A Picture Of Virtue

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Lorraine Daston and Peter Galison, *Objectivity*, New York, Zone Books, 2007; 500pp, £25.99 hardback.

Scientific objectivity, Lorraine Daston and Peter Galison claim, is best conceived as a virtue. Their use of a concept of virtue is persuasive, as is their style of argument. They begin by anticipating sceptical readers who question their every turn: scientists who defend objectivity as a defining and trans-historical aim, as necessary, even if unachievable; cultural theorists who dismiss it as the myth of 'the view from nowhere', outmoded by contemporary understandings of subjectivity; and historians who expect them to identify the historical triggers of this powerful idea or to chronologically chart its development.

Detailed descriptions of the practices of scientists, catching snowflakes before they melt, measuring the impact of liquids on surfaces, or trying to describe the relationships between neurons, are harnessed to discussions of the interdependence of the objective and subjective, and the emergence of the scientific self (and recently, of a hybrid engineering-scientific self). Daston and Galison argue that objectivity needs to be treated as something that develops through actions and practices, an entity that is more than a concept or an idea, a virtue cultivated through techniques, regimes and routines. The value of treating objectivity as a virtue rather than a myth, say, is that it entangles it in practice, and in subjectivity, the very thing it tries to suppress. Virtues are aimed at through 'techniques of the self' in Foucault's sense, though this is not a straightforwardly Foucaultian argument. In the case of the 'epistemic virtue' of objectivity, this means the cultivation of skills, and, most importantly, self-restraint. Although modern science is now generally understood to have undone the link between knower and known which characterised science in the seventeenth century, Daston and Galison argue that 'the emergence of scientific objectivity … goes hand in glove with the emergence of scientific subjectivity' (p197). They point to how scientists repeatedly wrote, in quasi-religious tones, about themselves, and the discipline and sacrifice that being a scientist requires.

Objectivity is not the only epistemic virtue in science. Daston and Galison distinguish between 'mechanical objectivity', which aims to accurately and directly record nature, and 'structural objectivity', which is concerned with the transcendence and translatability of knowledge. They also contend that scientific objectivity is a modern virtue that emerges in the nineteenth century through the practices of doing, recording, picturing and disseminating science. It is distinct from 'truth-to-nature' and 'trained judgment', which

exist (respectively) before and after objectivity, but also coexist with it. The qualities and practices that are seen as vices and failings in relation to objectivity are valued in the drive for truth-to-nature: where a truthful representation means a perfected one, one that shows the essential and the typical. Truth-to-nature relies on the scientist's accumulated knowledge to eliminate the accidental, arbitrary and atypical, and on the artist's skill to translate life studies of specific specimens into depictions of an ideal type. It is only in the mid-nineteenth century that the search for essence comes into conflict with a search for objectivity, and that scientists begin to perceive the desire to perfect as a psychological failing.

This conflict is illustrated by the physicist Arthur Worthington's attempts to depict and classify the movements of fluids. Worthington made observational drawings of drops of milk or mercury as they hit surfaces. After 1894 he used a camera. This was not exactly a move from the body to the machine, since he had already been relying on a carefully orchestrated use of flashlight to 'imprint' on his retina the image of the moment of impact. Nonetheless, he saw in the photographic image an 'objective view', which his drawings could not achieve. When his photographic results contradicted his earlier drawings, Worthington concluded that the scientific project of constructing typologies had led him to inadvertently produce ideals with no basis in reality. To be true to nature, it was necessary to draw up typologies, extricating the essential from the accidental and irregular. But the difference between the results from the two recording methods drove two scientific imperatives into conflict, and forced Worthington to choose. He chose the objective view over truth-to-nature, and, symptomatically, attributed his earlier practice of editing out inessential difference to a subjective, psychological tendency. The German anatomist Johannes Sobotta, working circa 1900, used photographs as the basis for drawings that were mechanically reproduced via colour lithography. Sobotta reassured his readers that mechanisation restricted the discretion and subjective alterations of the illustrator, yet he also montaged together various microscopic anatomical samples from different people into single pictures. The desire to perfect, and to depict an ideal 'type' existed in uneasy combination with the use of a machine to restrain subjective judgment: Sobotta was caught between the different epistemic demands of truth-to-nature and mechanical objectivity.

