes this relationship: the winged female figure of Art, crowned with laurels, seated on a globe, and surrounded by books and mathematical instruments, guides the hand of the male figure of Practice as he draws—another emblem, like the books and instruments, of careful advance planning in handiwork. The caption, in Latin and Dutch, promises that the partnership of Art and Practice would bring "riches and fame."» p51

«Let us return to Goltzius's allegory of Art and Practice one last time. (Fig. 3.2.) With her left hand, winged Art is pointing out something to Practice, focusing his attention on a telling detail, just as a thick rule would have done with its examples and exceptions. She sits astride the globe, symbol of the expansive reach of her teaching and the fame it brings. He is closer to the background landscape, which at first glance looks quite generic but upon closer inspection reveals a windmill, a local Dutch detail from Goltzius's own immediate surroundings in Haarlem. Globe and windmill bring together universal and particular. In the lower right-hand corner, at a slight distance from the scattering of books and instruments, all emblems of practice tutored by art, stands an hourglass, the symbol of time passing, grain by grain of sand. Without time and the slow sedimentation of experience, both the learning of art and the diligence of practice would be for naught. Parading examples, explanations, and exceptions before the mind's eye, thick rules recalled the passage of time and the slow fusion of head and hand.» p. 80-81
«Not only Cotton's treatise but the successive eighteenth-century editions of Edmond Hoyle's (1672–1769) guides to whist and other card games aimed at making the reader not just competent but proficient. For that reason, the line between what we would call the rules of the game proper (e.g., how many cards each player is dealt at the beginning of a hand of whist) and tips on how to win (e.g., "If you have Queen, Knave, and three small Trumps, with a good Suit, trump out with a small one") is deliberately blurred.» p.60-61

Hendrik Goltzius, Ars et Usus [Arts and practice] (1583) - The Trustees of the British Museum, London.

«Everywhere in the early modern literature of reducing practice to an art, the theme of minimizing the role of chance crops up. As in the case of the "low sciences" of practical medicine and astrology, practitioners of the arts and crafts confronted not just

the compliant regularities of form but the recalcitrant singularities of matter: this individual patient with this particular phlegmatic complexion and sedentary regimen; this particular block of walnut wood with this distinctive grain, knots, and warp. In both medicine and carpentry—and fortifications—the reasons for the predominance of particulars were the same: the resistance of matter to form.» p.60-61

«Just as mastery of a rule in mathematics and measurement entailed working through the examples, so mastering a rule of whist or chess entailed observation and experience. Once again, the rules were not free-standing: models, examples, tips, and observation propped them up and filled them out. This is not necessarily because the rules were vague or unspecific or approximate. Rather, it was because no universal formulation could anticipate all the particulars with which it would be confronted in practice. The gap between universals and particulars is hardly news; what is striking about the early modern rules are the provisions they included to bridge that gap.» 60-61

«The early modern rules of the mechanical arts are rich in lessons for contemporary discussions about tacit versus explicit knowledge. (…) Polanyi's aim was to carve out a middle space between objective, impersonal knowledge available to all and the purely private preserve of subjectivity, unchecked by logic or empirical evidence. (…) As sociologist of knowledge Harry Collins observed in his probing analysis of the category of tacit knowledge, Polanyi's polar opposition in fact unfurls into a swathe of possibilities between the most deeply buried tacit knowledge of just the right gesture to get a finicky piece of laboratory apparatus to work properly and explicit knowledge of how to find a cube root so complete and unambiguous that it can be executed by a computer program. The stark binary of tacit versus explicit knowledge assumes that the latter is both possible— And also superior. "The idea of the tacit is parasitical on the idea of the explicit," Collins observed.
The rules of the early modern mechanical arts provide an example of a world of thought and practice not bifurcated between the tacit and explicit. Thick rules blended the tacit and explicit: they assumed some hands-on experience but also the insufficiency of experience alone to produce the finest results.» p.74-75

«Equally dynamic was the relationship between the mechanical arts and, on the one hand, the sciences, and, on the other, handicrafts governed by chance and routine. All three elements of this triad were in movement during this period, with the mechanical arts occupying the position of middleman, betwixt and between the necessary universals of the sciences and the happenstance particulars of the crafts. Although their immersion in the world of matter disqualified the arts from laying claim to the universality and necessity of form, their ability to formulate and follow rules elevated them above the rote bodily labor of the crafts.» p77

