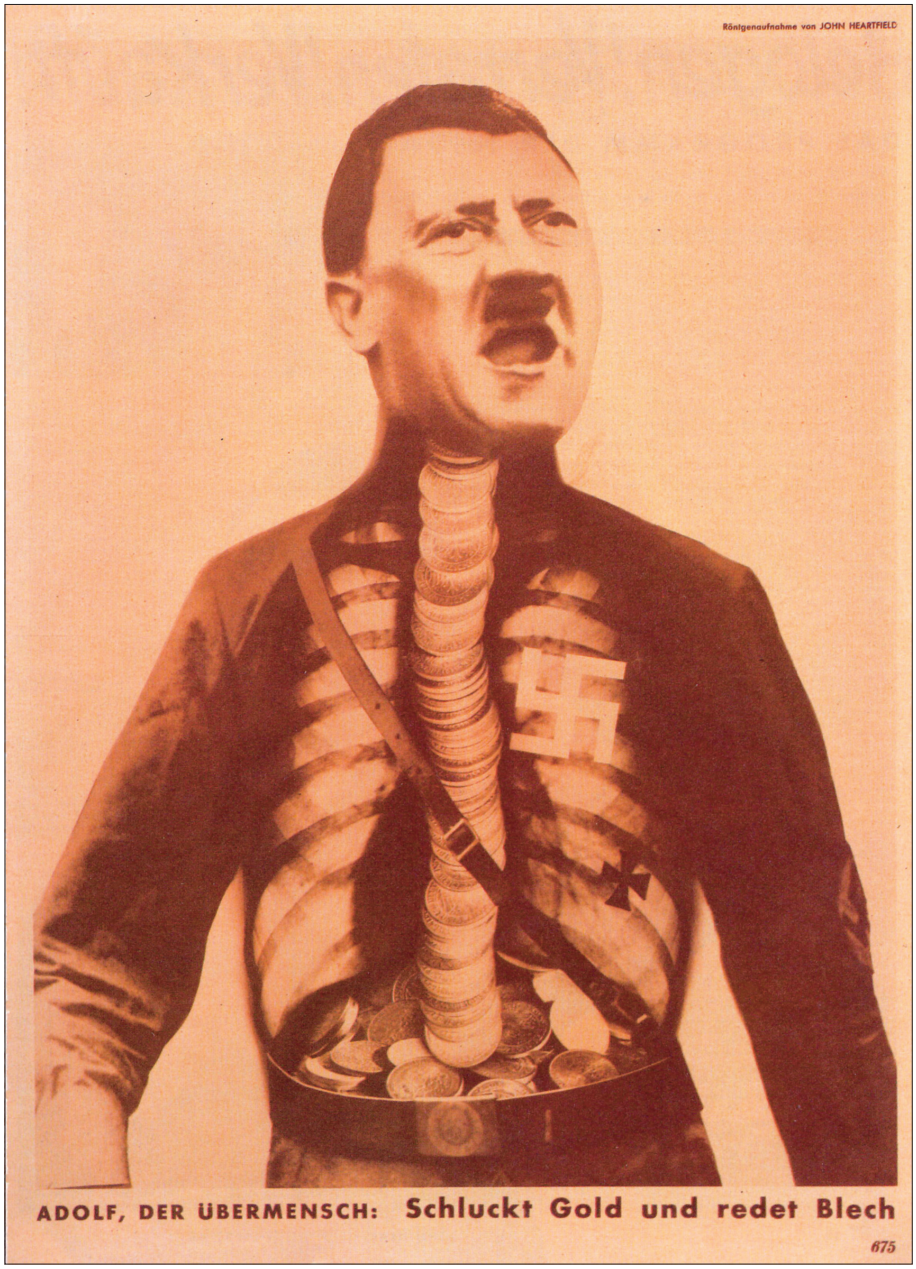


26

Sabine Kriebel

Using Photography as a Weapon

Most images in this book have no immediately apparent political meaning. By comparison, many images studied in the history of art have overt religious, ethical, and political significance.

The related field of visual studies is concerned with images in mass communication — many of which have political purposes. From a visual-studies standpoint, *all* the images in this book have their politics, even if it goes unremarked.

Visual studies sets out to use images — *any* images — as occasions to educate students as reflective members of society. Visual studies is therefore opportunistic: it can take images from any field and read them with an eye to the political work they do.

This chapter gives a brief sample of the analysis of the politics of images.

John Heartfield

John Heartfield was the pseudonym adopted by the German artist Helmut Herzfelde to protest German chauvinism and anti-British sentiment during World War I; he openly took sides with the enemy during period of virulent nationalism.

Anglicizing his name signaled Heartfield's internationalist convictions, as much as it declared his Dadaist predilections. His involvement with Berlin Dada was a leftist, anti-militarist, anti-bourgeois protest in which he developed the medium of photomontage as an anarchist weapon. During the 1920s and 1930s, he became the image-maker of the German Communist Left, producing a copious supply of mass-reproduced posters, book jackets, and satirical photomontages. Most significantly, he made 237 photomontages for the popular left-wing *Arbeiter Illustrierte Zeitung* (*AIZ*), or *Workers Illustrated Magazine* from 1929-1938. As a result he was regularly persecuted by the National Socialist regime, spied on by Gestapo agents, and twice forced into exile because of his provocative pictures.

Seizing viewers' attentions

The goal of Heartfield's photomontages was to seize the passing gaze in a public sphere saturated by the photographic image. These photomontages sought not just to attract the eye, like a seductive consumer advertisement, but labored to stimulate political consciousness through aggressive visual means. They aimed to reveal the realities behind appearances, to take the supposedly incontrovertible "realness" of a photograph, and by cutting and reassembling photographic images and text, manipulate them to elucidate certain conditions not revealed by the original image.

The Meaning of the Hitler Salute — Millions Stand Behind Me!

The photomontage on the next page was published on the cover of *AIZ* on October 16, 1932, just two weeks before an election. It lays bare the "millions" that stand behind Adolf Hitler. Here we see capitalism, translated into corpulent excess punctuated by gleaming ring, handing a diminutive Hitler millions of Rentenmark. The small Führer hand flops back limply, rather than thrusts dynamically forward, to nonchalantly receive those millions of support.

Adolf the Übermensch

Heartfield's *"Adolf the Übermensch: Swallows Gold and Spouts Junk"* of July 17, 1932 (the opening image in this chapter) "sees through" Hitler's persuasive speeches using a technological device more potent than the photographic lens, penetrating surfaces where cameras can only record them. Through an X-Ray photograph of Hitler's insides, we discover that Hitler's entire gastrointestinal tract is clogged with coins.

Like photomontage, the X-Ray is a visual device that intervenes in the surfaces of reality in order to lay bare "true" conditions. The montage was plastered all over Berlin in anticipation for the July Reichstag elections and provoked fistfights between Nazis and Communists.

