

OAC PRESS
Working Paper Series #3

How Knowledge Grows

An Anthropological Anamorphosis

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Open Anthropology Cooperative Press
www.openanthcoop.net/press

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‘the most admirable operations derive from very weak means’
Galileo Galilei (1968: 109)

‘Not just judgments about analogy but judgments about proportion inform any
organization of data.’
Marilyn Strathern (2004 [1991]: 24)

‘A strange thing full of water’
Michel Serres (1995: 122)

I open with a myth of origins:

All political thought evinces an aesthetic of sorts. Dioptric anamorphosis, for instance, was the ‘science of miracles’ through which Hobbes imagined his Leviathan. An example of the optical wizardry of seventeenth century clerical mathematicians, a dioptric anamorphic device used a mirror or lens to refract an image that had deliberately been distorted and exaggerated back into what a human eye would consider a natural or normal perspective. Many such artefacts played with pictures of the faces of monarchs or aristocrats. Here the viewer would be presented with a panel made up of a multiplicity of images, often emblems representing the patriarch’s genealogical ancestors or the landmarks of his estate. A second look at the panel through the optical glass, however, would recompose the various icons, as if by magical transubstantiation, into the master’s face.

Noel Malcolm has exposed the place that the optical trickery of anamorphosis played in Hobbes’ political theory of the state (Malcolm 2002). According to Malcolm, the famous image of the Leviathan colossus that furnishes the title-page of Hobbes’ book came as an inspiration to Hobbes following his encounter with a dioptrical device designed by the Minim friar Jean-François Nicéron. Nicéron’s design involved a picture of the faces of twelve Ottoman sultans which, on looking through the viewing-glass tube, converged into the portrait of Louis XIII (Malcolm 2002: 213). Seduced by the structural symbolism through which such optical illusions could be used to represent *relations* between political persons (e.g. between the state and its subjects) (Malcolm 2002: 223), Hobbes commissioned an iconographic representation of similar effects for the title-page of his book. Here the image of the colossal Leviathan rises over the landscape energized by a mass of small figures. These morph by congregation into the

body of the monarch, that hence takes a life of its own. A projection onto a one-dimensional surface of the dioptric trick, the figure of Leviathan aimed to capture the political innovation of Hobbes' theory of representational personification. For Hobbes, the aggregation of the political will of multiple individuals into an overarching sovereign person brought about a political transubstantiation: the Many became the One, which contained, but also transcended, the Many. This is why for Hobbes the theory of (political) representation is a theory of duplicity and duplication: it calls for the critical capacity to see oneself as both the creator of a political object (the body politic) and its subdued servant; both a distant outsider to the body and in partial identity with it. This entails, as Malcolm puts it, 'a curious structure of argument that requires two different ways of seeing the relation between the individual and the state to be entertained at one and the same time.' (Malcolm 2002: 228)

Building on the implications of Malcolm's analysis for our theories of the state, Simon Schaffer has recently offered a phantasmagorical reinterpretation of the place of optical illusionism in political perspectivism (Schaffer 2005). For Schaffer, the dioptric capacity to 'see double' is in fact but a first step towards the cancelling of all visions but the sovereign vision. According to Schaffer, dioptrics enables this parallax shift because it rationalizes as illusory all political perspectives that do not conform with the One: outside the body politic all visions are but the visions of political phantoms (Schaffer 2005: 202; on parallax shifts see Žižek 2006). In seventeenth century politics this was easily accomplished, according to Schaffer, because outside the rule of sovereign law – as Hobbes noted – lay only a chaotic state of nature, shaped by mistrust, fear, witchcraft accusations and the mischievous play of invisible phantoms. The rise of Leviathan exterminated the invisible, neatly aligning, in a supreme gesture of political illusionism, the planes of the natural and the phantasmagorical.

* * *

This paper offers anthropological insight into a certain fashion of Euro-American intellectual practice, namely, the operations through which knowledge comes-onto-itself as a descriptive register (of other practices). I am interested in the cultural epistemology that enables knowledge to become an enabler itself: what the growth of knowledge – or

its rise as an expression of enablement – looks like. What does knowledge need to grow ‘out of’ for such an escalation to become meaningful or, simply, visible?

The making visible of knowledge as an object of growth has an anthropology to it.¹ It involves playful operations with social ideas of size and vision, and is materialized in a practical epistemology where the optical plays an intriguing culturally salient role². Optics makes size an effect of exploration. It makes things big and small in different proportions, intensities and shapes. It provides a form or carrier for the expansions and contractions in/of knowledge. There is a seductive analogy between how knowledge has been rendered a mode of enablement in some Euro-American social theory and the perspectival technique known by art historians as anamorphic illusionism. (This should not be taken as pejorative: an illusion can be both hopeful and delusive.) As a praxis or craft of optical deformation, the anamorphic offers a useful *imago* for the cultural compartment of some aspects of Euro-American knowledge (De la Flor 2009).

As will come evident throughout, a source of inspiration for what follows has been the work of Marilyn Strathern. Of her own experimentation with narrative and analytic strategies in *Partial Connections*, she described the use she made of the imagery of the fractal (Cantor’s Dust) in that book as ‘an artificial device’ that allowed her to ‘experiment with the apportioning of “size” in a deliberate manner.’ (Strathern 2004 [1991]: xxix) My interest in the anamorphic lies likewise in its use as a tool for making explicit how social theory and critique size themselves – that is, how ‘size’ has become an idiom for what theory does.

A rather obvious and yet rarely acknowledged route through which the imagination of ‘size’ has made its way into the sociological canon is via the descriptive and analytical purchase afforded by relations of magnitude known as ‘proportions’. The analogy between enablement and escalation that I drew above – the image of knowledge as an expression of escalating enablement – is a case in point. There is an important and not-always acknowledged current in Euro-American social theory and philosophy that refracts the work of knowledge through the operations of a proportional imagination. Proportionality becomes the enabling mechanism of knowledge: how knowledge escalates out of itself.

Take the Leviathan. Hobbes' iconographic choice makes the Leviathan appear as a supreme trickster figure, at once enabling and concealing its own source of agency. The state's power figures as an aesthetic effect: the effect of a parallax shift, the alignment of two perspectives in one optical illusion. Importantly, the illusion is held in place through the work of a proportional imagination: 'the relation between the individual and the state', as Malcom puts it, is tricked into view and held stable as a proportional artifice. The One and the Many stand in a political relation to each other *because* of their proportional relationship. As a symbolic form, the meaningfulness and 'comparability of phenomena rests on preserving proportion or scale.' (Strathern 1990: 211) Nicéron's dioptric lens generates the perspective from which knowledge of the political surfaces. 'The political' emerges as a modern theoretical object thanks to the effect of the anamorphic artifice: it is what the world looks like from the point of view of the lens. Anamorphosis situates and aligns the world of political theory for us.