Daston and Galison characterise 'epistemic virtues' via narratives such as these and through analysis of scientific atlases – lavishly illustrated large-scale publications used in scientific practice since the seventeenth century. The atlases demonstrate changes in picturing techniques, in notions of the typical and the normative, and the evidentiary basis of scientific practices. Through them, Daston and Galison point to the central role of images in scientific practice and chart the changing ideal of the scientific self. For in the prefaces of these publications, as well as in letters and other autobiographical commentaries, scientists describe their own practices. They reassure readers about the objectivity or truthfulness of their images, detail the minutiae of

image-making processes, and acknowledge or downplay the work of artists and technicians.

Objectivity emphasises how ideas and beliefs are inextricable from practices, including the technical procedures by which images and texts are produced and the rituals, habits and disciplines which constitute the self. It also shows how the concept of objectivity and the normative self it implies are rooted in philosophy, particularly in Kant's formulation of the distinction between subjective and objective as the distinction between 'mere sensation' and the necessary and the general (p207). For Kant consciousness had both subjectively and objectively valid aspects. Objective validity did not guarantee metaphysical validity, but nineteenth-century scientists, according to Daston and Galison, were in any case becoming wary of making metaphysical claims, as the pace of scientific change accelerated and the 'life spans' of theories shortened (p213).

Kant's philosophy challenged the Enlightenment view of the self with the argument that objectively valid 'a-priori intuitions' condition experience; these include intuitions of space and time, and processes of logic and reason. For Kant, the self is unifying and transcendental, structuring sensations and enabling objective knowledge. At its centre is the will, which is also both objective and subjective, responding both to individual psychological motivations and to the 'objective laws' of reason. For nineteenth-century scientists, who adopted and adapted Kantian epistemology, scientific knowledge necessitated an internal battle of will, using strength of will to counteract wilful, subjective interpretation. With the new epistemic virtue of mechanical objectivity came new temptations: when truth-to-nature is at the forefront, the scientist must prevent fancy and imagination from displacing reason, and resist giving in to inchoate sensation; when mechanical objectivity is the priority, willpower and self-restraint are needed to resist the seductions of aesthetics and theory. To tamper with images, and to correct, perfect and give symmetry where none could be found, was no longer virtuous. Mastery of the will was key, and with it the bourgeois virtues of patience and industry. The ideal scientist was like the ideal factory worker, diligent and painstaking, but 'the willpower required to hold the will in check' distinguished the active, heroic 'man of science' from the passive worker (p230). In the eighteenth century, Daston and Galison argue, virtue had been understood as first instilled through habit, through daily practices and routines, guided by reason and judgment. Habit and reason, not will, trained and held in check the appetites, including visual appetites. They shaped scientific practices too: disciplined and attentive observation was practised as a matter of repetitive habit. But by the late nineteenth century William James could assert that the 'strain of attention is the fundamental act of will' (cited p241).

However, the idea of a will-centred self, and practices of self-restraint and the control of will are not fundamental to all forms of objectivity. When the sciences of psychology and physiology begin to discover ('post-1848') that even the supposedly 'objectively valid' aspects of mind appeared

to vary from individual to individual, far from unseating objectivity, a different understanding emerged, in which objectivity meant 'enduring structural relationships' (p259). Daston and Galison term this 'structural objectivity'. If mechanical objectivity requires self-restraint, structural objectivity requires 'renunciation … giving up one's own sensations and ideas in favour of formal structures accessible to all human beings' (p257). Central to structural objectivity, according to Daston and Galison, is the question of communicability, not the concern for accurate representation that characterises mechanical objectivity. For Poincaré, for instance, colour is not objective since we cannot verify that one person's experience of it is the same as another's, not because it is not a property of the world. As psychology and physiology discover subjective disunity and incommensurability of experience, structural objectivity seeks out the laws and structures that are constant and invariable.