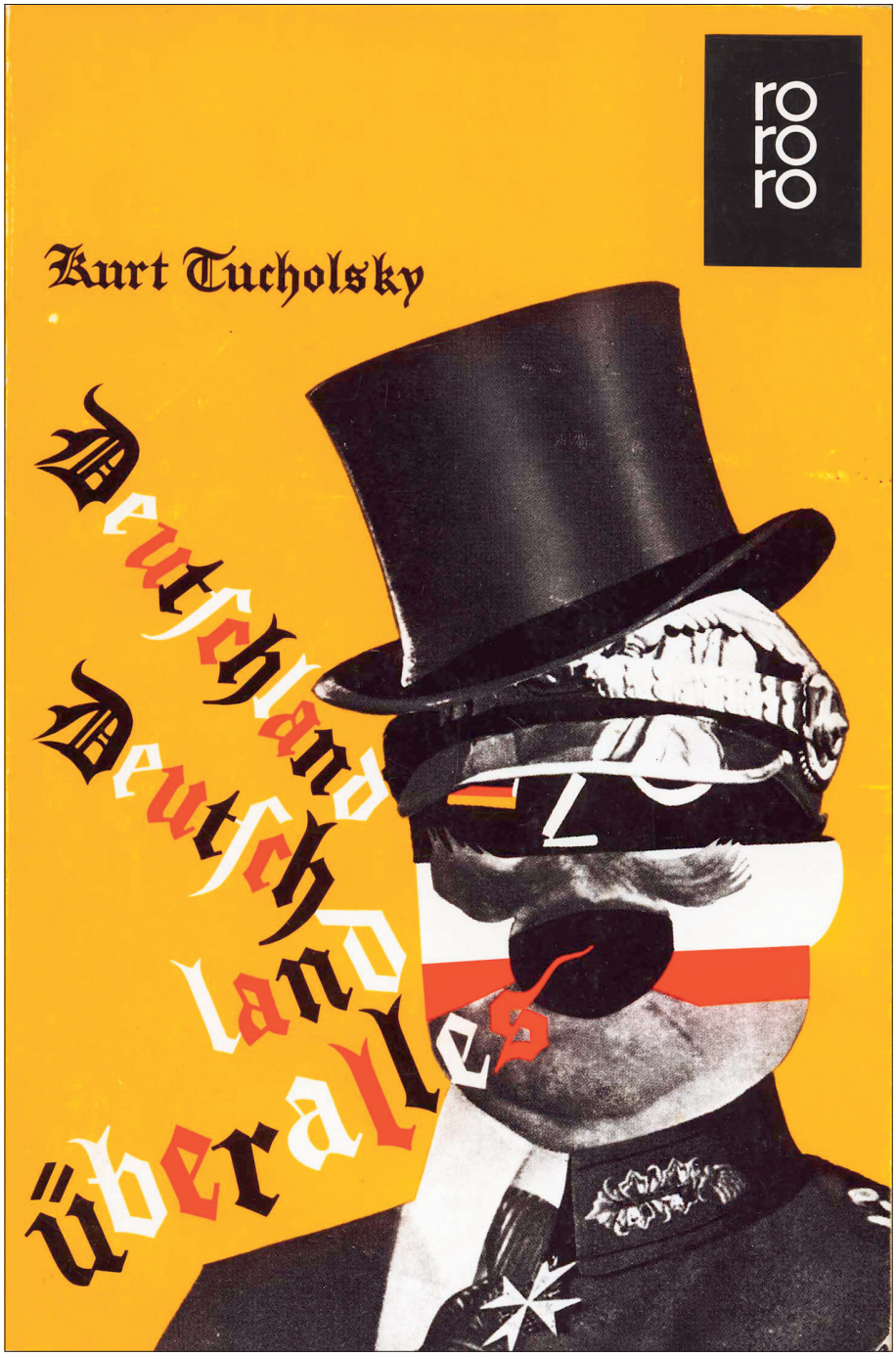
Deutschland Deutschland über Alles!

While John Heartfield gained prominence for his radical leftist photomontage, he was also greatly admired by the commercial sector, particularly for his election posters and book jacket covers.

His photomontages for the satirical book *Deutschland Deutschland über Alles!*, a text-image collaboration with the well-known author Kurt Tucholsky, was widely acclaimed and also became the focus of public controversy in 1929.

The framed print

By contrast, Heartfield's 1924 dust jacket for the collected stories of the best-selling American author Jack London is more conservative in its design and content. The montage juxtaposes a photographic portrait of Jack London, a com-



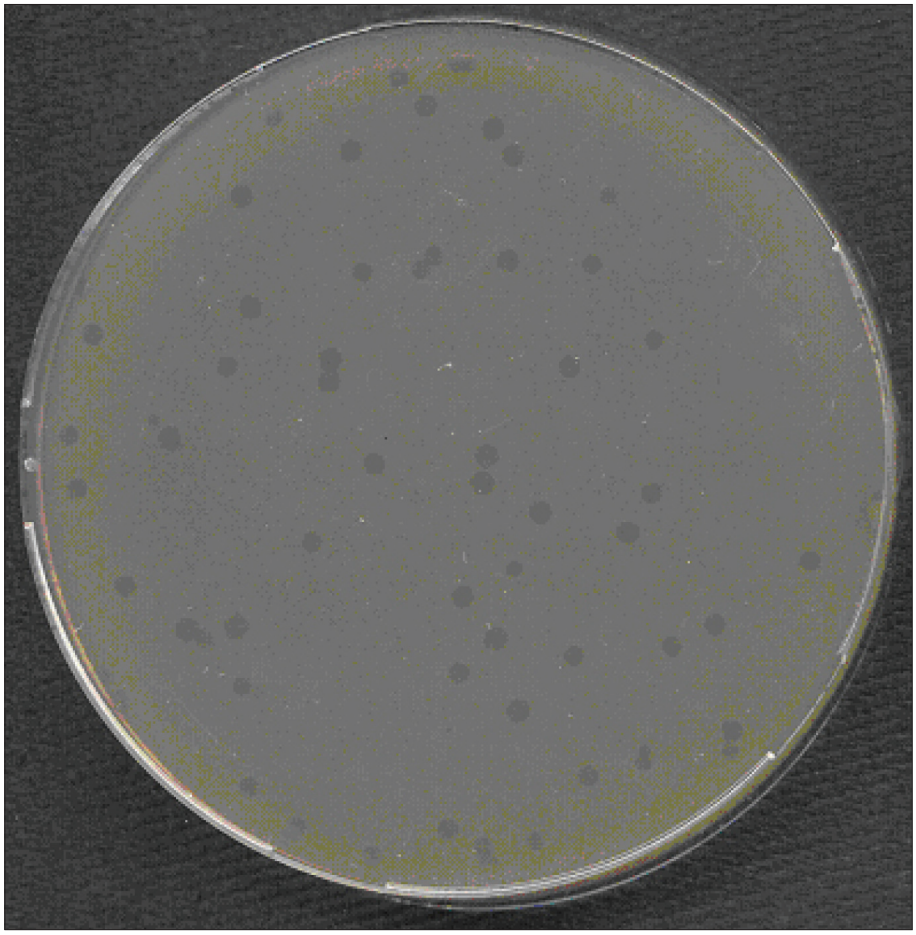
mitted socialist, with visual fragments associated with his stories of high adventure and survival. The cover montage not only reveals the book's assembled contents in a single glance but also reinforces London's leftist message of resolute and heroic struggle against a hostile environment.

Photomontage as a medium

More economical than film, more pervasive in daily life than the cinema, photomontage in the 1920s and 1930s became a political weapon, a form through which to shape mass-consciousness before radio and television were competitive forms of everyday information.

For further reading

Dawn Ades, *Photomontage* (London: Thames and Hudson, 1976); David Evans and Sylvia Gohl, *Photomontage: A Political Weapon* (London: Gordon Fraser, 1986); David Evans, *John Heartfield, AIZ-VI, 1930-1938* (New York: Kent Fine Art, 1991); and Peter Pachnicke, *John Heartfield* (New York: Harry Abrams, 1992).



27

Visualising Viruses

Stephen McGrath

The biologist Stephen Harrison wrote a book called *What Does a Virus Look Like?*. In it he considered over ten different kinds of images of viruses, made with different instruments. They are not all compatible — they cannot be assembled into one perfect picture. Harrison concluded that viruses don't "look like" anything except the sum total of those images.

William Wimsatt, a philosopher of science, has called this problem the "thicket of illustration": no one strategy will do, he notes, when it comes to picturing things as complex as DNA. Here we consider five different ways of producing images of viruses.

