

Kim H. Veltman

Can Museum Computer Networks Change our Views of Knowledge?

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1. Introduction

Yes. There are least eight ways in which computer networks connecting museums and other institutions can change our views of knowledge, namely, our understanding of: scale, context, variants, parallels, history; theory and practice; abstract and concrete; static and dynamic. It will take time. For our purpose we shall suppose that it is the year 2020.

In our living room are two screens. They look like televisions of the late twentieth century but differ in several ways. They have high-level image definition. They have an interactive video feature, which allows us to study, compare and store any detail or segment. They are linked to archives of all earlier films and all major databases. Hence knowledge from documentaries in studios, books and maps in libraries, paintings in galleries, and objects of material culture in museums are available to us. Instead of going to a series of institutions, we can consult all this information at home. Today a specific problem interests me. I am planning to go to Athens and want to learn about the Parthenon. I type in this word and find myself with a menu that reads: Scale, Context, Variants, Parallels, History, Theory and Practice; Abstract and Concrete; Static and Dynamic. I choose the first of these.

2. Scale

Our knowledge about the world is recorded at a great number of different scales. Until recently it was customary to use scale as a criterion for separating knowledge. Scales of 1:1:000,000 or more became maps of the world and were gathered in world atlases. Scales c. 1:500,000 became national maps. Scales c. 1:50,000 became regional maps. Scales between 1:10,000-1:20,000 became city maps. Lesser scales were used for ground plans, photographs of sites and photographs of actual objects. Each of these was frequently collected separately in different kinds of books.

All this has changed. In my hand is a monitor with a scale meter. It effectively transforms the screens in my room into zoom lenses such that they function as a combination of a telescope and a microscope. If I put the meter at 1:1,000,000, a corresponding map of Greece comes to the screen. As I lower the scale I get regional maps, city maps, topographical maps which show me the Acropolis, then photographs of the Parthenon, and details of the metopes and friezes. If I am a research scholar I can continue increasing the scale and receive microscopic information concerning individual sculptures resulting from conservation reports. Or I may wish to pursue the material at any of these levels in more detail in which case I press a button for details. This gives me the source and allows me to consult what scholars in the field have said about the work in question. Instead of having to run to the library to search for relevant books on the subject, I now have this material at my fingertips in the comfort of my own home, or wherever I am. Having done my study I go to Athens. As I stand on the Akropolis in front of that noble ruin that is the Parthenon, I put on a head mounted display which again provides me with the material at different scales. Wherever I am I have the ability of seeing how an object appears at different scales, as if a bird looked at an object from high in space and then came ever closer until it actually perched on the object.

But the problem of scale is not just a question of relating an object to its environment. The history of a subject used to be told in terms of a given medium at one scale without reference to other scales. The rise of realistic portraiture in Antiquity offers an excellent case in point. Too often this was told in the context of developments in sculpture without reference to tomb sculptures, grave steles, coins, or seal impressions. Similarly the conquest of realism was typically told in terms of monumental examples without attention to the exquisite detail in jewellery or other ornamental pieces. Now when I choose a motif, I am provided with examples in various scales and am able to see the interdependence of painting, sculpture and the so called decorative arts.

3.Context

Closely related to the problem of scale is that of context. The vagaries of history have scattered objects to many different locations. In the case of the Parthenon many of the original sculptures, now known as the Elgin Marbles, are preserved in the Duveen Galleries of the British Museum. The head mounted display when I am in Athens standing on the Akropolis or in London standing in the British Museum looking at the Elgin Marbles or the screens at home make this connection for me. If I wish to study the friezes in the British Museum in more detail I can also receive reconstructions of individual pieces, of the arrangement of the entire series in context, or of the whole temple in order better to picture the original appearance thereof. Hence I am able to relate not only objects of different scales at a given place but also other relevant objects or fragments

which happen to be preserved elsewhere in different places without travel. In London I can consult related views in Athens. In Berlin, standing in front of the Pergamon altar I can consult views of its original location on that hill in Northwest Turkey and conversely. In the Metropolitan Museum in New York standing in front of the intarsia room from Gubbio I am able to see the castle in central Italy from which it came and conversely.