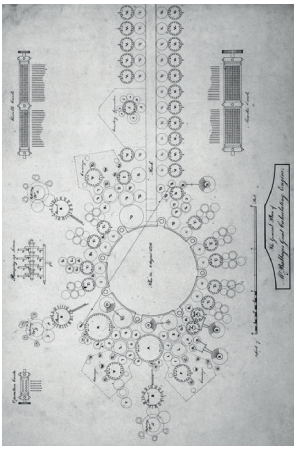
«Discretion is perhaps too bland a term for the delicate sense of knowing just when and how to adjust a rule to circumstance or abandon it all together. Even the most categorical rules of art, trumpeted under the impressive title of "axioms," invariably gave way a few sentences later to a notable exception. For example, Vauban laid down what indeed sounds like a self-evident axiom of siegecraft: always attack a fortress at its weakest point. But barely a paragraph later he offers the counter-example of the Siege of Valenciennes, attacked at the gate of Anzin, not the weakest point in the fortifications but more easily reached by a good paved road that greatly facilitated the transport of cannons and other heavy munitions. This was the exception that proved the rule in the old-fashioned sense of prove as "test" (as in the proverb, "the proof of the pudding is in the eating"): it tested the limits of a serviceable rule in practice.» p.79

Algorithms before Mechanical Calculation

Excerpts Selected by Julien Rippinger

«From the oldest surviving written documents from ancient Mesopotamia until very recently, the natural home of the algorithm was the classroom, and its natural medium was the textbook, whether written on clay, papyrus, palm leaves, bamboo slips, parchment, or paper. […] Algorithms were first and foremost about computation, not computers, and our sources for their long, far-flung history are overwhelmingly didactic texts.» p.83

«Only in the final quarter of the twentieth century was near-full automation of the execution of computational algorithms achieved by pre-programmed electronic devices. Yet already in the early nineteenth century, even before algorithms could be reliably executed on counting machines, much less computers, these sorts of computations began to be described as "mechanical," a word that flags a new way of viewing algorithms as rules that can be followed with little or no understanding—and followed in a completely standardized fashion, without adjustments to specific context. In the course of the nineteenth and twentieth centuries, algorithms became, in the terminology of "thin" and "thick" rules introduced in Chapter 3, the model of the thinnest rules of all—and thin rules in turn became the model of all rules.» p. 84



Joseph Clement's plans for Charles Babbage's never-realized Analytical Engine (1840). Science Museum, London / Science and Society Picture Library.

«The English word algorithm (and its cognates in other European vernaculars) is the latinized version of the name of Muhammad ibn Musa al-Kharizmi (c. 780–c. 850 CE), a Persian mathematician, astronomer, and geographer whose treatises on Indian numerals, algebra, the astrolabe, and astronomical tables and revisions of Ptolemaic geography greatly influenced these sciences in medieval Europe and the Middle East. In the twelfth century his treatise on calculation with Indian numerals was translated into Latin; the oldest surviving such Latin manuscript begins with the words "Dixit Algorizmi" (Thus spoke Algorizmi), and variants of "Algorizmi" became the term first for calculations conducted with Indian numerals (0,1,2,3,4,5,6,7,8,9) and eventually for arithmetic calculations more generally.» p. 85

«Judged by these empyrean standards of generality, even the most general of pre-modern algorithms, such as Euclid's propositions

VII.1–2, seem myopically specific. But formalization, whether by means of algebra or logic, is not the only means of achieving generality—and generality of mathematical objects is not the only kind of generality. The twentieth-century efforts to generalize Euclidean geometry by assimilating it to arithmetic, algebra, number theory, and logic aimed to safeguard the consistency and rigor of mathematics—not to solve problems, the original objective of most pre-modern (and many modern) algorithms, and most certainly not to train students in these practices, the context of most pre-modern texts about algorithms.34 So the question concerning generality must be reframed: what standards of generality suit problem solving, especially in pedagogical and practical contexts?» p. 96