The anamorphic operates a second effect on the workings of knowledge, which I shall call 'reversibility'. Reversibility describes the double and simultaneous vision required to grant theoretical status to an object. When commenting on the illusionary character of Hobbes' Leviathan, Malcolm described it as 'the curious structure of argument that requires two different ways of seeing the relation between the individual and the state to be entertained at one and the same time.' (Malcolm 2002: 228) The *relational* character of sovereign power emerges thus as another effect of the anamorphic artifice. It is a produce of having to hold *simultaneously* an internal and external vision on the images of the twelve sultans and Louis XIII's emblem. Not without reason, Simon Schaffer described the methodological exigency underpinning our encounter with the phantom qualities of the Hobbesian body politic as 'seeing double' (Schaffer 2005). Moving in and out of the dioptric lens – performing the anamorphic – lends political theory its relational purchase.

The rest of this paper explores the hold that proportionality and reversibility have over the make-up of social theory. It may be read as an exploratory foray into the cultural analytics of some aspects of Euro-American knowledge,³ and in this sense as an investigation into the novel anamorphic devices through which contemporary social theory may be generating its escalatory effects. Some comments are also made in

passing about the contemporary economy of knowledge as, itself, an anamorphic configuration.⁴

* * *

Let me start with a rich and evocative account of how architects visualize their building projects by sociologist Albená Yaneva. Her field site is the Office for Metropolitan Architecture (OMA), the workplace of the famous Dutch architect, Rem Koolhaas; and her focus is the work carried out by architects at OMA during the design and development of a number of models for the new exhibition hall at the Whitney Museum of American Art in New York (Yaneva 2005). Yaneva writes from a self-confessed social studies of technology perspective, and indeed declares that in her account ‘the architectural office will be studied in the same way that STS has approached the laboratory.’ (Yaneva 2005: 869)

The ethnography starts from the premise that ‘knowing through scaling is an integral aspect of architectural practice’ and the author sets as her task to describe ethnographically the so-called enigma of the ‘rhythm of scaling’ (Yaneva 2005: 870, 868). The scales that Yaneva takes to task here are differently sized models of the Whitney building project. Architects in OMA work with two scale models of the projected building: a small-scale model, which is quickly put together by architects to provide a sketchy and abstract materialization of the basic concept guiding the project, and which includes a number of site constraints, such as urban and local zoning regulations or client requirements; and a much larger scale model, which is used to fine-tune the small model by fleshing-out its concrete details.

The small and large models are set up in two adjacent tables and architects spend a good amount of time moving from one table to the next, “‘scaling up’, ‘jumping the scale, ‘rescaling’ and ‘going down in scale’”, in the vernacular terminology used by Yaneva’s informants (Yaneva 2005: 870). In moving between tables and models, architects spend a considerable amount of time working with an instrument known as a ‘modelscope’, which is used to explore the inside of the small model. By inserting a miniature periscope into the model, architects redeploy themselves as human users of the building. ‘The modelscope’, an architect tells Yaneva, ‘gives you a view that is like the scale of

that model. So, you get to express the space at that scale. It gives you the opportunity to move around spaces you ordinarily can't get into and to see how they look... We are able to see how space is inside.' Yaneva further notes that 'minimized to the scale of the tiny model, [the architect] is exploring these microscopic spaces like in Gulliver's travels, he 'enters' the spaces and experiences them.' (Yaneva 2005: 876) Having cruised the inside of the small model, architects then assemble to discuss possible changes in the architectural layout of the building, which are later given concrete expression in changes made to the large model.

The scoping in and out of the small and large models is a recursive process: 'Scaling up', writes Yaneva, 'is immediately and reversibly followed by scaling down.' (Yaneva 2005: 883) However, as times goes by, the larger model inevitably amasses more information and detail than the smaller one, for it is to the larger model that the insights gained from exploring the small model eventually get transported and where they get reflected. Thus, the larger model grows in power and information by gathering the produce of the recursion. But importantly, Yaneva insists, this does not mean that the design involves a linear or evolutionary movement from the small model to the large model. The small model is not a pre-condition, or an evolutionary antecedent, for the revelation of proper and useful knowledge at the level of the larger scale model. Rather, the design is simultaneously present in the small and the large, the before and after of every recursion, the scoping in and out through which architects multiply the versions and the trajectories of the design. According to Yaneva, the shape the project finally takes emerges gradually as a form of extended and ubiquitous co-presence in the time and space of all such scalar operations. As 'it passes through these trials,' she says, 'it becomes more and more visible, more present, more material, real. 'Scaling' is not a way to fit into reality; rather, it is a conduit for its extraction.' (Yaneva 2005: 887)

There are two points I would like to make about the architects use of scaling as a method of knowledge and design. One is the extraordinary ease with which it sits next to *Gulliver's Travels*. The second is what this figure of scale takes for granted.

It is certainly worth noting how Jonathan Swift and Yaneva resort to a similar imagination of size to make their arguments carry force. For both size is important; it helps render certain insights valuable and visible. In fact, literary theorist Douglas Lane

Patey has described *Gulliver's Tales* as 'laboratory experiments based on difference of size' (Patey 1991: 827), much like Yaneva describes her ethnography of architecture as a laboratory study in the 'rhythm of scaling'.

Of course, Swift's use of size has long attracted the attention of literary theorists for its satirical effects. It is satire that size aims for. I want to suggest, however, that one may explore the use of size in Swift not for its effects on something else, but for its effect on itself – that is, on its own self-apprehension as a body of knowledge. Size, then, as a vehicle for making knowledge an adequate expression of itself.

There is a wonderful episode in *Gulliver's Travels* that captures something of what I am hoping to convey here, namely, the extent to which knowledge comes in different sizes. At Brobdingnag, the land of the giants, Gulliver is taken to court for the diversion of the Queen and her ladies. Impressed by Gulliver's demeanour, the King, 'who had been educated in the Study of Philosophy, and particularly Mathematicks', suspects of Gulliver being 'a piece of Clock-work... contrived by some ingenious Artist.' He therefore sends for three great Scholars to examine Gulliver's shape and make-up. The scientists all agree that Gulliver 'could not be produced according to the regular Laws of Nature'. However, an opinion that he was an 'embrio' was rejected, as was his characterisation as an 'abortive Birth'; nor could he be a dwarf, because his 'Littleness was beyond all degree of comparison; for, the Queen's favourite Dwarf, the smallest ever known in that Kingdom, was near thirty Foot high.' (Swift 2002 [1726]: 86-87) Thus, 'After much debate', the scholars finally sentenced that Gulliver

was only *Relplum Scalath*, which is interpreted literally, *Lusus Naturae* [a freak of nature]; a Determination exactly agreeable to the Modern Philosophy of *Europe*, whose Professors, disdaining the old Evasion of *occult Causes*, whereby the Followers of *Aristotle* endeavour in vain to disguise their Ignorance, have invented this wonderful Solution of all Difficulties to the unspeakable Advancement of human knowledge. (Swift 2002 [1726]: 87)

