

Scale

ICI Focus 2024–26 of the Core Project ‘Reduction’

Scales are used to quantify properties such as length and temperature, or also to measure popularity and affect. But as Alice discovers in Wonderland, a change of scale can also have dramatic qualitative consequences. It disrupts customary ways of perceiving, acting, and being — to the point of feeling as ‘queer’ to her as a caterpillar’s metamorphoses. Helped by the arguably inextricable intertwinement of different meanings and aspects of scale, Alice’s experiences continue to provide apt metaphors for the disorienting importance and effects of scale and scaling at a time of hyperglobalization and the so-called anthropocene.

Scale is indeed a highly ambiguous notion, even when one only considers the meanings deriving from the Latin or Italian *scala*, ladder. It simultaneously denotes the whole ladder, one of its steps, and the relation between two steps: The scale of a cartographic map is the ratio between a distance on the map and a distance on the ground, but any particular length also defines a scale, and the range of scales from the subatomic to the planetary scale is part of the spatial scale. Paradoxically recursive, scale combines and helps mediate quantity and quality, as well as subjective perception, objective material properties, and contingent construction.

The ladder has been criticized as a metaphor for the arrangement of scales insofar as it implies a vertical hierarchy. Other metaphors have been proposed, such as concentric circles, rhizomatic networks, or also musical scales. However, if hierarchy is problematized for privileging a scale to which all others can be reduced, the privileged scale is actually ambiguous and depends on the field. Geographers, for instance, who have long discussed the social construction and politics of scales like the ‘national’ or the ‘global’, tend to worry that the large-scale is constructed as an unperturbable monolith, determining underlying scales and making local interventions or worldings futile. Physicists and biologists, by contrast, regard small scales as more fundamental and generally explain large-scale phenomena by reducing them to phenomena at smaller scales.

If scaling — working with, at, or between any particular scale(s) — necessarily implies reduction, what does such reduction enable and what does it impede? What may be gained by shifting or jumping between scales, even if this enacts further reductions? How can binaries such as the local and the global, the particular and the general, the private and the public be made more fluid and entangled by situating them on a continuous (not necessarily hierarchical) spectrum of scales? And how can one also mediate between materialist and idealist, ontological and epistemological understandings of scale?

Increasing the distance decreases the apparent size of things, while optical instruments like the looking glass, microscope, or telescope makes things larger or brings them closer. Such devices, which dramatically expanded the observable spatial scale, played a prominent role in the history of early modern science and also informed early speculative fiction narratives like Swift’s *Gulliver’s Travel* or Voltaire’s *Micromégas*, which explore the fascinating, defamiliarizing, and critical potentials of scaling. They could be called ‘scale-shifting technologies’ as long as one remembers that they change only an object’s apparent size, not its actual physical dimension. Similarly, time lapse and slow-motion cameras shift perception along the temporal scale without accelerating or slowing down processes.

The so-called ‘cosmic zoom’, most famously in Charles and Ray Eames’s film *Powers of Ten* (1977), presents a fascinating journey through scales, to the cosmic, the subatomic, and back to the human. It is often faulted for seducing viewers into believing that things can actually be smoothly scaled up or down. Disembodied vision — vision not situated in a body that provides the scale to measure distances through the parallax of stereoscopy or body movement — indeed cannot tell the difference between scaling actual objects and changing the scale of their appearance by moving or zooming in or out. This incapacity plausibly relates to the sense of power associated with playing what Donna J. Haraway calls the ‘god trick’ and enacting a ‘conquering gaze from nowhere’: one is led to believe that objects actually

shrink when one moves away, or at least that they could be scaled to a manageable size.

But things do not scale as easily as one sees and imagines it. More generous readings of the film take it as stressing this point, showing how differently things look and behave at different scales, how nature (and culture) seems to consist of separate and autonomous levels, requiring very different disciplines and methods for their understanding.

At times, scale differences also get short-circuited when some microscopic scales visually resemble macroscopic ones. The film thereby conjures up the scale invariance and self-similarity of fractals, which in the last quarter of the last century had elicited much excitement, not only on account of their aesthetics but also for their link to complexity and chaos theory and the cross-scalar butterfly effect.

The possibility of small, local changes having huge, global effects has always been as much of a promise as a threat. With the anthropocene and its disjunction between the spatiotemporal scales of human action and that of its consequences, the latter has come to dominate. Also, the prospect that increasing connectivity, information, and interaction in the worldwide web and big data would lead to self-organized emergent properties now appears more ambivalent. Instead of leading to the emergence of a higher swarm intelligence, machine-learned artificial intelligence, or noosphere, scaling up the human and its communication data risks exponentiating rather than fixing structural biases and injustices and may well lead to a regressive, hallucinating, or deeply fake subject or to something altogether different, like an assemblage largely composed of more-than-humans.

In other words, scalability, a notion that is curiously biased towards growth, is the exception rather than the rule as in the case of scalable businesses that can grow exponentially without changing their organization or scalable research projects that can apply to ever larger scales without changing their framework. As Anna L. Tsing emphasizes, scalability is 'not an ordinary feature of nature' but requires a lot of work and often violent reductions of diversity. If the scalability of the colonial sugarcane plantation provided a model of expansion for factories during industrialization, scalability has also become for her the 'hallmark of modern knowledge' and a demand of 'most of modern science'. While Tsing calls for a theory of nonscalability to resist and counteract the ruinous lure of upscaling, the upcoming ICI Focus 'Scale'

seeks also to explore other forms of scale, scaling, and scalar practices.

The question of how things and their properties scale goes beyond the binary alternative of non/scalability. While some properties scale linearly others may just scale differently. For instance, a tenfold increase in length implies a thousandfold increase in volume and mass when the same proportions and material are retained. Upscaling objects therefore eventually makes them collapse under their own weight. Interestingly, Galileo addresses this at the very beginning of his *Two New Sciences*, which draws on the expertise of artisans at the Venetian Arsenal, a large-scale industrial complex that developed methods for mass-producing ships. He highlights: 'For every machine and structure, whether artificial or natural, there is set a necessary limit beyond which neither art nor nature can pass.'

Conversely, downscaling may open new possibilities. Gravity becomes irrelevant, for instance, together with its hierarchical verticality, allowing insects to walk as easily on walls and ceilings as on floors. Strategies of close reading and 'thick description' bracket the general and universal to give space to the singular and particular of cultural works and practices. Queer practices and aesthetics often engage with the downscale, small, and 'cheap' as forms of resistance against the normative, grand, upscale, and large. All these attempts evoke humbler, marginal perspectives that risk getting lost in macro-political templates, but — rather than veering towards parochialism — they share the potential for larger social transformation that Deleuze and Guattari theorize with their notions of the minor and 'micro-politics'.

If different disciplines, discourses, and dispositives each have their privileged scales to which they tend to reduce others, what may be gained by thinking them together, acknowledging both the relative autonomy of particular scales — each with their own affordances, limitations, rules, even laws and ontologies — and their interdependence — each affecting and being affected by other scales? What is the critical purchase of developing multiscale architectures or patchworks of scale-specific, mutually inconsistent and irreducible descriptions, theories, and models? How might the tensions be made productive where they overlap or come into contact?

The ICI's upcoming focus 'Scale' within the long-term core project 'Reduction' will address such questions by reflecting upon the critical role of scale within and across a wide range of different fields.