The plaque assay

Phages are obligate parasites of bacterial cells. They have no intrinsic metabolism and are totally inert in the absence of their bacterial hosts. They attach to the bacterial cells in a tail-first orientation, triggering the release of the DNA from the phage head, where it has been held under immense pressure.

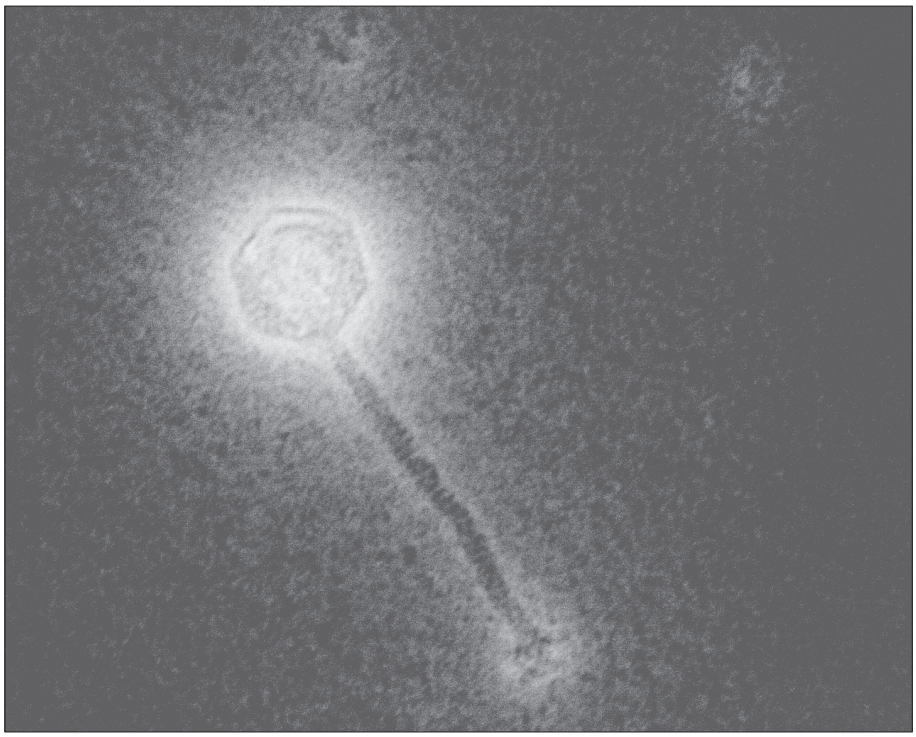
The *plaque assay* is a method used in the laboratory to visualize the bacteriophage life cycle. An agar plate is seeded with a "lawn" of bacteria that has been mixed with some phages (see opening illustration). The clear spots on the plate show where a phage has infected a bacterial cell and the progeny phages have killed the cells around it, causing a clear zone or "plaque."

At this stage, no special optical equipment is necessary to locate the phages.

Transmission electron microscopy

The main structural features of phages can be seen in the large TEM image, below. This is the lactococcal bacteriophage Tuc2009. Toward the top is the head, containing the DNA; then the tail; and at the bottom the structure that recognizes the host cells and contains the adsorption apparatus.

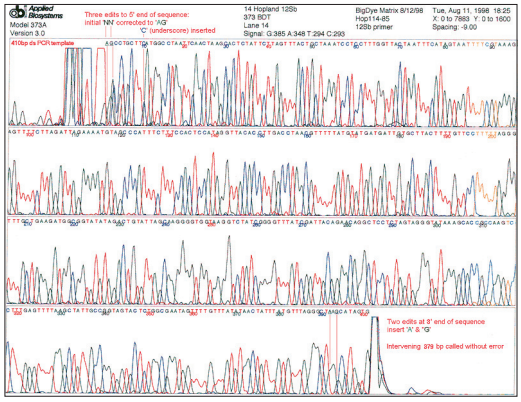
TEMs work on the analogy of light microscopes, but they shine a beam of electrons through the specimen (another example is in Chapter 21, page 212). Whatever part is transmitted is projected onto a phosphor screen for the user to see. This is a typical, full-resolution TEM image; the original is 1280 x 1024 pixels in 16-bit grayscale — these images do not need to have ultrahigh resolution.



Gene mapping

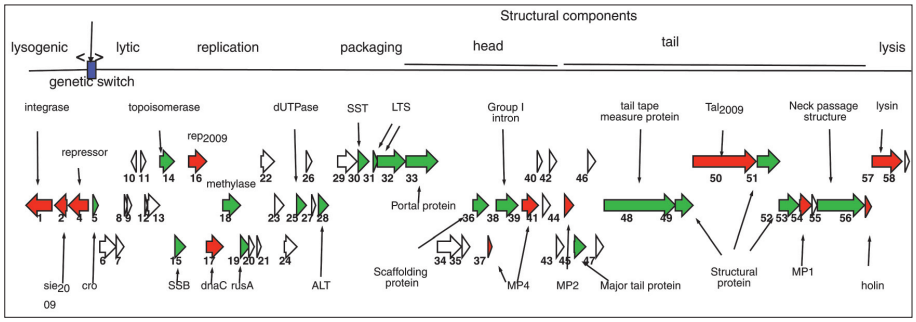
The first step in gene mapping is sequencing. The familiar base pairs of DNA — the rungs in its ladder — are sequenced. The graph that results is called a chromatogram. The names of the base pairs can be read off the graph (in five print, below the horizontal baseline); the heights of the peaks show the confidence level of the analysis.

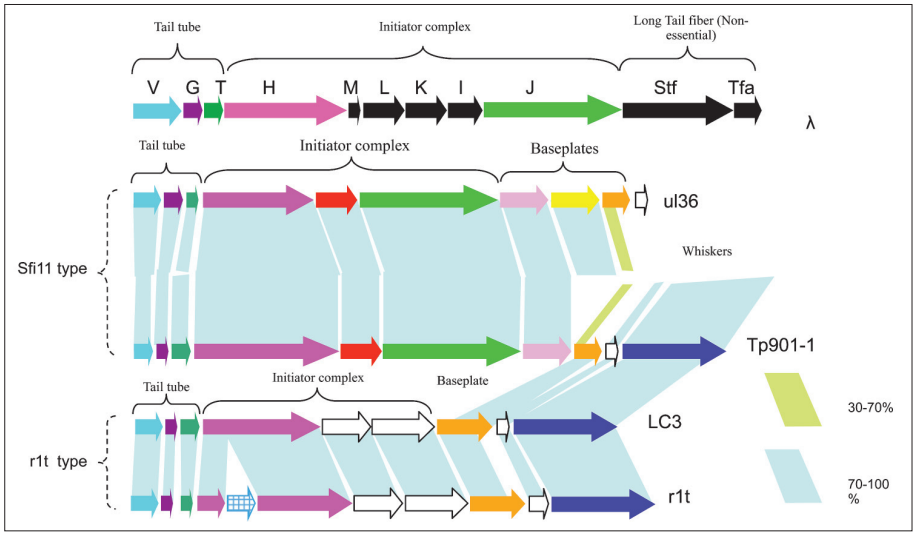
The graph reproduced below illustrates the genome of the bacteriophage Tuc2009. Its complete genome sequence has been determined and the individual



genes contained within it identified using a set of criteria based on the recognition of patterns and signatures in the DNA sequence. Each of the arrows represents an individual gene. The arrows are arranged in three rows, just to make them more visible. At the top of the image is a map of the parts of the phage that are formed by the different genes.