The episode is emblematic of Swift's mordacity, and in particular his dislike of the new Modern science of the Royal Society, epitomised here in the figure of the three scholars. For Swift, modern science falls trap to tautology (circular and self-explanatory

arguments, such as something being a ‘freak of nature’) inasmuch as ancient science did. But the episode is further remarkable for its defence of size as comparative epistemology. Gulliver does not survive comparison, not against dwarves, embryos or abortive births, so he is in the last instance catalogued as a freak of nature. Not even the use of a ‘Magnifying-Glass’ can help the scholars reach an agreement on what Gulliver may be. They size him up and they size him down, only to conclude that he is not a product of nature.⁵ Thus, for Lane Patey, ‘Swift’s play with perspective (relative size and its implications)’ ultimately enacts the question: ‘what is there in us that survives comparison – what that cannot be rendered ludicrous, shameful, or disgusting when magnified to Brobdingnagian proportions or shrunk to Lilliputian?’ (Patey 1991: 826) Said differently, in Brobdingnag country, Gulliver lacks ontology because he is out-of-proportion with the world.

My second remark on architects’ use of scaling as a method of knowledge builds on this question about size and the proportionality of the world. In Yaneva’s account, what is at stake is how the project grows and consolidates its own size, or how it finds in the small and large models different capacities to deploy different aspects of the design. The qualities of the design are therefore allowed to emerge through the recursive travelling between models of different size. Thus, the scale that dominates is that of size. I want to suggest, however, that Yaneva’s ethnography provides some room for speculating about an alternative scale; to imagine the architects looking into the models for certain qualities other than those of *adjustment to size*. For example, when the effect that a giant red escalator has on the interior of the exhibition hall is examined through the modelscope, the architects agree that the escalator needs to be moved to a different spot within the hall. We are left in shades as to what exactly motivates the relocation, although Yaneva intimates that the ‘scaling team engages in a dialogue... [about] dispositions, objects they see inside the model, spatial transitions, material properties of the foam [used to build the model], proportions and shapes.’ (Yaneva 2005: 875) Things do not quite fit together for the architects, but it is no longer clear that this fit is a question of scale. Thus, the adjustment that the architects appear to be looking for now seems to aim for a different kind of harmony, or an equilibrium of different proportions.⁶

Adjustments to scale

In an age of computer technology, the use that OMA's architects make of the use of scale models may appear a little surprising for those of us who are new to the field of architecture. But in fact, as historian of architecture Paul Emmons has shown, the use of scale and scalar drawings has played a fundamental part in architectural practice throughout history (Emmons 2005). For example, from 'the middle of the second millennium BCE,' writes Emmons, 'a statue of Gudea, leader of the City State of Lagash in present day Iraq, is seated with a building floor plan resting on his lap. Also on the tablet are a stylus and a scale rule, showing fine divisions of the finger measure.' (Emmons 2005: 227). Like Yaneva, in his historical survey Emmons draws too an analogy between the use of scale in architecture and Swift's *Gulliver travels*, and the 17th century scalar imagination at large. Thus, he compares Swift's use of scale with that of Voltaire's in *Micromégas*, and identifies further in Robert Hooke's *Micrographia* a locus of general influence for the period. Hooke, who was a Surveyor for the City of London and designed himself a number of buildings along with his friend Christopher Wren, 'transferred his familiarity with scale from architectural drawing to the microscope.' (Emmons 2005: 231) Published in 1665, *Micrographia* described Hooke's use of a microscope to make observations of miniature aspects of the natural world, such as fly's eye or a plant cell. The book became an immediate best-seller of its day.

Of interest for our purposes here is Hooke's mode of use and relationship to the microscope. Emmons cites a passage in the *Micrographia* which echoes in fascinating ways how Yaneva's architects scooped in and out of the small and the large scale models. 'Hooke organised his microscopic observations', writes Emmons, 'progressively from simple to complex, like a geometer ascending from point, line, plane to volume and the chain of being from mineral to vegetable and animal. He began with observing the point of a pin under the microscope... He next analysed a dot made by a pen, and in a scalar reverie imagined this dot as the earth in space.' However, Hooke was also aware that this amassment of detail – from the simple to the complex – required a second operation to remain epistemologically productive. He went at quite some effort to keep the observations made *inside* the scale of the microscope at a par with those made *outside* the microscope. As Emmons puts it, 'Hooke explained his method determining the microscope's scale of magnification by looking with one eye through the microscope as the other naked eye examines a ruler, *simultaneously engaging both scales.*' (Emmons 2005: 231, emphasis added) This simultaneous

engagement of both scales echoes the parallax shift of Hobbes' Leviathan: an illusion of epistemological and political efficacy enabled by the dimension of reversibility at work in the anamorphic. I shall come back to this point later.

Emmons concludes his observations on the historical importance of scale for architecture by commenting on architects' contemporary use of computer software to generate 1:1 or full scale CAD projections of architectural designs. For Emmons, the use of CAD technology emulates a Cartesian approach to the generation of objects, where things can be described or plotted through systems of notational or algebraic relations. Thus, the use of CAD-enabled full scale drawing 'makes it more likely that the designer looks at the image as an object rather than projecting oneself into the image through an imaginative inhabitation. Scale sight is not an abstraction; it is achieved through judging the size of things in relation to ourselves.' (Emmons 2005: 232) His 'handbook advise', then, is to 'learn to think within a scale rather than translate from actual measure.' (Emmons 2005: 232) Against Cartesianism, for Emmons, the 'empathetic bodily projection' of scale is 'critical to imagining a future edifice.' (Emmons 2005: 232)

Of Emmons' description of the history of architectural practice there are two aspects that I would like to hold in view. The first deals with the proportionality of architecture as a skill and trade; the second, to which I shall return later, with the deployment of the 'double vision' that is entailed in the practice of scoping in and out of scale.

Emmons' concern is with current architectural practice, where scale fares as a context-free metric, and advocates instead a return to 'judging the size of things in relation to ourselves.' This form of empirical judgment echoes what Yaneva called a 'rhythm of scaling': an iterative re-proportional exercise through which the world sizes its ontology (its human and non-human landscape) to a proper shape and form.