This principle of context is of the greatest significance in museums where almost everything has been removed from its original position. In the past I would often stand in front of a Roman chair or a piece of Renaissance furniture with only the vaguest idea of how it might have looked in context. Now my screens at home or the head mounted displays in museums provide me where possible with original examples or artists' reconstructions of how they might have appeared in context. This applies to everything in a museum from jewels or costumes to tapestries and tables, from reliquaries to altars, from miniature figurines to life-size sculptures. Museums are now more than repositories of material culture. They use their materials to provide windows into the diversity of cultural contexts, windows not only into how they have actually been but also into how we have imagined them to have been.

4.Variants

Besides these questions of scale and context there is the question of variants. When I see a picture of the Parthenon or stand in front it, I want to know how many other Greek temples there are. Where are they? How many are on hilltops? How many are close to the sea as is Didyma? How many are on mountainsides such as the temple at Delphi? How typical is the Parthenon relative to these? The same applies to theatres. When I see a picture of the theatre at Epidaurus, by pressing the variants button I learn know how many other theatres were made by the Greeks, where they were built, and what were the differences between the theatres at Segesta, Delphi, Selinunte, and Ephesus. This provides both a quantitative record of how widespread was a cultural manifestation and a measure of the parameters of variation. In the case of the theatre, which continues after the Greeks, it is possible to explore how this form changes in Roman civilization, what variations occur thereby and how its cultural significance changes. How does the Odeon on the Acropolis differ from the theatres at Taormina in Sicily or Aspendos in Turkey. In the case of sculpture, pottery or other more fragile objects the extant records will not reflect as accurately the original quantities that were produced. Even so, the examples which have come down to us provide some indication of the earlier significance of that art form.

And as I stand in front of, or see on my screen at home, a red figured vase depicting a battle scene, a story from one of the epics, or a scene from everyday life, it is possible to gain some indication how many extant battle scenes there are, where they are and how this particular example in Toronto or Montreal differs from other vases in New York, London or Athens. Hence when I look at an object I am able to see not only the physical context into which it fits, but also to see the range and horizons of the species or genus of which it is part. This is the age old philosophical debate of universals versus particulars in a new context, not just as an abstract problem but as a concrete one. It may sound witty to say of a temple or a theatre that once you have seen one you have seen them all. But it is simply not true. To know about theatres we need to know about all available examples. To know about vases means knowing about as large a sample as possible and therein ultimately lies the difference between a casual enthusiast of Greek vases and a Beazley. The encyclopaedia has

made us aware that our first challenge lies in focussing on particulars, increasing the sample of individual cases on which our judgments are based. Once we have seen range of variation within a set objects, be they theatres or vases, we are then in a position to understand the dimensions of the universal category under consideration. It is not a question of universals vs. particulars. We need particulars if our universals are not to be abstract figments.

5. Parallels

History as it was taught in the nineteenth and even the twentieth century was almost always told from the standpoint of a given culture without any reference to parallel developments, i.e. the problem of synchronicity was ignored. The screens in my living room solve this problem. If for instance I am looking at the former capital of the Hittite empire at Hattusas in Turkey, I am told of the civilization in Egypt at the time of Akhenaten. If I am looking at the rise of Gothic architecture and the expansion of mediaeval cities in the thirteenth century, I am reminded that this was the period when Pagan, that great city in Burma of 30 square miles was at its height. If I am studying the frescoes connected with Giotto at Assisi and Padua, then I am informed that there were also monumental fresco cycles being done in China at the time. Conversely if I am in the Bishop White Gallery of the Royal Ontario Museum in Toronto looking at such frescoes, then developments at Assisi and Padua are drawn to my attention. Or if I am concerned with the rise of cities in Renaissance Europe, then parallel developments in the Moghul courts of India and new cities in China are drawn to my attention. If I look at the grand landscape planning that underlies Versailles, then I am reminded that this is partly because two of Louis XIV's envoys had seen Angkor Vat in Cambodia, that great mediaeval city which remains the largest planned environment in human civilization. Instead of seeing events in fifteenth century Istanbul simply as the fall of Constantinople, I am also given the other side of that story in terms of the rise of the Ottoman Empire. Unlike the colonial history books of the nineteenth and early twentieth centuries, the parallel button provides us with a global view of events, allowing us to see much larger patterns of culture synchronically.