Daston and Galison intend to challenge a range of assumptions and arguments regarding objectivity and its rise to dominance in science, but they also set out an argument about historical explanation. The cases described earlier, of Worthington and Sobotta, may suggest that photography plays a key role in the development of mechanical objectivity, but Daston and Galison emphasize that mechanical objectivity was not driven by photography, nor exclusively associated with it and scientists in many disciplines continue to use drawing. In fact, they dismiss the rise of photography, along with various other social and technical changes as only of minor relevance to an explanation of how mechanical objectivity comes to dominate modern science. Nor do they want to see scientific objectivity as a response to or outcome of a larger social and economic revolution in the way that a base-superstructure model proposes, though they acknowledge that changing social landscapes are relevant. Following methods used in their previous writings, they set out to place objectivity and subjectivity in a wider field of changing conceptions of the self, and altered attitudes to metaphysical certainty. By seeing the different 'epistemic virtues' and the scientific selves they entail as co-existent, they also distance themselves from Foucault's theory of historical rupture and Kuhn's account of paradigm shifts in science.

Though Daston and Galison are right to distrust the notion of historical explanation as the search for deep causes, the book loses something in its inattention to the social. For instance, though Rudolf Carnap's structural conception of objectivity is discussed, his role in the Unity of Science movement is not. This movement was the vehicle through which the logical empiricists set out to establish communication and a community across the sciences (the German term *Wissenschaft* was used to include the humanities and social sciences too). Daston and Galison write of the structural objectivists' 'yearning for a common world, and one that can be communicated, not just experienced' (p301). In the case of the Vienna school and the Unity of Science movement, this 'yearning' is oriented to the changing social and political circumstances in which its members found themselves, not just the

discoveries of psychology and physiology.

This is most obvious in the case of Otto Neurath (whose work Galison is familiar with, though he is mentioned only in passing in *Objectivity* as a sociologist in broad agreement with Carnap). His leadership, with Carnap, of the Unity of Science movement was explicitly linked with his other concerns about communication, and his role in the social planning movement from the 1920s to the 1940s. Though he published academic papers in optics, mathematics, philosophy and economics, he had, for most of his career, no university post, and saw all his endeavours in terms of the communicability and democratisation of knowledge. For Neurath, objectivity was associated with the needs of non-scientific people to evaluate the claims of experts. Pictures were a means of dissemination and democratisation and Neurath invented the Isotype system of pictorial statistics for precisely this purpose, though Daston and Galison suggest that in structural objectivity visual illustration takes a back seat. In Neurath's work, unity and communicability were not in reaction against the discovery of radical diversity in human experience, but about constructing forms of communication and planning which did not conflate or collapse difference and idiosyncrasy. Accusations that linked logical empiricism and the Unity of Science movement with totalitarianism stung badly because Neurath's political anti-fascism and his philosophical commitment to the Unity of Science were, for him, closely connected.[1]

His friend Carnap wanted to keep politics and philosophy more sharply divided: for him, the neutrality of objective structures was connected with political neutrality. George A. Reisch claims that Carnap's relatively successful postwar career in the US, Neurath's obscurity after his death in 1945, and the pressures on Carnap and others in the McCarthy period, shaped the way in which the philosophy of logical empiricism is now seen. Carnap's 'view of philosophy as neutral with respect to politics became central to logical empiricism's postwar reputation as a strictly philosophical program'.[2] Galison has also written about the depoliticization of the Unity of Science movement in the USA, and the roles of Charles Morris and the Rockefeller foundation in this.[3] Yet it is, oddly, a depoliticised concept of communicability that appears in Galison and Daston's account of structural objectivity, presented as a matter of subjective 'yearning'. This is not to dismiss their understanding of objectivity in terms of virtue, based on disciplines and techniques of the self. Neurath too could be productively understood in these terms – his interest in artificial languages, which he shared with Carnap, was premised on what they offered for 'clear thought'.[4] But perhaps the potential of the concept of virtue, which ties subjectivity to specific social and historical practices, could be more fully realised here.