In fact, architectural practice provides in this context an interesting place for seeing not only the work of proportionality at play, but its recurrent entanglement in larger debates about the epistemic structure of scientific knowledge. David Turnbull, for example, has described how in the absence of knowledge about structural mechanics the use of

proportionality in medieval times enabled the construction of imposing and majestic Gothic cathedrals such as Chartres. According to Turnbull,

In the absence of rules for construction derived from structural laws problems could be resolved by practical geometry, using compasses, a straight-edge, ruler, and string. The kind of structural knowledge which was passed on from master to apprentice related sizes to spaces and heights by ratios, such as half the number of feet in a span expressed in inches plus one inch will give the depth of a hardwood joist.... This sort of geometry is extremely powerful; it enables the transportation and transmission of structural experience, makes possible the successful replication of a specific arrangement in different places and different circumstances, reduces a wide variety of problems to a comparatively compact series of solutions, and allows for a flexible rather than rigid rule-bound response to differing problems.... Essentially it enables a dimensionless analysis precluding the need for a common measure. Geometrical techniques in this case provide a powerful mode of communication that dissolve problems of incommensurability that the use of individual measurement systems might otherwise have. (Turnbull 2000: 69)

Turnbull is interested in the constitution of what he calls 'knowledge spaces'. These are the 'kinds of spaces that we construct in the process of assembling, standardising, transmitting and utilising knowledge' (Turnbull 2000: 12). Western science is in this respect no different from other knowledge systems, such as indigenous or amateur knowledge systems. What distinguishes the epistemic robustness of technoscience, rather, is its development of a corpus of techniques and protocols that enable knowledge to move and travel beyond localised sites of production. The further knowledge can travel, the more coherent and robust its epistemic make-up. This is why for Turnbull one can imagine the architectural site of a cathedral in no different terms from those of a laboratory (Turnbull 2000: 66-67). All that it takes is identifying an analogical 'scalar' denominator: something that can operate the changes in scale required for knowledge to cohere and travel. For Turnbull, in the context of medieval cathedral building this task was performed by the 'template':

Three major ‘reversals of forces’ are achieved with this one small piece of representational technology; one person can get large numbers of others to work in concert; large numbers of stones can be erected without the benefit of a fully articulated theory of structural mechanics or a detailed plan; and incommensurable pieces of work can be made accumulative (Turnbull 2000: 68).

Turnbull’s focus on proportionality as a tool for sense-making provides a vivid example of the terms through which knowledge is said to ‘grow’ as an epistemic object. The work of proportionality suffuses knowledge with an ontological structure. In Turnbull’s account this is actually so in two senses. On the one hand, proportionality is what masons used to calculate the fit between spaces and heights. The proportion is the vehicle for lending the world a certain height, length and width. But the imagery of proportionality is also what underpins Turnbull’s very own analytical explanations. Thus, in an echo of the Galilean epigram that heads this paper – ‘the most admirable operations derive from very weak means’ –, Turnbull writes of how the use of the template by masons enabled ‘one person... [to] get large numbers of others to work in concert’. This is a truly Archimedean metaphor, where a sociological effect is made visible by imagining agency as a leverage of sorts.

Architectural optics of volumes

The movements in size, the dynamics of aggrandizement and miniaturisation that Turnbull describes as characteristic of the epistemic work of science, are nowhere rendered in so vivid a style as in Bruno Latour’s historical ethnography of Pasteur’s microbiology. According to Latour, amongst Pasteur’s greatest achievements is his translation of the interests that nineteenth century farmers and veterinarians had in the anthrax bacillus into the discourse and practices of bacteriologists. This Pasteur accomplishes by becoming himself a ‘microbe farmer’: by removing a cultivated bacillus from the ‘outside’ real world of farming and veterinary science and isolating and culturing it ‘inside’ a sanitised laboratory space. Whereas in the former the ‘anthrax bacilli are mixed with millions of other organisms’ and therefore practically invisible to the scientific gaze, in the latter ‘it is freed from all competitors and so grows exponentially’, ‘growing so much’ that it ‘ends up... in such large colonies that a clear-cut pattern is made visible to the watchful eye of the scientist.’ (Latour 1983: 146) The

inside:outside::visible:invisible equation creates and enables different zones of empowerment and agency for different actors. Thus,

the asymmetry in the scale of several phenomena is modified: a micro-organism can kill vastly larger cattle, one small laboratory can learn more about pure anthrax cultures than anyone before; the invisible micro-organism is made visible; the until now interesting scientists in his lab can talk with more authority about the anthrax bacillus than veterinarians ever have before. (Latour 1983: 146)

Translation works therefore as a sort of rebalancing mechanism, where Pasteur stands as fulcrum: the messy and cloudy world of outside farming and veterinary diseases is funnelled through the inside of Pasteur's laboratory to crystallise and make visible a new balance of powers. Pasteur's laboratory becomes a lever for a new distribution of power. In Latour's succinct formulation:

The change of scale makes possible a reversal of the actors' strengths; 'outside' animals, farmers and veterinarians were *weaker* than the invisible anthrax bacillus; inside Pasteur's lab, man becomes stronger than the bacillus, and as a corollary, the scientist in his lab gets the edge over the local, devoted, experienced veterinarian. (Latour 1983: 147)

In these and other accounts Latour uses the imagery of scale to produce sociological explanations. He sizes objects and agencies up and down vis-à-vis each other to make certain sociological effects visible. A similar appraisal of the Latourian project has been offered by Simon Schaffer, who has remarked on the extent to which 'The model of the lever plays a fundamental role throughout Latour's *oeuvre*: scientists achieve astonishing reversals of force by rendering lab objects commensurable with the forces of the world, then manipulating the former to shift the latter.' Schaffer notes how in his descriptions Latour chooses an 'Archimedean point' around which he then proceeds to effect an 'inversion of scale' letting certain beings (human or nonhuman) 'move forces apparently more powerful than' them (Schaffer 1991: 184).

Latour is certainly aware of the choice of imagery through which he fleshes-out his epistemology. Of his Pasteur article, 'Give me a laboratory and I will raise the world',

he writes that ‘I used in the title a parody of Archimedes’s famous motto’ because ‘[t]his metaphor of the lever to move something else is much more in keeping with observation than any dichotomy between a science and a society.’ (Latour 1983: 154) His point, quite rightly, is that the reception and endorsement of Pasteur’s scientific advances by French society cannot be explained by a simple dichotomic framework of Science-Society encounters. Rather, one needs to attend to the different strategies and practices through which a variety of partisan interests are recruited and converted into laboratory skills and techniques, and vice versa, the way in which the laboratory and its infrastructural equipment gets deployed and travel outside the laboratory walls *sensu stricto*. In other words, the way in which Pasteur becomes a farmer and farmers becomes Pasteurians.

Notwithstanding this declaration of epistemological self-awareness, what remains intriguing is the long lineage of proportional epistemologies to which this style of sociological reasoning and argumentation belongs. In *We have never been modern* Latour comments on the Hobbes-Boyle controversy by observing how Hobbes insisted on denying what was ‘to become the essential characteristic of modern power: the change in scale and the displacements that are presupposed by laboratory work.’ (Latour 1993: 22) For Latour, the laboratory performs for modernity the role of a ‘theatre of measurement’ or instrument for size-making, and indeed it is the self-explicitation of size that in his own work becomes his analytic trademark. His sociology fares as a sociology of size, or rather of the fluctuations of size.