The coloured arrows indicate genes coding for proteins to which physiological functions have been assigned. Red indicates that a function has been assigned on the basis of experimental work,





whereas green denotes that a function has been assigned on the basis of the similarity of that protein to experimentally verified proteins encoded by other phages. Computer analysis allows us to predict which proteins will form part of the bacteriophage structure, but the actual visualization of these proteins is the only definitive proof.

The gene sequence in the Tuc2009 can then be compared with genes in other bacteriophages (diagram at the bottom of the previous page). The genes occur in slightly different places, but they can sometimes be correlated, making it possible to determine some of their functions.

Electrophoresis

The electrophoresis technique is used to separate and visualise individual proteins in a biological sample. (Compare Chapter 24, showing gel electrophoresis of cheddar cheese.)

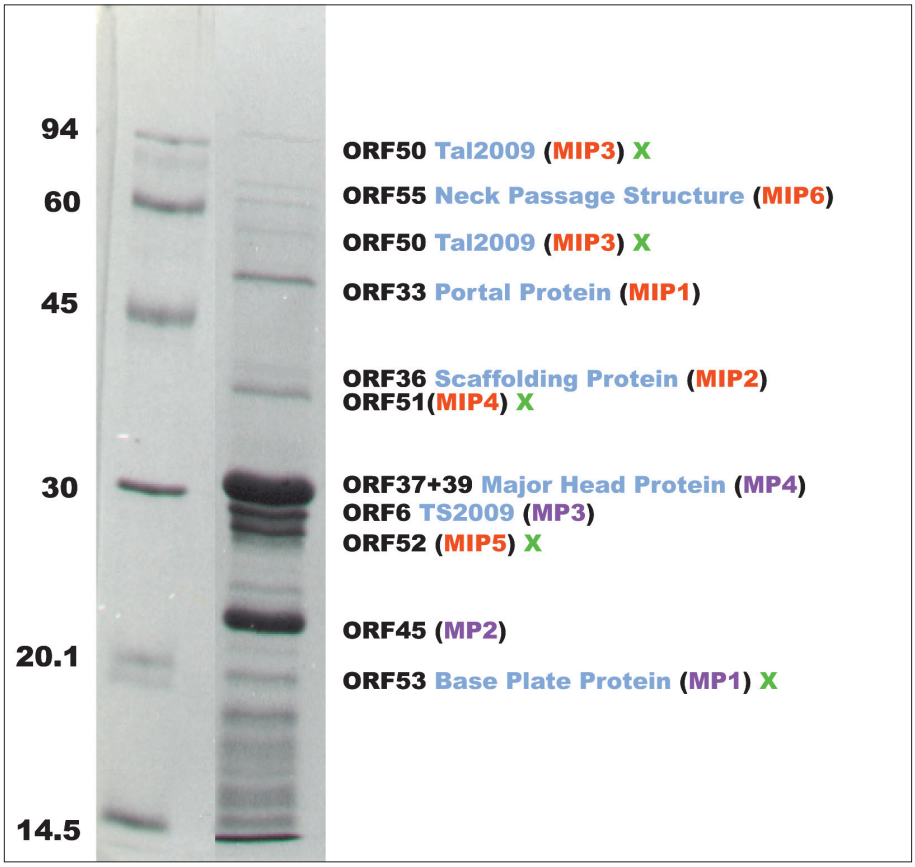
The protein bands in lane 1 (image on the next page) represent a standard mixture of proteins of known size to which test proteins are compared. Each of the bands in lane 2 represents individual proteins that constitute the bacteriophage. Single bands representing individual proteins may then be cut from the gel and further analyzed in order to determine the sequence of amino acids that they contain.

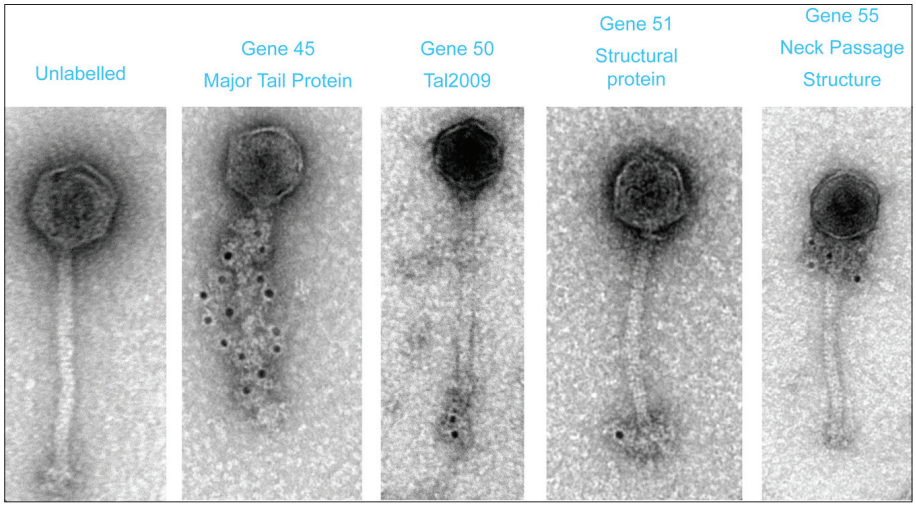
This type of analysis is dependent on the successful separation of the individual protein constituents into discrete homogenous bands as well as the presence of sufficient concentrations of proteins in these bands. The amino acid sequences may then be compared to those predicted from the gene map, thus allowing the identification of the structural proteins. You can compare the labeled protein bands in lane 2 to the arrows in the gene map (middle illustration on the previous page) to see the location of the genes that encode the proteins.

Immunogold electron microscopy

Data from the electrophoresis analysis reveals whether a particular protein forms part of the phage structure or not, but it doesn't locate the precise location of the protein on the bacteriophage. Antibodies that are highly specific for individual proteins may be generated using a variety of genetic and biochemical techniques. Labeling these antibodies with gold makes them appear as dense black spots when viewed under a transmission electron microscope. When the antibodies are mixed with the bacteriophage they specifically recognize and "tag" their cognate protein on the bacteriophage structure, thus marking the precise location of the protein.

The first panel is a TEM of the Tuc2009 bacteriophage without the addition of gold-labelled antibodies. Gold-labelled antibodies specifically recognizing


94
60
45
30
20.1
14.5
ORF50 Tal2009 (MIP3) X
ORF55 Neck Passage Structure (MIP6)
ORF50 Tal2009 (MIP3) X
ORF33 Portal Protein (MIP1)
ORF36 Scaffolding Protein (MIP2)
ORF51(MIP4) X
ORF37+39 Major Head Protein (MP4)
ORF6 TS2009 (MP3)
ORF52 (MIP5) X
ORF45 (MP2)
ORF53 Base Plate Protein (MP1) X


Unlabelled
Gene 45
Major Tail Protein
Gene 50
Tal2009
Gene 51
Structural
protein
Gene 55
Neck Passage
Structure

individual proteins are added in the other pictures and are indicated on the panels. Their encoding genes are also included — the same numbers appear on the image just above (top of p. 255).

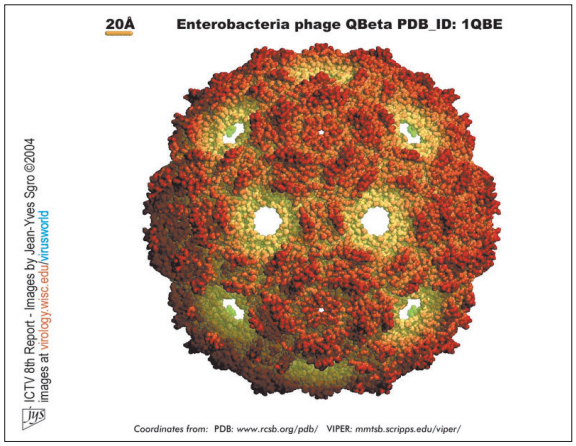
The process of generating these antibodies can be laborious and expensive, and the success of the tagging of the specific protein on the phage is dependent on a number of critical factors such as the quality of the antibody and the accessibility of the protein on the phage structure to the antibody.