Evidently, Daston and Galison do see virtues as social phenomena. For instance, when they discuss the wilfulness of scientific observation, they argue that voluntary attention is treated as a form of active labour in the late nineteenth century, so that to focus on something we do not automatically find attractive requires wilful effort. The Kantian wilful self is entangled

1. See Otto Neurath, 'The Orchestration of the Sciences by the Encyclopedism of Logical Empiricism', *Philosophy and Phenomenological Research*, Vol. 6, No. 4. (June, 1946): 496-508 and George A. Reisch, *How the Cold War transformed the Philosophy of Science: To the Icy Slopes of Logic*, Cambridge and New York, Cambridge University Press, 2005.

2. George A. Reisch, *How the Cold War transformed the Philosophy of Science*, op. cit., p48.

3. Peter Galison, 'Constructing modernism: Cultural location of Aufbau', in Ronald N. Giere and Alan W. Richardson (eds) *Origins of Logical Empiricism*, Minneapolis, University of Minnesota Press, 1996, pp37-38.

4. Otto Neurath, *International Picture Language*, London, Kegan Paul, 1936.

in industrialisation and Victorian perceptions of labour. Attention is more explicitly associated with wider social developments in the work of Jonathan Crary, who sees the late nineteenth-century concern with problems of attention and inattention in the context of the growth of an industry of recreational attractions.[5] Daston and Galison's account is arguably subtler, insofar as it links the opposition between labour and diversion to philosophical concepts of the self, and distinguishes the nineteenth-century opposition of willed, voluntary attention to automatic, unthinking attraction, from older notions of knowledge acquisition rooted in habit, routine and pleasure. This way of conceptualising changing models of attention casts an interesting light on other things outside the remit of this book: for instance, on Walter Benjamin's arguments in the 1920s about distraction – effortless attention, oriented by pleasure and instilled through habit rather than an effort of will, which constitutes a form of learning.[6] Galison has elsewhere written that environmental determinism is deeply rooted in the 'political ideology of left-liberal modernism'.[7] But the modernist faith in the ability of the designed environment to alter the self by transforming mundane habit might also constitute a rejection of the notion that the only form of attention that counts is strenuously and consciously directed.

Modernist design and theories of distraction may be off-topic, but one of the beauties of this book is that it is so suggestive. It is possible to think experimentally about a number of topics using Daston and Galison's ideas about the embedding of concepts in practices, the question of what constitutes a virtue, and of how different virtues co-exist. This is perhaps because the book seems very dialogic: while the arguments are careful and detailed, the rhetorical structure, the knowledge that this is a collaboratively written text, and the lengthily captioned illustrations, make it engaging in a way that few academic books are. This is, as you might expect from both authors, a theoretically nuanced account that avoids arcane jargon or unnecessary theoretical terminology. As the culmination of a project begun nearly twenty years ago, its influence has already started to be felt.

5. Jonathan Crary, *Suspensions of Perception: Attention, Spectacle and Modern Culture*, Cambridge Mass., MIT Press, 2000, p21.

6. See Walter Benjamin, 'Toys and Play: Marginal Notes on a Monumental Work' (1928), in *Selected Writings: Volume 2, 1927-1934*, Cambridge MA, Harvard University Press, 1999, p101; and 'The Work of Art in the Age of Its Technological Reproducibility: Second Version' (1936), in *Selected Writings: Volume 3, 1935-1938*, Cambridge MA, Harvard University Press, 2002, p120.

7. Peter Galison 'Aufbau/Bauhaus: Logical Positivism and Architectural Modernism.' *Critical Inquiry* 16, (1990): 716.

This Is Your Life

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Marcello Barbieri (ed), *Introduction to Biosemiotics: The New Biological Synthesis*, Dordrecht, Springer, 2007; xii + 530pp, £54.00.

'The over-arching context for bisoemiotics is our biosphere, in the sense of the organic whole of living matter', wrote Thomas A. Sebeok in 2001, 'and Earth', he went on, 'is the only geosphere which contains living matter. Because there can be no semiosis without interpretability – surely life's cardinal propensity – semiosis presupposes the axiomatic identity of the semiosphere with the biosphere'.[1] Thus stated, this has been the general programme for biosemiotics in the last fifteen to twenty years. Yet, this is not an easy thesis to grasp, particularly for those who have retreated into the comfort of a view of the world as comprised solely of different combinations of power and endless language games.