The term ‘theatre of measurement’ is Michel Serres’ (1982). It is used by Serres to describe ‘the scene of representation established for Western thought [by ancient Greeks] for the next millennium.’ It marks the ‘instauration of the moment of representation’ by philosophy, an instauration brought about through the use of ‘a perspectival geometry, of an architectural optics of volumes’ (Serres 1982: 92). This is a wonderful phrase that captures much of what I have been dwelling on up to this point. Serres’ argument builds on the tale of Thales’ measurement of the height of the great pyramid. Thales accomplishes this feat by placing a post in the sand. As the sun sets, the triangular shadows cast by the pyramid and post are then compared. In so doing, Thales invents thus ‘the notion of a model’ (Serres 1982: 86):

By comparing the shadow of the pyramid with that of a reference post and his own shadow, Thales expressed the invariance of similar forms over changes of scale. His theorem therefore consists of the infinite progression or reduction of size while preserving the same ratio. From the colossal, the pyramid, to the small, a post or body, decreasing in size *ad infinitum*, the theorem states a logos or identical relation, the invariance of the same form, be it on a giant or a small scale, and vice versa. Height and strength are suddenly scorned, smallness demands respect, all scales and hierarchies are demolished, now derisory since each step repeats the same logos or relation without any changes! (Serres 1995: 78)

Steven Brown, who has commented on the originality of Serres' oeuvre for social theory at large, glosses Serres' analysis thus:

Here truly is the 'Greek miracle' – one man dominates a mighty pyramid. In this 'theatre of measurement' invented through the simple act of placing a peg in the sand, it is as though everything changed place. The weak human overcomes ancient hewn stone, the mobile sun produces immobile geometric forms... There is an interaction or communication between two diverse partners (Thales, Pyramid) which involves a switching or exchanging of properties (weak/strong, mortal/durable). (Brown 2005: 220)

We are back, then, to the Archimedean image of the leverage. The world's intelligibility holds itself together through an image of ontological balance. Whatever the world turns out to be – however and wherever we locate its sources of agency – this will always 'net-out' as an exchange of equations: weak/strong, mortal/durable, cathedral/template, gigantic/infinitesimal, etc. The use of a proportional imagination allows social theory to net-out its descriptive projects in ontological fashion.⁷

Proportions in perspective

Of course, in some sense, the importance of proportionality for architectural, and indeed socio-spatial reflection at large, has always been a matter of perspective – of optics. The origins of perspective in the fifteenth century have long been traced back to the renaissance of classical proportionality. As Martin Jay has observed, 'Growing out of the late medieval fascination with the metaphysical implications of light - light as divine

lux rather than perceived *lumen* - linear perspective came to symbolize a harmony between the mathematical regularities in optics and God's will.' Pictorial and aesthetic preoccupations shifted from a religious interest in objects to 'the spatial relations of the perspectival canvas themselves. This new concept of space was geometrically isotropic, rectilinear, abstract, and uniform.' (Jay 1988: 5-6) Thus, famously, for Erwin Panofsky Renaissance perspective realised reflexivity as a spatial gaze (Panofsky 1993 [1927]). The difference between classical and renaissance perspective is one in the mode of occupying space and imagining spatial relations. In the Renaissance, the perspective marks a mode of taking the world in by looking through it. This is different from the classical disposition of bodies in space, which remains anchored in the physical mimesis of experience and bodily movement (Iversen 2005). We may say that Renaissance perspectivalism introduces epistemological gradients to the way we look at the world: perspective does not drive us to a singular epistemological residence. There are differences between 'looking at' and 'looking through' something; the movement of the gaze through space – the achievement of depth and the skewing of vision through off-centred displacements – generates different sorts of friction. In this context, rather than, or beyond its comprehension as a geometrical or symbolic form, the way Panofsky did, perspectivalism may be seen instead as a 'general capacity for producing effects' (Damisch 1997 [1987]: 41, my translation).

What kind of effects are those the deployment of perspective produces? Very early on in the theorisation of perspectivalism, Renaissance writers already described Brunelleschi's architectural use of perspective (for it is Brunelleschi who is widely acknowledged for discovering the technique of perspectivalism), for its very special effects on making objects *diminish in size*. Hubert Damisch cites Antonio Filarete's famous *Trattato di architettura*, where the use by Brunelleschi of a mirror to help frame the lineaments of whatever the architect needs to represent is praised for 'making easily observable the contours of those things closer to the eye, whilst those that are farthest away will diminish proportionately in size.' (cited in Damisch 1997 [1987]: 68) The observation is common: Antonio di Tucci Manetti, an early biographer of Brunelleschi, likewise describes perspective as a 'science which requires to determine well and with reason the diminutions and augmentations... of things close and afar' (cited in Damisch 1997 [1987]: 70-71). An acknowledged novelty of perspectivalism, then, seems to lie in the cultural salience lend to the technical capacity for making

variations in size visible. Moreover, size becomes an effect of scoping: a consequence of zooming-in and out of representation. A spectator can enter a picture's plane so long as she can keep certain proportions in place. The world inside the painting is therefore made to appear geometrically co-extensive with the world outside. An ontological continuity between pictorial and world space is obtained through the friction and play entailed in making things big and small.

In its original formulation, the question of perspective raised yet another cultural complex with epistemological significance, namely, the problem of reflexive *distance*. The experiment or demonstrations for which Brunelleschi is regarded as the discoverer of perspective involved two paintings of the Baptistery of St. John and the Palazzo de' Signori, both long lost. The only eye-witness account describes the Baptistery painting as being executed on a small wooden panel. Once the painting was accomplished, Brunelleschi drilled a small hole in the panel at the point which would represent his equivalent viewpoint on the Baptistery's plane (the vanishing point). He then invited spectators to peer through the hole from the back of the panel at a mirror held in front to reflect the painting. (In passing, let me draw attention to the emphasis that Filerete's account of the drawing places in how it is the sharp use of 'one eye' that will best bring to life the full power of the perspectival illusion (Damisch 1997 [1987]: 69).) It remains uncertain whether Brunelleschi realised he needed to control the viewing distance for spectators to replicate his original point of view on the Baptistery (Damisch 1997 [1987]: 98; Kemp 1990: 13, 344-345). What Brunelleschi's experiment did accomplish, however, was to throw into relief the significance of *distance* as an epistemological figure. There is a proper distance between our holding the world in view and the world's presentation or disclosure of its forms. A subtle shift is introduced: between the point of view on the world and the *relational variance* through which the view obtains.

Anamorphosis

The relation between perspectivalism and proportionality assumed a number of forms from the fifteenth to the seventeenth century.⁸ In keeping with the optical trope, Martin Jay has identified at least three scopic regimes of modernity: Cartesian perspectivalism, of the symbolic kind analysed by Panofsky; the so-called art of describing, where the viewer is drawn to the surface or material qualities of objects and not their relational

disposition in space; and, finally, baroque or anamorphic modernity (Jay 1988). It is with the latter that I am concerned here.