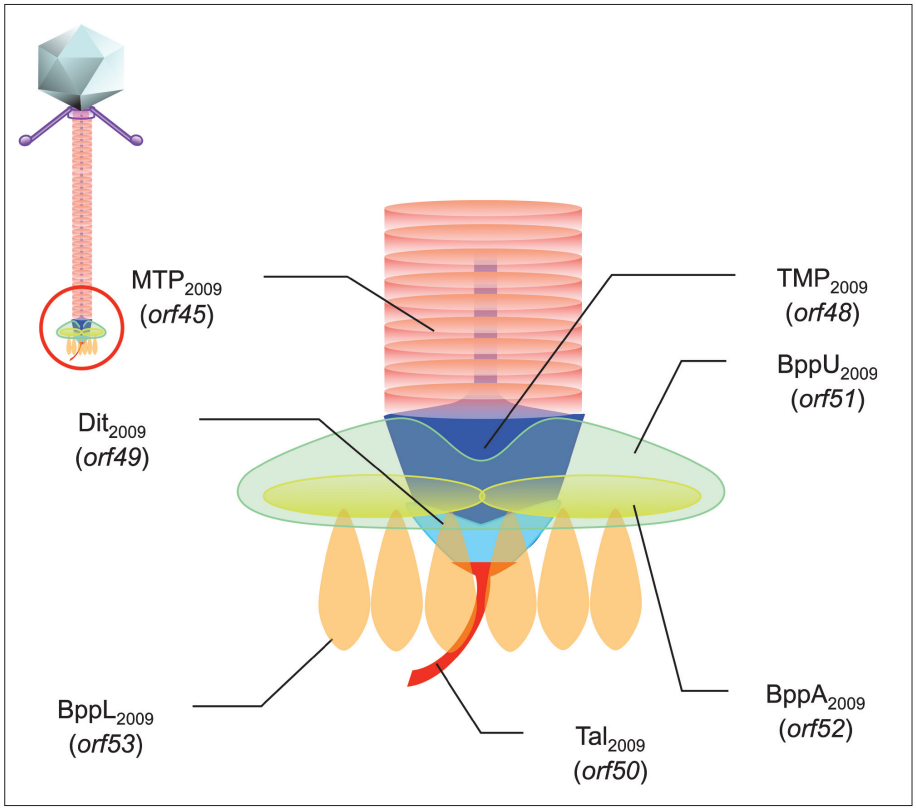
Other kinds of pictures

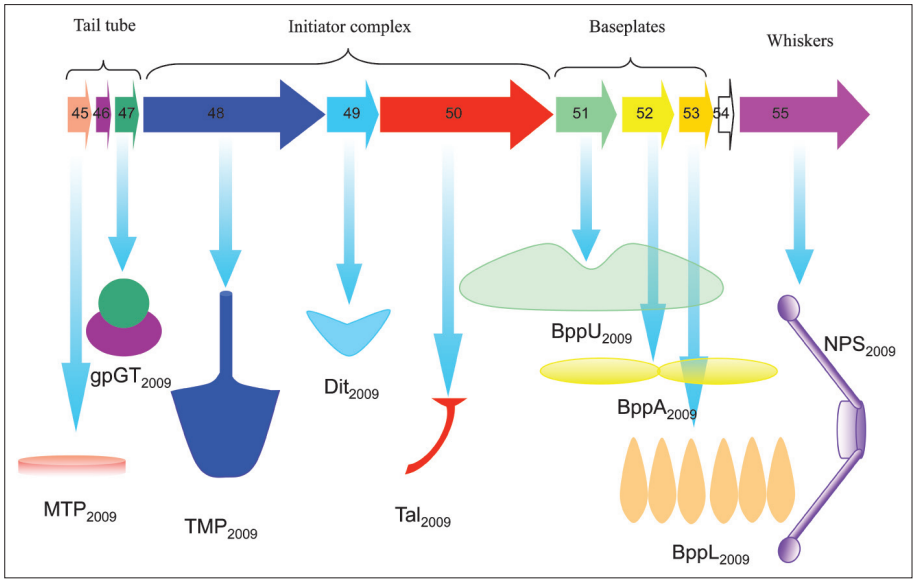
In addition to these kinds of images, virologists also make extremely detailed images of all the atoms in parts of the bacteriophages (image at the bottom of this page). At the other end of the scale of detail, virologists find it useful to make schematic pictures of the different parts of the virus, to model how they might be put together (image at the top of the next page). Ideally, each part corresponds to a known gene (photo 10).

Conclusions

These are just eight of the ten or more methods of visualizing viruses. Clearly, no single representational method is sufficient. The opposite of the "thicket" of representation is the assumption, common in fine art, that a single image — say, the *Mona Lisa* — is not only sufficient but definitional for its subject. No further representations can even be imagined, except pastiches. In this case, however, the object does not exist except as a series of partly incommensurate representations.

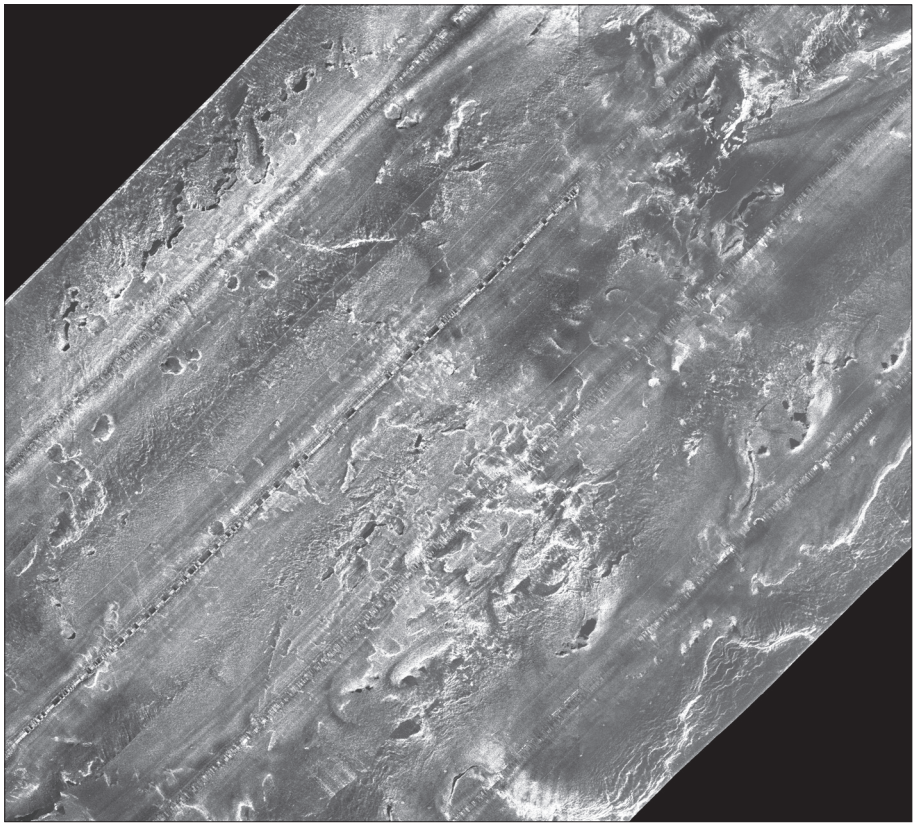



MTP2009
(orf45)
TMP2009
(orf48)
BppU2009
(orf51)
Dit2009
(orf49)
BppL2009
(orf53)
Tal2009
(orf50)
BppA2009
(orf52)


Tail tube
Initiator complex
Baseplates
Whiskers
45
46
47
48
49
50
51
52
53
54
55
gpGT2009
MTP2009
TMP2009
Dit2009
Tal2009
BppU2009
BppA2009
BppL2009
NPS2009

For further reading

More on the visualization of viruses: Stephen Harrison, "What Do Viruses Look Like?" *The Harvey Lectures* 85 (1991); James Elkins, *The Domain of Images* (Ithaca NY: Cornelll University Press, 1999), chapter 3.