1. Thomas A. Sebeok, 'Biosemiotics: its roots, proliferation and prospects' in Global Semiotics, Bloomington, Indiana University Press, p37.

It is for this reason that biosemiotics has thus far failed to see itself at the centre of a sustained academic publishing enterprise, despite the commitment and endeavour of a range of embattled multi- and trans-disciplinary scholars. And it is for this reason that Barbieri's volume constitutes a major achievement. With the arrival of this *Introduction*, particularly in its open demonstration of a diverse range of opinion within the field, biosemiotics has reached a defining moment. (One is tempted to say that it has 'come of age', but this happened quite some time ago.)

The book is not a single-author monograph, concise and aimed at absolute beginners. Instead, it consists of eighteen largely original contributions from major names in biosemiotics (Hoffmeyer, Kull, Barbieri, Markoš), sympathetic major theoretical biologists (Pattee, Salthe) as well as at least one commentator who has come to biosemiotics from semiotics rather than in the reverse direction (Danesi). These contributions are divided into three sections: 'Historical background', 'Theoretical issues' and 'Biosemiotic research'. The volume is not comprehensive – I would have liked to have seen contributions from, to name just a few appropriate living scholars, Terrence Deacon, Claus Emmeche, Timo Maran and Søren Brier. However, there are always going to be quibbles of this kind with edited collections. So, it would be more even-handed to say that this volume provides an invaluable overview in addition to a much-needed summing up of the biosemiotic enterprise.

Let us sketch some of the issues raised by the thematic sections. The explicit 'summing up' is mainly to the fore in the first section on 'Historical background'. Favareau's essay, though seemingly bitty, amounts to a persuasive account of one of the leading trajectories in biosemiotics (if not semiotics generally). Ranging from Aristotle, through Poinsot to Sebeok and, then,

Barbieri, with the help of Deely and by way of a coruscating account of the influence of Descartes on modern thought, its 68 pages are worth the (intellectual) admission price alone. Favareau's essay also hauls aloft the main issues and criticisms that biosemiotics has elicited, although in the historical section, it is Jämsä's review that actually looks at the marriage of Peircean theory and biology. Finally, Barbieri's essay in the same section is a 'revised repeat' (as they say in the description of updates on reality TV programmes) of his 2002 review of Kull's special von Uexküll issue of *Semiotica*. In their summing up, both Barbieri and Favareau suggest that biosemiotics is now a field which is more varied than it previously was when dominated by the rediscovery of von Uexküll; chiefly, the change in the field consists in the way that it has embraced the more mechanistic approach to semiosis of Barbieri himself, leading to a perspective within biosemiotics which is not geared towards explication of the dynamics and context-based nature of signs and texts but allows for understanding the workings of nature as code-based.

The section on 'Theoretical issues' kicks off with Pattee's essay focusing on the 'symbolic control' of matter. Salthe's essay questions the exclusive role of genetic information as the seat of 'meaning' in biology, redrawing its role in tandem with 'informational properties at large in Nature'. Hoffmeyer's essay, which follows, focuses on the relational properties of the 'semiotic scaffolding' whose object is also the genetic code. Kull's essay discusses one of the key issues of biosemiotics, the need to proceed with a methodology which is not based simply on the assumption of dealing with measurements of 'dead nature'. Barbieri's essay, which follows, takes biosemiotics to the lower threshold, one explored by Sebeok, in asking whether the cell is a semiotic system. In this essay, Barbieri's theory of the 'ribotype' brings him to the centre of the enterprise of biosemiotics as an attempt to illuminate the semiotic nature of biological processes. There follows an analysis by Artmann of the status of the concept of 'code', especially as used by Barbieri and in relation to algebraic modelling. Perhaps a complementary essay on 'text' might have been welcome here; Kull, not coincidentally a Tartu scholar, is the only one to really introduce this key semiotic term. Markoš et al deal with the thorny issue of Darwinian evolution. Since biosemiotics has been accused of neo-vitalism and an anti-Darwinian stance, it is interesting to see that Markoš et al's critique of Darwinism is aimed not so much at its inherent principles rather than the fact that it is too individualistic in its neglect of the entire biosphere of species. Given the centrality of Peircean sign theory to contemporary biosemiotics, it is useful to have the essay of Vehkavaara which follows, on the 'logic of science' and the 'logic of the living', taking in Peirce's 'pragmaticism' as a whole in biosemiotics. Danesi's essay following Vekhavaara's is notable because it is written by a renowned 'cultural semiotician', but mainly because it discusses not just the possibility of 'meaning' in biology but the issue of continuity of 'meaning' across biosemiotic, zoosemiotic and anthroposemiotic realms. Drawing on Peirce, especially, but also the work of the Tartu-Moscow semioticians, as well as general semiotics, the Modelling Systems Theory

