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**Annamari Carusi, Aud Sissel Hoel,
Timothy Webmoor & Steve Wolgar (eds.):
Visualization in the Age of Computerization.
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The profound transformation that computer-assisted visualization has initiated in sciences and humanities is nothing short of revolutionary. It can be compared to that of engraving techniques, which changed the nature of image production and underpinned the invention of the printing press. Pervasive computerization has not only radically enhanced technical and cognitive tools of displaying, manipulating, and understanding data, its ability to produce detailed, moving, interactive, and three-dimensional visualizations in science, digital media and journalism has changed our everyday environments.

The book, *Visualization in the Age of Computerization*, consists of thirteen chapters that explore visualization practices and practitioners in different fields of knowledge. The authors are experts and academics from the interdisciplinary crossroads of science and technology studies (STS), geography, history, archaeology, medical sciences, architecture, anthropology, and ethnography. Most of the authors conduct their research across these cross-disciplinary fields, and the chapters are based on extensive empirical research and computational practice. The first part of the book focuses on visualization in human sciences and art, as well as in neuroscience and nanotechnology. The second part of the book is dedicated to science and technology studies, and the ways in which visualization is used as a medium in sciences.

In the Introduction, the editors outline five overlapping theoretical themes that bind the contributions together. The first theme explores ways in which computerized visualization has contributed to 'mentalistic cognitivism', which sees visualizations as cognitive

aids. This has given transformative and performativity roles to visualization in knowledge production and mediation. In other words, visualization in the sense of 'making visible' always 'constructs' knowledge. Tom Schilling's chapter on mapping British Columbia as indigenous land exemplifies how antagonistic communities within the region use data and maps to support their territorial arguments on their rights and sense of belonging.

The second overlapping field focuses on the relationship between visualization, data, and scientific claims. Whilst researchers and scientific communities have always used visualization to convey results and representations of studied phenomena, increasing uncertainty exists concerning the value of digital visualizations as these can easily be manipulated because of their digital binary format. Chiara Ambrosio's chapter shows, however, that scientific representations and their 'objectivity' have always also been subject to modification in the interplay with artistic modes of representation. Hence, these fields have been developing in interaction. The third overlapping field focuses on the question of the ontology of scientific objects. Especially in STS, continuous digitalization has been transforming physical objects into computational and digital objects. This has raised the question as to whether they should be treated differently due their new ontological status. On the other hand, digital objects do not only mimic the physical object; they also attract our focus towards the generative aspects of visualization. Timothy Webmoor's chapter on 'codework' illuminates this paradox brilliantly. His ethnographic London-based data visualization laboratory is a 'bleeding edge' among the new visualization companies specializing in harvesting, using, and visualizing open databases. These open-data sources include datasets from governments, international NGOs, and public institutions such as universities and various authorities. The data from the London Transport Authority, for example, turned into a visualization of 'The London transport model' in the visualization laboratory which was studied. As Woodward explores the coders reflecting their practices, the 'codework' itself emerges as a new core skill for visualization and as a language for knowledge production with a cultural impact. Here, the technical practices of programming interlace with cultural practices, reshaping sociality, and forming collectivity and ideas of selfhood.

The fourth overlapping theme focuses on ontological changes regarding ways in which computational technologies have inspired the new and flourishing study of embodied experience and technology that nests between boundaries of techno-science, activism, and art. Davis Ribes' chapter 'Redistributing Representational Work: Tracing a Material Multidisciplinary Link', shows how visualization practitioners, as well as researchers, apply methods from the arts, as well as artistic techniques, in order to create more efficient visualizations of data.

The fifth and final cross-cutting topic relates to computational tools that bring about profound modifications and re-boot practices in research sites and laboratories. Here, one of the prominent questions is how visualization tools are reconfiguring organizational and management-related practices in research settings, such as in 'wet labs', and also in the computationally coded space and environment in which concrete objects are being trans-

formed into bits. This leads to a more profound question regarding the change in the academic work when data is being created with software tools, organized, and constructed with specific 'codework' and objectified through visualization.

The contributions in this book, stemming from a range of visual studies and STS experts, paint a manifold and intellectually fascinating picture of a transformative moment in the time of the 'visual turn'. It captures the dynamic and emerging epistemological phenomenon of 'visual thinking', which can only be burgeoning due to its principal and intuitive character, and because it is affective and dynamic; it will not only have an impact on journalism and digital design, but also on research in humanities and the sciences.

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