«Whereas the mechanical tinge of rote memorization implies that the material is as inert as an unopened book gathering dust on a shelf, what is learned by heart has been taken to heart, metabolized as an integral part of the self. A sonata or sonnet learned by heart and rehearsed over and over again is deeply learned and therefore deeply understood in ways that the same piece played from notes or read from the page is not. Immersive understanding, like immersive observation, uncovers analogies and forges classifications: fugues in music, epics in poetry—and algorithms for finding the area of plane figures in mathematics. Memorized repertoires, analogy, and classification work together to enable forms of generalization that do not fit the modern mathematical ideal of abstract universals rigorously deduced and formally expressed. Instead, the relevant model for pre-modern algorithm texts—primarily mathematical but also other step-by-step sequences of instructions designed to achieve a specific end, whether a recipe or a ritual—may once again be natural history.» p. 104

«Th[e] elision between human and mechanical calculators dates back to Prony's manufacture of logarithms—or rather, to Babbage's interpretation of Prony's project. Mechanizing calculation first became thinkable not because machines could reliably calculate at that time but because mechanical workers could. Until the early nineteenth century, mechanical had referred to the lowest class of manual labor, conceived as all hands and no head. Machines existed to assist and perhaps replace mechanicals. In contrast, calculation, however wearisome, counted as headwork, and even after Babbage had built his first prototype of the Difference Engine, the idea that it might be possible to substitute "mechanical performance for an intellectual process" and thereby gain a degree of "celerity and exactness unattainable

in ordinary methods" astonished contemporaries.» p. 116

"The poorly paid computers at the bottom of the scale, whether schoolboys, unemployed artisans, or (later) women, differed from the students who learned algorithms in the pre-modern world in at least one important respect: they no longer needed to exercise the faculty of analogical reasoning that bridged old and new applications. They received their problems and the methods to solve them pre-packaged, thanks to the labor of Maskelyne, Airy, Prony, and others who had divided and standardized procedures. There was no need for the induction from particulars to particulars so characteristic of pre-modern algorithm textbooks, and there was no scope for the classificatory generalization of algorithms practiced by earlier mathematicians. The problems had been pre-classified and the procedures specified to the last detail. No computer needed to ask what species of problem this was or what algorithms were needed to solve it. Nor were computers likely to encounter a wide variety of kinds of problems and algorithms. Their experience of algorithms contrasted sharply with that of pre-modern calculators. Their rules were genuinely thin." p. 120

Algorithmic Intelligence in the Age of Calculating Machines

Excerpts selected by Marine Spor Ceccaldi

«Psychologists at the turn of the twentieth century were unanimous that the ability to muster voluntary attention for tedious but necessary tasks was the essence of the conscious act of will— and therefore the highest expression of consciousness.» p.140

«Like the psychologists who had tested the calculating machine operators, Ribot emphasized that the exercise of voluntary attention was always accompanied by a sense of effort, an abnormal state that «produced rapid exhaustion of the organism.» Calculation was therefore a routine task given to experimental subjects by psychologists in order to test the strength of voluntary attention and resistance to mental fatigue.» p.140

«In the context of the classroom or the laboratory, the dread of the tedious task was observed to grow with fatigue, allegedly sometimes to the point of «milder forms of insanity.»» p.140

«All that could be done was to organize the work of calculation so as to minimize the discretion of the operator-but at the same time to maximize her unflagging attention to her monotonous task: mechanical calculation made mindful.» p.141

«For a history of rules, this point matters because the dream of unambiguous rules flawlessly followed has always fed upon the special case of calculation, the thinnest rules of all. Even before «mechanical calculation» involved actual machines, it referred to this dream, conjured by Babbage and Wittgenstein in contrasting fashion, of a rule with no wiggle room: explicit and unambiguous in its articulation and automatic and flawless in its» p.143

«thick rules of the mechanical arts, which also emerged from examples. It was only in the nineteenth and twentieth centuries that calculation became the paradigm of the kind of rule that needed no paradigm, the algorithm that needed no model to imitate, no mind to interpret or adapt it. What gives the category of mechanical calculation its deceptive semblance of coherence is not the uniformity of the machines employed but rather the category to which it was opposed: mindful calculation.» p.143

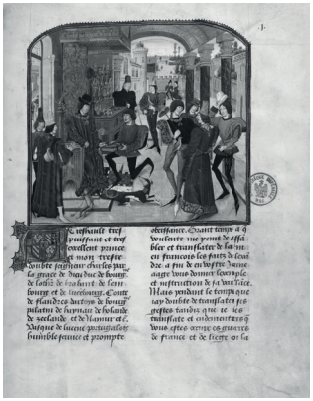
Test results of the best operators using an Elliott-Fischer calculating machine, showing wide variations in force and attention (J.-M. Lahy and
S. Korngold, "Séléction des operatrices de machines comptables [Selection of calculating machine operators]," Année psychologique 32 (1931): 131-49).