reviewed here and originally proposed in Sebeok and Danesi's 2000 work, *The Forms of Meaning*, may yet prove to be the most applicable feature of Sebeok's legacy. The section concludes with Gérard Battail's return to the issue of codes, in this case the intrinsic, code-based error-correcting properties of the genome.

The final section of the volume is concerned with 'research', a curious matter since biosemiotics is occasionally criticized because it does not do research. However, such a criticism rather misses the point. In the tradition of Sebeok, the contributions here review research in fields that have not yet been fully 'semiotized'. Thus Faria deals with research on RNAi, Bruni returns to inter- and intracellular communication, while Huber and Schmid-Tannwald analyse signs in mammalian reproduction (oocyte-to-embryo transition). Interestingly, this section also features two reviews of research in zoosemiotics. In an intriguing essay, Pain considers invertebrate cognition and Martinelli returns to the matter of 'interspecies communication', a case that Sebeok by no means declared closed but one which, nevertheless, he demanded that science must treat with healthy scepticism.

The volume as a whole gives the impression that the main aim of biosemiotics is to introduce a greater sense of the phenomenon of 'meaning' in biology. Even Favareau's informed intellectual historical account of the shaping forces of sign theory, its aims and its objectives, leads one to this conclusion. Of course, it is no mean aim, especially in its potential to realign the sciences. At a strictly disciplinary level, such an aim is one that semioticians, operating within their own institutionalized disciplines but with a strong allegiance to sign theory, will recognize. Yet, given the implications of biosemiotics for the understanding of social life and culture, it is worth adumbrating the aims that Sebeok had in mind for biosemiotics. He sought not only to inform investigations in biology but to reorient views of truth, science, verbal and nonverbal communication, and to overturn the anthropocentrism that is attendant on a limited awareness of the functioning of signs in the biosphere – that is, sign functioning in all organisms – not just humans – and within organisms. Repeatedly, Sebeok stated that he was concerned with *semiotics* rather than just biosemiotics: a theory of signs which, without necessarily becoming a master discipline, promises to be a field that traverses all disciplines in the arts, sciences, social sciences and the humanities. As we have seen, this wider vision is only really addressed head on in the volume by Danesi's contribution.

My own work takes place at the level of human animals' sign systems only. Yet, I would declare that I am fully sympathetic to biosemiotics without necessarily having come from the (biological) sciences. Attempting to ignore the biosemiotic project or to subject it to dismissive critique in favour of a pure anthroposemiotics is to behave like an ostrich. In short, if you are not at least a dilettante in biosemiotics then you will remain no more than a dilettante in contemporary semiotics.

So, although not an *Introduction* in the conventional sense, if you are

familiar with the work of Sebeok and Hoffmeyer, you should be encouraged to turn to this book next. Even if you have not read Sebeok and Hoffmeyer, do not be dissuaded from picking up Barbieri's collection. It is a notable milestone in the development of biosemiotics. But, as well as playing out some of the themes in a 'biologized' understanding of semiosis, this volume is an important contribution to the rather major project of defining life in all its manifestations. Considered alongside the work of John Deely, Augusto Ponzio, Susan Petrilli, Yuri Lotman and, ultimately, Peirce, Barbieri's collection is an important brick in the important edifice of a desperately needed semiotic consciousness.