6. History

If I wish to study any of these developments over time, diachronically, then I press the history button. Histories of science and technology traditionally gave only the first and latest instances of an invention. This has changed. Now, if I am interested in the development of the lifejacket, I am given an encyclopaedic list from the first recorded instance in Assyrian times, through various Renaissance examples, to the present. It is the idea which Max Müller envisaged, Pitt Rivers developed in his essay *On the Evolution of Culture* (1875) and which Montelius first demonstrated in a serious way in his monumental *Die Ältere Kulturperiode* (1900-1925). IBM subsequently pursued this approach in an important exhibition in the 1980's. As a result we no longer look upon Leonardo da Vinci's lifejacket as an anomaly in isolation. We are able to see where it fits into a larger historical development and can discern patterns of continuity amidst developments.

This method has also transformed our approach to art history. With a theme such as the Annunciation, we are able to follow its development not only in painting but also in other media. Hence if I am in a museum or a library in front of an illuminated manuscript of an *Annunciation*, then I can see how the iconographic treatment on this page relates to other examples and where it

stands within the tradition concerning this theme. The same applies to other themes such as the *Baptism of Christ*. Hence, as in the case of scale, I am able to see new connections between high art (painting, sculpture) and the so called minor or decorative arts.

The history of an object need not involve development and may nonetheless change with time. The Arch of Constantine offers a striking case in point. It was built c. 312-315 A.D. In the course of the Middle Ages it was largely buried. In the sixteenth century excavations began to bring it back into view. A series of drawings and engravings from the time of Francisco de'Hollanda and Du Perac, through Piranesi allow us to follow this re-emergence with surprising clarity. Hence we can trace how the rebirth of culture during the Renaissance was in part due literally to an unearthing of ancient exemplars, a problem to which the painstaking work of Bober and Rubenstein drew our attention in the 1960's and 1970's.

In some cases such as the six petalled geometrical flower, this new encyclopaedic approach has brought to light the universality of basic symbols and motifs. If I am in the Royal Ontario Museum and see this motif used ornamentally on a bowl, I may decide to study its history. When I return home I learn that it was well known in Chinese ornament, was common in Roman mosaics and remained a popular architectural motif in Austria and Germany since the fourteenth century; that Leonardo used it in his transformational geometry and that it is even found in Nature in certain kinds of fish. All this has made it obvious that ornamental motifs are much more than a colourful branch of the decorative arts. They are linked with the intellectual traditions of the cultures in which they arose.

If we examine other motifs, we discover that they are specific to a given culture, country or religion, e.g. used only in Mayan or Aztec, in Japanese or Korean, in Jewish or Muslim contexts. While we must take into account that many earlier examples will no longer be extant, a quantitative survey will give us some impression of how widespread was a given motif, whether it was used only for a brief period or whether it be one of those Jungian symbols of the collective unconscious ever recurrent in new and subtle variants; whether it affected only one type of art, such as painting, or permeated expressions of culture at every level. All this has taught us that material culture is not in opposition to intellectual culture. Rather it is a challenge of discovering the ways in which ideas of the mind were given material expression. Plato and the neo Platonists in the school of Plotinus had considered one version of this story, where every material expression was seen as an imperfect copy of a perfect world of ideas, and in one respect they were right. For why else would each new civilization inevitably abandon the greatest monuments of the civilization that preceded it? Yet it is not merely a question of the Fax principle being applied to creation. The true marvel lies elsewhere, in recognizing how a few ideas have become central themes in every sense and have inspired expressions at every level of culture. Mona Lisa may live in the Louvre but her wry smile has spread across many another canvas, around our morning coffee cups and even along the cloth of bath towels. The greatest themes in art and literature are not the unknown ones, but rather those familiar to us all.

The new encyclopaedia has taught us to explore how images move through different levels and even seemingly contradictory levels of culture. There were times in the past when persons argued that greatness pertained to an isolated branch of either high culture or some other elect group. We now recognize that true greatness transcends the horizons of any single level of society.

Shakespeare, for instance, had as much to say to persons on the street immersed in their country and folk traditions, as to the courtly members of his audience. In an earlier generation scholars such as Frye pointed to these realities and the R.E.E.D. project confirmed that there were unexpected parallels between provincial customs and Shakespeare's plays. The encyclopaedia has further enriched our picture of this interconnectedness of things, and led us to rethink the whole question of elite culture. The worrying of pundits about canons and their constant bickerings about what and who should be admitted are now recognized as part of a bigger picture which has to do with whether the corpus, which is merely the common ground for discussion in a civilized context, truly reflects the multivalent levels of the society which it seeks to define. Paradoxically elitism at its best is truly democratic.