28

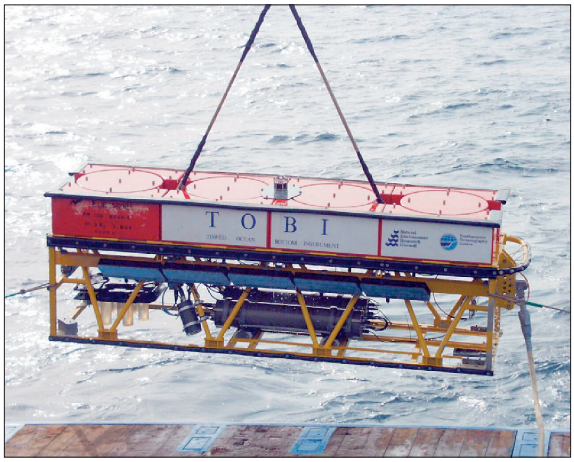
Imaging the Seabed using Side-Scan Sonar

Andy Wheeler

To image the sea floor, it is necessary to translate one kind of sensing — hearing sound echoes off the seabed — into another kind — ordinary greyscale images. Like all translations, this one produces "false friends": forms that look familiar, but are not.

How the image was taken

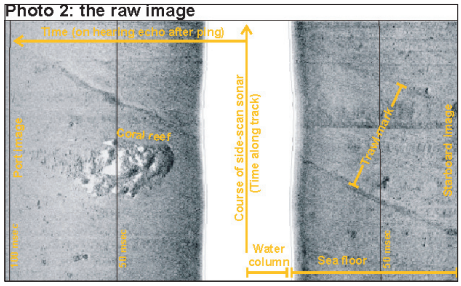
The side-scan sonar system used to acquire the image is called TOBI. TOBI weights 1.8 tons; it was towed 300 meters above the seabed, several kilometers behind the vessel. TOBI emits a ping and then listens for the return echo on two transceivers (port and starboard).



Side-scan sonar

The side-scan sonar produces raw data that can be plotted at sea in real-time. After the side-scan sonar emits a ping, the transceivers initially record silence as the sound wave travels through the water column. This is followed by the first echo from the seabed directly below sonar where it is the nearest. The echo continues, ending with the last return from the seabed furthest away on the extreme port or starboard. The

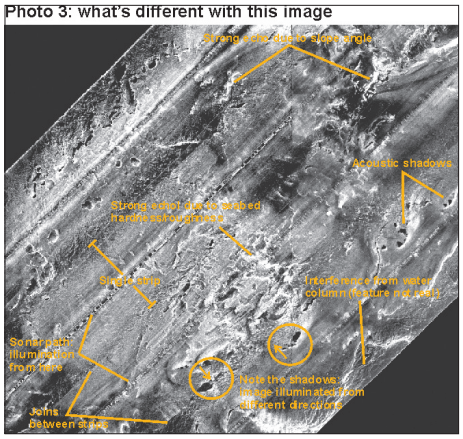
Photo 2: the raw image



time delay in hearing the echoes, measured in milliseconds, can be translated into distance from port or starboard. In this way the sonar beam scans the seabed. When the echo is fully recorded, a new ping is emitted and another echo is recorded — by that time the apparatus has moved forward so it images the next piece of the seafloor. By plotting the echoes against time in grayscale, one next to the other, a preliminary image of the seafloor is obtained.

In the photo above, the starboard image is on the right, and the port on the left. The ship travels over the seabed as shown. A gap, directly below the ship, is marked "water column." Two features of the seafloor are marked: a coral reef, and grooves left by trawling.

Photo 3: what's different with this image



What different about this image

It is tempting to look at the finished image as if it is a black and white photograph of the seabed. In fact, it is a black and white *sonograph* of the seabed that has been made from a number of strip images.

It's possible to list the features that can be misleading:

First, there is the series of diagonal lines across the image following the path of the sonar. (They do not indicate features of the seafloor.)

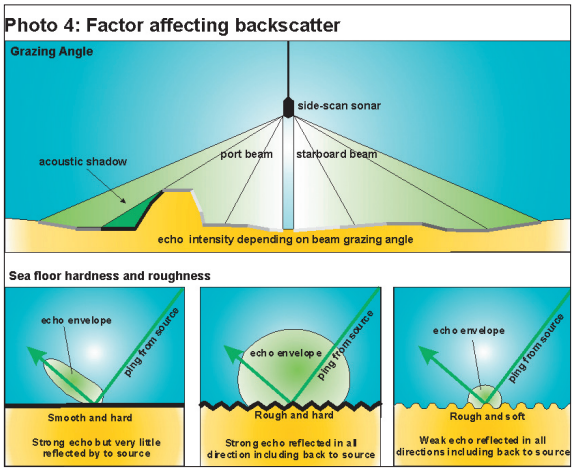
Second, there are fainter lines where the strips join. (Marked at the bottom of photo)

Third, there are shadows, but they do not behave in a familiar fashion.

Sonar shadows

Each strip is illuminated from the center (from the sonar path) out to the edge so that acoustic shadows (like normal shadows) fall to the left and right of this line. When the strips are put together, the new image is illuminated by sound in a very unusual way: from the center of each strip rather than from one direction only.

More oddities



Fourth — continuing the list of things that aren't "normal" about this image — the interpretation of bright and dark areas also differs from how we would see a black and white photo. Dark areas are formed from seabed that returns weak echoes and bright areas from seabed that gives back strong echoes.

In a similar way to photographs, this is partly caused by slope angle (grazing angle): steep slopes facing the sonar path are bright (like sunlight slopes) and slopes facing away are dark. However, strong echoes (bright values) can also be formed by hard or rough seabed, which reflects more sound.

The bottom of this diagram shows even more complexities of hardness and roughness. The image at the bottom of the previous page shows a couple of the permutations (middle and top). This does not correspond well with ordinary objects illuminated by light: this image has to be *learned* before it can be seen.

And one last oddity

Fifth, an illusion is formed when sound is bent (or diffracted) by density differences in the water column producing a series of wavy lines due to echo return clustering. This is apparent at the edge of imaged strips where the echo has had to travel the furthest. It is marked on the lower right of the labeled photo at the bottom of the previous page.

How the image is assembled and cleaned up

To produce the final image, the raw data from the side-scan sonar needs to be processed. First, the port and starboard images are stitched together by removing the silent "water column." This has been done large image.

Next, across-track time has to be converted to across-track distance based on the speed of sound through water. Then, along-track time has to be converted to along-track distance based on the tow speed of the sonar and the ping-rate.

The image then has to be "navigated" — its global position fixed — based on ship's position (as determined by satellite) and the distance of the sonar behind

the vessel. The overlaps between the outer edges of adjoining strips are neatly cut together. The entire image can then be enhanced to maximize density contrasts.