Rules and Regulations

Excerpts Selected by Mélusine Lebrun

«Each of the three case studies that make up this chapter picks out an episode in which an explosion of regulation signals one of these transformations: the sumptuary laws that responded to the economic boom, fueled mostly by luxury textiles, in European cities from circa 1300 to 1800; the traffic and sanitation regulations designed to cope with Paris's enormously expanded population, circa 1650 to 1800; and the spelling reforms that expressed a dawning vernacular patriotism from Elizabethan England to Enlightenment France to newly unified Germany in the late nineteenth century to the here and now. Each of these examples shows how rules-as-regulations tried, with varying degrees of success, to bridge the chasm between the universal ideal of good order and the most minute particulars in real life.» p.154

«This brings us back to the central problem posed by this chapter: when do regulations succeed and fail, and why? We are now in a position at least to discard a few plausible hypotheses. Repeated failure, even over centuries, does not necessarily eliminate regulations. Hard-headed functionalism is at best an uncertain guide as to which regulations stick and which don't. Regulations imposed by absolutist monarchies may be less sweeping and authoritarian than those imposed by more republican governments. If there is a positive finding, it is that enforcement alone cannot entrench regulations. Without swift, strict, and sustained enforce-ment, almost no regulation can take hold, for there would be no need for regulations if the forbidden objects or conduct were not beckoning temptations. Yet constant, ubiquitous enforcement is impossible even in the most tyrannical police state.» p 208 - p.209



Beaked shoes (The Translator Presents the Book to Charles the Bold. Quintus Curtis, Fais d'Alexandre le Grant [Deeds of Alexander the Great, 1470], Paris, Bibliothèque Nationale de France.

Natural Laws and Laws of Nature

Excerpts selected by Jérémy Grosman

The Grandest Rules of All

«The history of these extreme rules, natural laws and laws of nature, presents two puzzles. First, how did the mismatched components of each hybrid become fused together so tightly that they have endured despite oft-remarked internal incoherence? And second, how did these two hybrids, which existed for centuries apart in the writings of jurists and astronomers, theologians, and philosophers, come together in a powerful symbiosis in early modern Europe—only to come apart again by the end of the eighteenth century? The answers to these questions are intertwined.» p. 214

Natural Law

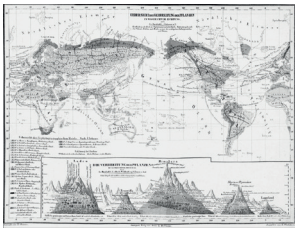
«By rethinking both elements of ancient natural law jurisprudence—natural law as reason and natural law as what nature teaches all animals—early modern jurists shifted its foundations from divine law to human reason (and a narrow version of reason at that) and from procreation and care of progeny to survival in a mythical state of nature.» pp. 223

Laws of Nature

«But after circa 1660, "laws of nature" became a way of talking about all kinds of natural regularities, not just in the traditionally mathematical sciences, and it crowded out competing terms such as "rule," "theorem," or "principle" in the space of just a few decades. Why?» pp. 230

Conclusion: Universal Legality

«Throughout the early modern period, European thinking about natural law and laws of nature had evolved in parallel. There were obvious contrasts: natural law held only for h uman nature and compelled by reason rather than physical necessity; laws of nature could be called such only metaphorically and had to be discovered by empirical inquiry rather than thought experiments



Alexander von Humboldt's global distribution of plan kinds (Atlas zu Alexander von Humbolts Kosmos [Atlas of Alexander von Humbolt's Cosmos], ed. Traugott Bromme, 1851, Table 31).