7. Theory and Practice

Material culture in museums and the larger story of human culture that it reflects is clearly much more than a simple record of what humans have done. It is intimately related to the development of theories about what has been, can and should be done. For a long time connections between man as maker (*homo faber*) and thinker (*homo cogitans et ludens*) were forgotten because the objects were collected in museums and art galleries, while the theoretical writings in books were stored in libraries. Effects of *entasis* were evident in columns of buildings: principles of *entasis* were discussed in books by Vitruvius and his followers. Perspectival effects were in paintings: the principles behind these effects were stored in books and manuscripts in libraries.

This has now changed. Correlations between practice and theory have been codified. So when I now stand in front of a cylindrical form in architecture or in a painting, I am able to trace the history of abstract and concrete versions of that form. It is also possible to trace changing relationships between practice and theory. In early civilizations practice existed almost to the exclusion of theory. In the West, during the Renaissance, theory codified methods already established in practice. Since the seventeenth century, theory has increasingly explored new possibilities and thus acquired a predictive function with respect to potentials of practice. Indeed the encyclopaedia has made us aware that a central reason for what McNeill has provocatively termed the *Rise of the West*, lies precisely in the unique ways that it has forged links between theory and practice, to the extent that until recently R. and D. became so intertwined in the minds of some that the traditions of disinterested scholarship which are another central feature of western culture were in danger of disappearing. The encyclopaedia has reminded us that most of Leonardo's work in so called practical matters such as weapons and fortifications was largely derivative. His most fascinating and original work involved topics that seemed completely impractical: dissecting corpses and developing a method for drawing their contents; watching the way birds fly; studying the way water flows etc. Had Leonardo only done the kinds of things that Cesare Borgia and his counselor Machiavelli wanted, had scientists only stuck to practical paths, western culture would never have become the rich and complex phenomenon that it is.

8. Abstract and Concrete

Even in the late twentieth century my father used to speak of the development of knowledge as if it were a question of increasing levels of abstraction, as if an algebraic formula were better than a picture. Hegelianism was not dead even then. Today we look at all this quite differently. We

recognize that a formula represents one end of a spectrum linking abstraction with the concreteness of physical objects. Between these two extremes are diagrams, figures, photographs, models and a series of other bridge building devices. Knowledge is not simply at one end of the spectrum. It is the whole spectrum and the system that allows us to recognize and organize this spectrum. Without computer networks we could never hope to gain systematic access to the myriad connections that are entailed in this. The networks are our new equivalents to catalogues, except that they tell us not only about titles but also about contents, words, numbers, diagrams and pictures.

9. Static and Dynamic

There was a time when knowledge, especially mathematics which was taken as the paradigm for knowledge, seemed to be static; something which could be summarized in postulates, axioms and theorems in the manner of Euclid. In the nineteenth century mathematicians such as Gauss, Lobachevsky and Riemann explored what happened if one questioned those postulates, and axioms. They discovered new possibilities, that truth was never a single plane, seldom a simple one and usually a complex plane. The twentieth century went further and explored the transformations and symmetries underlying these. In so doing the twentieth century revived the mediaeval tradition of the geometrical game (*de ludo geometrico*), adding to it a dynamic element whereby mathematics became a new catalogue of patterns of motion, and transformation. The growth of chaos theory and fractals gave new impetus to this approach. In the meantime these insights have affected the way we look at the whole of knowledge. Knowledge is concerned with systems: how they grow, change, transform. The new computer networks reveal how static and dynamic aspects are interdependent.

10. Conclusions

Knowledge was once conceived as a static quest for definitions in terms of substance. The new networks have shown us that knowledge involves a systematic treatment of scale, context, variants, parallels, history, theory and practice, abstract and concrete, static and dynamic aspects. Knowledge is also the system that allows us to make connections between Nature and humans, between what persons think and do, between what they imagine and make. That is why museums and other cultural institutions have become so important in the last decades. Once upon a time they were seen more as storehouses for outmoded things. Now we see that they are our keys to knowledge past; our only hope of understanding the continuities that have led to present knowledge, and our richest resource for exploring horizons for future knowledge. The networks are more than handy tools and entertaining pastimes. They help explore vital questions of knowing what we are and understanding the very processes of how it is that we come to know. And as with all great outer achievements, the networks challenge us to look afresh at the inner world that made this possible.

IHPST Victoria College Toronto
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