Anamorphic illusionism deployed the epistemological power of relational variance to its full. Anamorphic projections of objects are distorted such that it takes the use of a special device or manoeuvre to have the object restored to its original form. Remember the Leviathan and Nicéron's dioptric device. Sometimes it is the use of a special kind of lens that does the trick of reconfiguration; sometimes the observer is required to skew her vision, for example, by approaching the picture at a particular angle. As Lacan famously argued, vision is here confronted with a blind spot of conscious perception (Lacan 1979). The object stares back from a point of view that remains oblique to us. In the Brunelleschian demonstration, what is excluded is *the other eye*: the eye that does not look through the peephole and yet which is reflected back from the vanishing point. This one-eyed optics is intriguingly reminiscent of Hooke's microscopic vision, where one eye holds the scale of the miniature in view whilst the other is focused on the scale of representation. It further echoes the 'seeing double' at play in the Leviathan's optics. An eye is constructed that is therefore simultaneously internal and external to vision.⁹ The eye becomes the optical metaphor through which the body is made visible as a conduit of dis/proportional relations: the bodies of the architect, the micrographer and the perspectival illusionist holding the world to account by virtue of a 'double vision'. Double vision foregrounds thus the body as a figure of scale between the natural and the social worlds. In Margaret Iversen's formulation, 'The real in the scopic field is formed when the eye splits itself off from its original immersion in visibility and the gaze as *objet petit a* [as unattainable object of desire] is expelled.' (Iversen 2005: 201) A split eye that signals in turn the birth of the Baroque as an aesthetic of the uncanny: an aesthetic 'which consisted in making something visible, in being a pure apparition that made appearance appear, from a position just on its edges' – and which citing Paul Klee, Christine Buci-Glucksmann describes as 'to see with one eye and consciously perceive with the other' (Buci-Glucksmann 1994 [1984]: 60).

Under the scopic regime of the anamorphic, then, the illusions of knowledge undergo a transformation from a concern with proportionality to an obsession with reversibility – with the illusions of double vision – the eye that sees inside/outside itself. It is indeed in these terms that Deleuze described too the anamorphic as the condition of possibility of

the Baroque age – and by extension of our neo-Baroque contemporary. In his lectures on Leibniz about the rise of perspectivalism in the development of projective geometry Deleuze asks, recalling Leibniz's thought, 'What produces a point of view?', to which he answers, 'That regional *proportion* of the world that is clearly and distinctively expressed by an individual in relation to the totality of the world that is expressed confusingly and obscurely.' (Deleuze 2006 [1980/1986/1987]: 37, emphasis added, my translation) However, in his book on the expressiveness of Baroque thought as a philosophy of curvature and sensuous shadows, which represents Deleuze's mature reflections on Leibniz (Deleuze 1993), this very same thought is rendered somewhat differently: 'every point of view', writes Deleuze there, 'is a point of view on variation. The point of view is not what varies with the subject... it is, to the contrary, the condition in which an eventual subject apprehends a variation (metamorphosis), or: something = x (anamorphosis).' (Deleuze 1993: 20)

What is at stake in the holding of the world as an ontological infinitude of variance, Deleuze realizes in editing his lecture notes on Leibniz for publication, is not the movement of proportional changes through which the world transforms itself, but the condition of variance itself: 'The infinite presence in the finite self is exactly the position of Baroque equilibrium or disequilibrium.' (Deleuze 1993: 89) What is of interest to Baroque thought, therefore, is no longer the proportions through which the world holds itself together, but the distortions and disproportions (the shadows) that call for its deformation (anamorphosis).¹⁰ It is the anamorphic, the politics of the gigantic and the exaggerated – of variance as a sense of amplitude, expansion and/ or subsequent contraction – that characterises and is worthy of commentary in modernist thought. The anamorphic becomes the distinguishing characteristic of modern society.

The economy of knowledge

Let me change registers for a moment and turn to the knowledge economy.

Much has been written about it so I will be very selective today on the aspects I want to focus on. My concern is the relatively recent discourse on knowledge as a social product. It is the explicitly 'social' dimension of knowledge that I am interested in here.

Prompted by recent developments in intellectual property law, legal theorists and information and knowledge economists have turned to the Internet for understanding the emergence of new distributed and collaborative platforms for the production and consumption of online media. There is a sense in which the velocity of distribution, circulation, modification and consumption of new media by an expansive community of users imprints the nature of such an exchange economy with a distinctive ‘social’ dimension (Benkler 2006; Lessig 2008). The social is here identified with a sense of expansion, velocity and online presence. This is a relational economy of knowledge where the social is the outcome of people being partners in the exchange of knowledge for one another. We may push the analogy by saying that if there is no knowledge and no exchange, then, in this economy, there is no sociality – or at least no *productive* sociality (Shirky 2008). It appears that knowledge, economy and the social are therefore conceptualised as some kind of substitutes for one another. Karin Knorr-Cetina and Alex Preda have described this allegedly mutual transparency of knowledge, economy and the social to each other as being founded on (again using an optical metaphor) a ‘specular epistemology’ (Knorr-Cetina & Preda 2001: 34). The work that the specular performs here reminds us of Emmons’ rendition of CAD-enabled full scale architectural drawing, where a computer-generated object is presumed to map transparently, one-to-one, to the future edifice. Architects work with the model *as if* it was the real building. Thus, both the specular and the ‘as if’ function seem to operate with an underlying principle of substitution which *regardless of the changes in scale* does not neutralize the importance of size. The computer-generated building is scale-free but it is sizeable nonetheless; as Michel Serres said of Thales’ accomplishment, it ‘expresses the invariance of similar forms over changes of scale.’ (Serres 1995: 78) Social theory and philosophy thus no longer need scale to deliver impressions of size. We could say that the substitution has effected a sort of proportional equivalence that allows one to stop thinking of size in terms of scale but which retains a sense of dimensionality. In the context of the new economy of knowledge, this is patently obvious: knowledge has a size because the economy has a size and because society, naturally, has a size too!

Such specular epistemology points to a second characteristic of those approaches to knowledge that take for granted its sociological condition, as if knowledge were indeed a sociological object *per se*. Knorr-Cetina distinguishes between ‘interiorized’ and ‘exteriorized’ theories of knowledge. The former focuses on knowledge as something to

be wrought and struggled with, sometimes with care, often with effects that are distressing, maybe even painful. Knowledge is something that is put together through time and whose permanency and stability is often transitory and contingent. Exteriorized theories of knowledge, on the other hand, see knowledge as a ready-made object upon which other forces exert their pressure. Knowledge is here imagined as an object of sorts, a commodity or resource to be transacted, stored, managed or appropriated in different ways. The idea that knowledge can be put to work alongside other objects of political economy, such as governance, interdisciplinarity or user-centred designs, partakes of the specular epistemology described above, because insofar as knowledge is treated as a self-contained object it can sit comfortably next to other political objects. ‘Knowledge’ and ‘governance’, for example, are specular to each other because arguments can be made about one *as if* refracted or optically accommodated through the other. They function as proportionate forms for each other.