about a hypothetical primordial state. Yet their commonalities dwarfed these differences. Both embraced a foundational model in which vast and varied consequences could be derived from a few simple, general laws; both contrasted the universality, uniformity, and immutability of these laws with the mosaic of local customs and local natures.» pp. 233-234

Bending and Breaking Rules

«Judgment and discretion did not become obsolete. But they did become deeply controversial. Specific decisions that stretched the rules had always encountered resistance, especially in the legal sphere. What was new in the seventeenth and eighteenth centuries were principled challenges to any rule-stretching, whether in cases of religious conscience, legal adjudication, or political sovereignty. In this chapter I will examine the ways in which early modern debates over casuistry in moral theology, equity in law, and sovereign prerogative in politics tested the firmness of rules—not just this or that rule but rules in general.» p. 241

«The Latin word aequitas, meaning evenness, equality, and fairness, derives its legal significance from Roman law. As we saw in Chapter 2, Aristotle had invoked the Greek word epieikeia, meaning kindness, lenience, and suitability, to temper the rigidity of laws that occasionally encountered cases unforeseen by legislators and in which the strict application of the law would result in injustice. Roman magistrates known as praetors had by the second century BCE institutionalized the practice of correcting and supplementing the law on an ad hoc basis.31 Medieval commentators on Roman law extended ideas of equity from principles of fairness to a holistic view informed not just by the relevant statute but by the entire Corpus iuris civile.32 Early modern European notions of equity were further enriched by new translations not only of classical sources like Aristotle but also of the Hebrew Bible, layering the associations of the Greek and Latin cognates with those of the Hebrew word mesarim (straightness, rectitude, justice), also often translated into English as equity.33 Finally, although all European law recognized some doctrine of equity, English jurists had by the fourteenth century developed a full-blown dualistic system of common law courts and the court of Chancery, the former presided over by the king's judges and the latter by the king himself (later by the Lord Chancellor), with a rough division of labor between statute law and equity, between strict rule-following and discreet rule-bending» p. 249

«This book has traced a historical arc that partially justifies the distinction between pre-modern and modern rules, but only partially. The chronological terms pre-modern and modern distract from the underlying preconditions of stability and standardization that are more domain- than period-specific.

Justice armed with a sword against malefactors and a scale toipped in favor of equity over iniquity (Samuel de Rameru, Justitia, 1652, Musée d'art et d'histoire, Ville de Genève

Wherever pockets of predictability and uniformity emerge, thick rules can be slimmed down into thin rules; flexible rules (as all thick rules must be) can stiffen into rigid ones. As we have seen in previous chapters and especially in this one, no rule is so thin or rigid to eliminate the need for discretion altogether, not even computer algorithms. But in an artificially stabilized world, the margin of discretion can be and has been significantly narrowed. Enormous efforts of technical know-how, political will, and cultural imagination must be invested to create and sustain such islands of ruliness. The lazy abbreviation "modernity" embraces a vast array of globe-spanning projects that have standardized everything from weights to time zones, clothing sizes to airport designs. International bureaus and regulatory bodies, their headquarters often discreetly located in the cities of small, neutral countries, oversee the largely invisible machinery that delivers the post or monitors epidemics or inspects nuclear reactors worldwide. They enforce the background rules that make thin rules possible.

But this machinery is neither perfect nor invulnerable nor even truly global. It reaches only as far as human will and foresight extend. Miscalculation and misfortune—in the form of an epidemic, a nuclear reactor accident, a wildfire—can still wreak havoc in the world's most thoroughly modern cities. When the background conditions for thin, rigid rules suddenly collapse, thick, flexible rules return, no matter what the epoch. Even in calmer times, thick rules persist wherever variability is either inevitable or desirablefor example, in individualized medicine or in teaching. While it is true that thin rules have proliferated in many domains since the eighteenth century, many thick rules have crept in through the back door, dragging discretion along with them. Bureaucratic rules followed to the letter are so cumbersome as to amount to a form of strike: "work to rule." Legions of lawyers and accountants have sprung up to interpret the cut-and-dried rules of the tax code. Computer algorithms, the thinnest rules of all, require an anonymous army of human monitors to correct their oversights and excesses on social media platforms. Behind every thin rule is a thick rule cleaning up after it.» p. 267