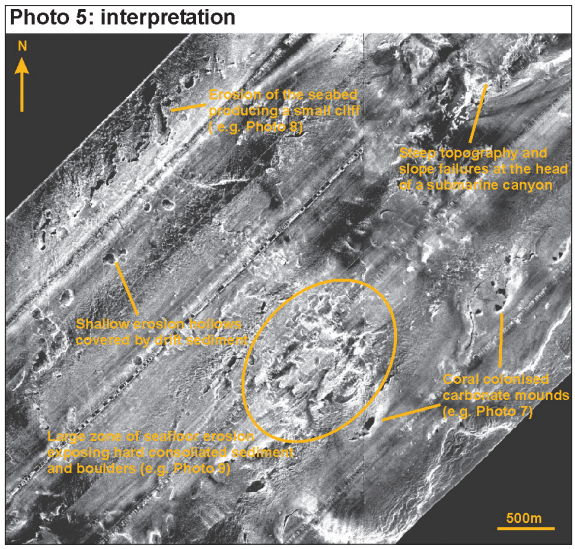
What is the topography?

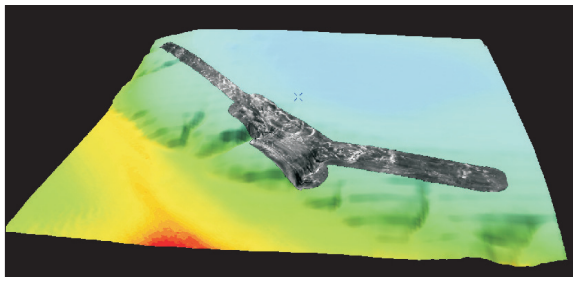
When the image is complete, the trained eye can start to interpret the seabed features. There are two main difficulties with interpretation.

First, the image contains no topography so it can be difficult to tell if a change in grayscale is due to a change in slope, a change in seabed type, or both. This can be overcome by draping the image over a topographic reconstruction of the seabed obtained by depth soundings using different acoustic techniques. In the image at the bottom of this page, submarine canyons not obvious on the side-scan sonar become clearly visible. (Notice the canyons in this overlay, and compare them with the same features on the large image.)

Second and more fundamentally, the image is still only a grayscale image, reflecting differences in the intensity of the echo. In theory the same echo intensity can be generated by a soft but rough bottom and a hard but smooth bottom. The geologist makes a contextual interpretation, but that is only an experienced guess until it is confirmed (or "ground-truthed") by the collection of physical seabed samples or seabed photographs.

Photo 5: interpretation





The purpose of the study

This seabed mapping was undertaken to make the remote accessible. The sonar image provides a map that can be used by others to explore the seabed. The image has the advantage of not only showing seabed features but also the nature of the seabed sediment; that information is impor-

Photo 7: Irish coral reef with crinoids and fish

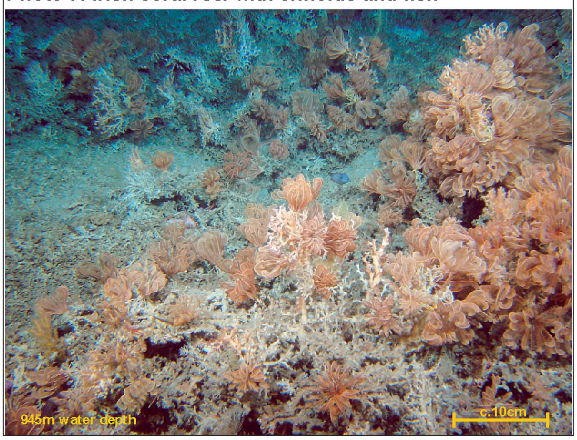


Photo 8: coral colonised top of submarine cliff

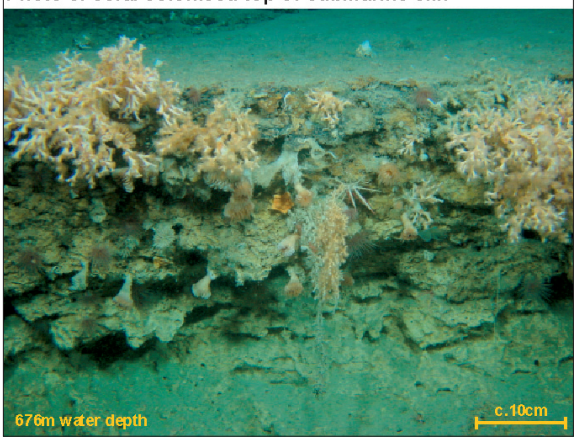
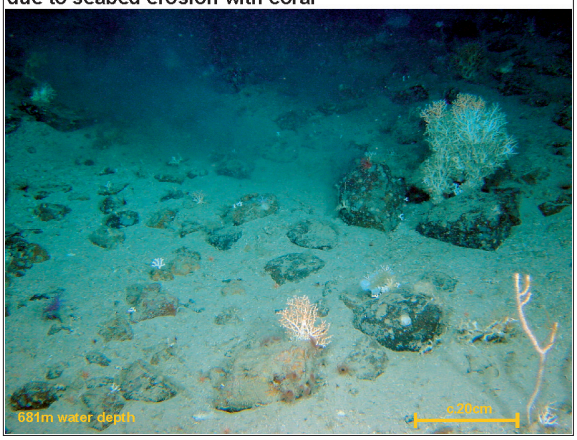


Photo 9: typical seabed showing exposure of boulder due to seabed erosion with coral



tant to fishermen trawling the seabed, marine mineral prospecting companies including oil companies, submarine cable layers and engineers who need to install seabed structures. Side-scan sonar can also be used to hunt for shipwrecks and salvage or check submarine dump sites.

The reason the university made this particular image was to understand what was happening in a particularly harsh environment where we suspected deep-water corals thrived. Following the creation of the image, a follow-up survey was undertaken "ground-truthing" interesting areas with sediment samples and video cameras mounded on a robotic submersible. Those images, shown with their original exhibition captions on the previous page, proved and refined our geological interpretations.

For instance, the bottom photo shows a boulder-strewn seabed. The boulders are too small to be seen by the side-scan sonar but they account for the strong return signal observed in that area. Without the video imagery we could only have said that there was a hard seabed there — possibly a rock platform, boulders, or something else.

Conclusion

There are two lessons here for the uses of the visual. First, as we have seen in Chapters 6,10 and 16, an image that appears to be an ordinary picture may not be. In this case, it may be necessary to elaborately re-train the eye to interpret such fundamental things as light and shade. Second, although the side-scan sonar allows us to map large areas and extract useful information it takes experience to read the results. The proof — "ground-truthing" — is a relatively simple photograph, video, or sediment sample. Mapping, here, precedes seeing.

For further reading

See first the website: www.marine-group.com/SonarPrimer/SideScanSonar.htm; then Andre M. Akhmetzhanov, Neil H. Kenyon, Micheal K. Ivanov, Andy Wheeler, Pavel V. Shashkin, and Tjeerd C.E. van Weering, "Giant Carbonate Mounds and Current Swept Seafloors on the Slopes of the Southern Rockall Trough," in *European Margin Sediment Dynamics: Side-scan Sonar and Seismic Images,* edited by Jurgen Mienert and Phil Weaver (Berlin: Springer Verlag, 2003), 203-210; Doug G. Masson, Brian J. Bett, Dave S.M. Billett, Colin L. Jacobs, Andy J. Wheeler and Russel B. Wynn, "The Origin of Deep-Water, Coral-Topped Mounds in the Northern Rockall Trough, Northeast Atlantic," *Marine Geology* 192 (2003): 215-37; Andy Wheeler, Maxim Kozachenko, Andres Beyer, Anneleen Foubert, Veerle A.I. Huvenne, Michael Klages, Doug G. Masson, Karine Olu-Le Roy and Jorn Thiede, "Sedimentary Processes and Carbonate Mounds in the Belgica Mound Province, Porcupine Seabight, NE Atlantic," in *Deep-Water Corals and Ecosystems,* edited by Andre Freiwald and J.Murray Roberts (Berlin: Springer Verlag, 2005), 571-603.