If exteriorized theories of knowledge treat knowledge as an ‘unspecified ‘it’’, ready to be grasped and deployed in policy circles, interiorized theories, on the other hand, bring ‘into focus knowledge itself, breaking open and specifying the processes that make up the ‘it’’. (Knorr-Cetina & Preda 2001: 30) In her study of the cultures of contemporary science (molecular biologists and physicists), Knorr-Cetina has unpacked some the processes that interiorize knowledge as an epistemic form (Knorr-Cetina 1999). Her focus is what laboratory work does to scientific knowledge: the reconfiguration of objects and human relationships that take place in laboratory settings. According to Knorr-Cetina, what laboratory work accomplishes in essence is the adaptation and reconfiguration of natural processes and objects to suit the spatio-temporal requirements of scientists. In a laboratory a scientist can resist the natural tendencies and properties of an object in at least three ways: (i) she ‘does not need to put up with an object *as it is*, it can substitute transformed and partial versions’; (ii) she ‘does not need to accommodate the natural object *where it is*, anchored in a natural environment’, and; (iii) she does not need to ‘accommodate an event *when it happens*’; she can ‘dispense with natural cycles of occurrence and make events happen frequently enough for continuous study.’ (Knorr-Cetina 1999: 27) Under such conditions

Laboratories recast objects of investigation by inserting them into new temporal and territorial regimes. They play upon these objects’ natural rhythms and

developmental possibilities, *bring them together in new numbers, renegotiate their sizes, and redefine their internal makeup...* In short, they create new configurations of objects that they match with an appropriately altered social order. (Knorr-Cetina 1999: 43-44, emphasis added)

The image of re-combinatorial and re-configuring processes draws of course on a familiar genealogy in science and technology studies. The ‘partial versions’ that are substituted for natural objects in laboratory experiments echo for example the ‘partial connections’ that relate difference in Donna Haraway’s famous cyborg assemblages (Haraway 1986: 37). Manipulating a laboratory object’s internal rhythms and developmental possibilities is not unlike what a cyborg’s prosthetic extensions realize by way of supplementary or accelerated capacities. The experimental and the cyborg both operate as scale-shifting devices: they bring about enhancements that are of a different order of magnitude to their original state. ‘The one component is of different order from the other, and is not created by what creates that other. They are not built to one another’s scale.’ (Strathern 2004 [1991]: 39) They both create extensions beyond a 1:1 equivalence. Importantly, as Strathern points out, such enhanced capacities work because the partial versions ‘are neither proportionate to nor disproportionate from one another.’ (Strathern 2004 [1991]: 36) There is a displacement, an extra-effect, that echoing Deleuze we might describe as a ‘variation (metamorphosis), or: something = x (anamorphosis).’

There is also central place warranted to bodies in cyborg politics. In

a cyborg world... people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints. The political struggle is *to see from both perspectives at once* because each reveals both dominations and possibilities unimaginable from the other vantage point. Single vision produces worse illusions than *double vision* or many-headed monsters.’ (Haraway 1990: 196, emphases added)

The architect, the micrographer, the illusionist, the microbiologist... and the cyborg. The eye becomes the optical metaphor through which the body is made visible as a

conduit of dis/proportional configurations. Double vision foregrounds the *political* body as a figure of scale of natural and social relations.

Conclusion

If I may sum up my argument to this point, I have tried to elucidate the terms of a proportional analytic underpinning in profound ways modernist social theory and philosophy. This is characterised by the work of scale and size as modes of explicitation of knowledge. The point is worth underscoring: it is not that knowledge takes a size (which in a very crass sense it certainly does) but that it becomes self-explicated as an epistemic object in terms of size and scale, and in particular through movements of aggrandizement and/or miniaturisation. The epistemic productivity of knowledge appears in this context as being premised on an analytic of what may be described as a play of scopic deformations. The figure of anamorph, I have suggested, may work as both an epistemic and political *imago* for these kind of effects.

The anamorphic provides us also with an interesting commentary on anti- or non-modernist social theory, or in the words of Martin Jay, with the point of view afforded by a scopic regime that operates at the margins of modernity, within the vicinity of its material wreckages.¹¹ A point of view, then, apprehended as such from its own displaced remainders. Anamorphism is what modernity looks like when residual vision (the other eye) pushes its discarded bodies centre stage. When the object, that is, stares back. In this sense, if there is a form of aesthetic elicitation that takes the point of view of the non-modern for granted (including non-human persons and objects), that would certainly be the anamorphic. We may therefore say that the anamorphic is the analytics that elicits ‘perspectivism’ itself as an analytic; the analytic that allows an object-centred epistemology to come into view.

In a beautiful image, Michel Serres has described Thales inauguration, his emplacement of the peg in the sand, as ‘a strange thing full of water’: the creation of a ‘logos-proportion’ capable of providing accounts of ‘objects whose appearance and birth are independent of us and which develop by themselves in relation to other objects of the world’: things that are born from air, fire or water, and that do not attend to the laws or rules of kings or gods. The Nile floods to which Thales was a witness washed away the fields’ crops and his ‘proportion’ came to the rescue of, indeed, a strange world full of

water: a world which demanded a new logos to measure the land, re-establish the cadastral register, net-out the outstanding balances between creditors and debtors (Serres 1995: 122).

Today the proportion has dried-up the world again. In their examination of the status and place of atlases in the history of objectivity (and the wider history of epistemology), Lorraine Daston and Peter Galison have searched for a type of explanation that is ‘on the same scale and of the same nature as the explanandum itself.’ In their own words,

If training a telescope onto large, remote causes fails to satisfy, what about the opposite approach, scrutinizing small, local causes under an explanatory microscope? The problem here is the mismatch between the heft of explanandum and explanans, rather than the distance between them: in their rich specificity, local causes can obscure rather than clarify the kind of wide-ranging effect that is our subject here... Looking at microcontexts tells us a great deal – but it can also occlude, like viewing an image pixel by pixel. The very language of cause and effect dictates separate and heterogeneous terms: cause and effect must be clearly distinguished from each other, both as entities and in time. Perhaps this is why the metaphors of the telescope and the microscope lie close to hand. Both are instruments for bringing the remote and inaccessible closer. But relationships of cause and effect do not exhaust explanation. Understanding can be broadened and deepened by exposing other kinds of previously unsuspected links among the phenomena in question, such as patterns that connect scattered elements into a coherent whole. (Daston & Galison 2007: 36)

Although they surreptitiously subscribe to the language of scale and the playful operations of scopic deformations, the call to attend the problems of ‘The mismatch between the heft of explanandum and explanans’, as they put it, is of course a call to re-describe the weights that inhere in the forms of the explainer and the explained; in other words, a call to creatively re-imagine the dis/proportions that exist in the languages of social-scientific explanation. We need, they are suggesting, forms of explanation that escape our proportional imagination. It is about time a flood washed ashore a new strange thing full of water.

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¹ On the importance of visualisations for the history of science, see Wise (2006)

² On materialized epistemologies see, for example, Pamela Smith's work on 'artisanal epistemologies' (2004) and Peter Galison on the 'epistemic machinery' of elementary particle physics (1997).

³ The praxicology of the anamorphic recalls Don Ihde's description of the *camera obscura* as an 'epistemological engine', involved in the Renaissance configuration of knowledge as something instrumentally generated. For Ihde, the camera obscura operates two optical transformations with epistemic effects:

The first is one of escalation — from Alhazen's observation of an optical effect; to da Vinci's camera as analogue for the eye; to Locke's and Descartes' analogue of camera to eye to mind — by which the camera is made into a full epistemology engine. The second is the inward progression of the location where 'external' reality, itself an artefact of the geometry of the imaging phenomenon, interfaces with the 'inner' representation. For da Vinci, the interface of external/internal occurs "in the pupil"; for Descartes, it is the retina; and, still continuing the camera epistemology, contemporary neuroscience locates it in the brain. (Ihde 2000)

What Ihde calls 'escalation' describes the kind of relation of magnitude that I have called proportionality. The movement between internal and external domains corresponds to my use of the term reversibility.

⁴ I should add that an interest in the laboratory runs through the essay as a possible *topos* of our contemporary anamorphism.

⁵ The disputation is reminiscent of the 'relation of a child which remained twenty six years in the mothers belly' which Monsieur Bayle published in the *Philosophical Transactions* in 1677 (cited in Daston & Galison 2007: 68) and which exemplifies the general fascination with the anomalous and the disproportionate that inflects the Enlightenment's epistemic way of life. Size figures thus as a contemporary epistemic quality.

⁶ Phillippe Boudon makes a distinction between architecture and architecturology (the study of architecture as a conceptual practice). According to Boudon, architecture confronts scale not as a given but as an epistemological 'shift': architects encounter scale and proportionality as something to work *with* rather than *upon* (Boudon 1999). Scale is something that one does to a project, rather than a geometric or physical constraint; it is a 'mode of shifting' one's conceptual take on an architectural challenge (Boudon 1999: 10). Thus, the criteria employed to relocate the giant red escalator in Yaneva's account above, would fare as one such 'mode of shifting'. It would provide an answer to the

question, ‘how does the architect give measurement to space?’, which is, for Boudon, the architecturological question par excellence (Boudon 1999: 15).

⁷ The netting-out of ontology accomplishes *purity of form*: the birth of logos or reason as pure relationality. Thus, Serres observes how

Thales demonstrates the extraordinary weakness of the heaviest material ever worked, as well as the omnipotence, in relation to the passing of time, of a certain logical structure: of the logos itself as long as we redefine it, no longer as a word or statement, but, by lightening it, as an equal relation; even softer because *the terms balance each other*, obliterate each other so that all that remains is their *pure and simple relation*. (Serres 1995: 78, emphasis added)

The ontological robustness of logic, then, appears in this context as the result of a proportional equation. Proportionality is prior to relationality. The world endures as an intelligible object for as long as we can provide some kind of proportionate account of it.

This proposition sets the place of ‘measurement’ in reason in a new perspective. Andrew Barry, for example, has brought attention to the central role of the history of measurement in mediating and configuring the relationship between science and political economy (Barry 1993). For Barry, the instrumentation of measurement has been key to generating political metrologies: ‘measurement and other forms of scientific representation have been deployed in the regulation of social and economic relations over large ‘geographical’ areas of space.’ (Barry 1993: 464) In his account this is a relatively recent historical phenomenon, in that ‘If measurement has become a central resource for the regulation of space, it has only been so to a great degree since the mid-nineteenth century - the period in which science has become articulated with the moral, political and economic objectives of imperialism; and more recently with those of transnational industry and government.’ (Barry 1993: 467) My suggestion here, however, is that measurement has been integral to how all forms of epistemic knowledge have conceptualised themselves in the modern age. (Note that Serres’ account is of course a modern account.) Measurement, or what I call proportionality, is the shape that modern knowledge takes every time it gets actualised.

⁸ For example, the relation between perspective and proportion inflected the manufacture of objectivity in scientific practice too. Lorraine Daston and Peter Galison have commented on the case of Bernhard Siegfried Albinus, professor of anatomy at Leiden, who produced ‘several of the most influential eighteenth-century anatomical atlases’ (Daston & Galison 2007: 70). In their words,

worried lest the artist [who drew the illustrations under Albinus' guidance] err in the proportions, Albinus erected an elaborate double grid, one mesh at four Rhenish feet from the skeleton and the other at forty, the positioned the artist at precisely the point where the struts of the grids coincided to the eye, drawing the specimen square by square, onto a plate Albinus had ruled with a matching pattern of "cross and straight [*sic*] lines." This procedure, suggested by Albinus's Leiden colleague, the natural philosopher Willem's Gravesande, is strongly reminiscent of the Renaissance artist Leon Battista Alberti's instructions for drawing in perspective (Daston & Galison 2007: 73).

⁹ David Topper has argued against what he calls the 'postmodern' use of anamorphosis for sustaining subjectivist or relativist epistemological positions (Topper 2000). In his rendering, a postmodern account of anamorphosis would emphasize the either/or version of an image: either you see the twelve sultans or you see Louis XIII. Instead, he makes a cognitive argument about the dual nature of visual perception. With James J. Gibson, he suggests that human perception can hold the 'concurrent specification of two reciprocal things' or 'in-between perceiving' (Topper 2000: 118, 116). A classic example is our holding together in one integrated vision the flat-depth distinction between a painting's surface and the surfaces of the objects represented inside the painting (Topper 2000: 117). Notwithstanding the fact that some anamorphs are so distorted that their viewing for the first time will require a wholesale surrendering of 'concurrent' perception, I think his argument about 'in-betweenness' is nonetheless part and parcel of the historical analytic of reversibility: the mode of knowledge that can hold simultaneously internal and external expressions of itself.

¹⁰ The place of the uncanny is thus intuited in the work of optics. Andrea Battistini recalls in this respect an early observation of Emanuele Tesauro, who 'marked the maximum wit of the optical emblems, "which, for *certain proportions of perspective*, through strange and ingenious appearances, make you see things that you do not see."' (Battistini 2006: 19, emphasis added)

¹¹ Hence the baroque's obsession with still life and material carcass.