СТОЛПЪ И УТВЕРЖДЕНІЕ ИСТИНЫ.

FINIS AMORIS, UT DUO UNUM FIANT.
ПРЕДѢЛЪ ЛЮБВИ—ДА ДВОЕ ЕДИНО БУДУТЪ.

29

Metaphors of Light and Dark in Arabic and Russian Philosophy

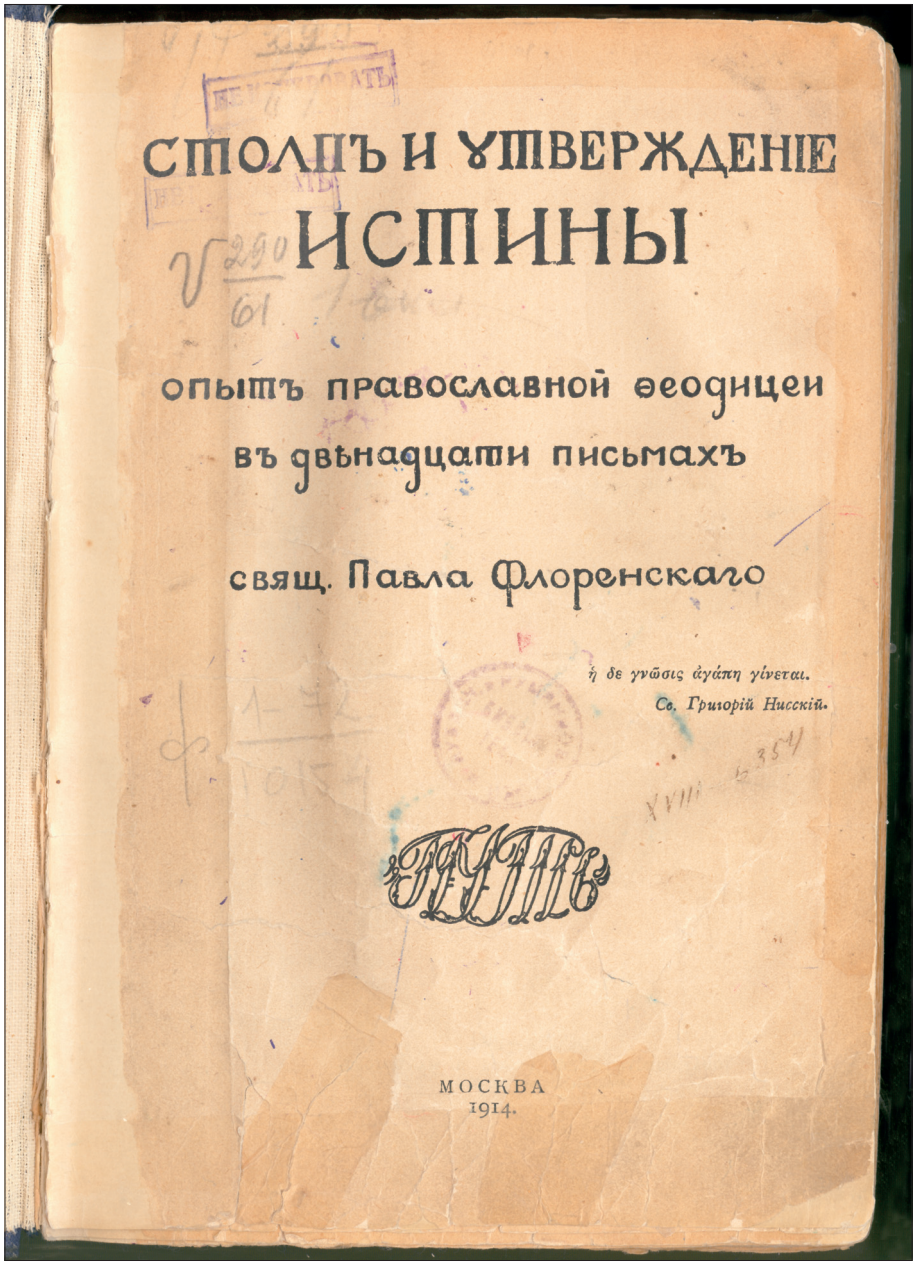
Anna Zenkova

Philosophy is shot through with optical metaphors. Hegel's use of optical metaphors is discussed in Borch-Jakobsen's book *Lacan: The Absolute Master.* In the book by Martin Jay *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* the role of vision and optical metaphors in western philosophy, particularly France, was investigated. I will consider just two examples out of the hundreds possible: Arabic Peripatetic philosophy and philosophy of Illumination, and Russian *fin-de-siècle* philosophy.

Pavel Florenskiy

The book illustrations here are of Florenskiy's *The Pillar and Ground of the Truth: An Essay in Orthodox Theodicy in Twelve Letters.* He designed the cover himself, including the fonts, and the book is self-published. The legend under the two angels, *Fenis amoris ut duo unum fiant* ("Love makes two into one") is intended to express his principal metaphysical claim: the assertion that all created coexist with each other. Consider these three key terms in his text:

Truth (истина, estina)
Darkness (темнотиа, temnota)
Clearness (ясность, yasnost')



СТОЛПЪ И УТВЕРЖДЕНІЕ
ИСТИНЫ

опытъ православной ѳеодицеи
въ двѣнадцати письмахъ

свящ. Павла Флоренскаго

ἡ δε γνῶσις ἀγάπη γίνεται.
Св. Григорій Нисскій.

МОСКВА
1914.

In Florenskiy's work, the true "act of seeing" opposes false distanced seeing. Florenskiy suggests the ontological aspects of idea and knowledge by using the example of the Russian word "truth" (истина, *estina*). He noted that the word descends from Latin verb *est* (истина: that which exists). The important factor of sense-building in Russian philosophy, he argued, is the difference "egoistic false seeing," that is "the darkness" (темнота, *temnota*) and "living true seeing," that is joint action in which subject and object flow together in "the clearness" (ясность, *yasnost'*). The egoistic concentration of self on itself leads to neuropathological conditions, namely a condition of "being in darkness" and being "separated from whole world."

Hence the opposition between "true seeing" and "false seeing" is more significant than the opposition "visible" and "invisible," or between "obvious" and "hidden". Florenskiy argues that the perception of objects takes place intuitively, and is a direct contemplation of living reality as it is in itself: it is "the act of inner union of perceiving person and perceivable object." The question about true seeing becomes a question about the true observer and his or her place in the world. The "true seeing" is a perceptible joining of subject and world in common action. To be is "to be revealed"; and "to reveal" is to find truth.

Prozrachnyj and prizrachnyj

Transparency (прозрачный, *prozrachnyj*)
Spectral (призрачный, *prizrachnyj*)

Another important conceptual difference between West European and Russian philosophy is between transparency and the spectral or mirroring function in epistemology. In Russian "transparency" (прозрачный, *prozrachnyj*) and "spectral" (призрачный, *prizrachnyj*) have similar pronunciation. According to Florenskiy transparency isn't just a requirement of cognition, it is the highest human value. This value is as unavoidable as our desire for being in the world. Because of the ontological orientation of nineteenth-century Idealist Russian philosophy the metaphor "transparency" was gradually transformed from "transparency of the environment in which the object is located" to "transparency of the object."

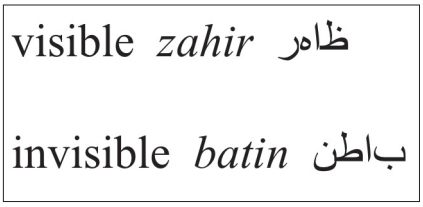
By means of transparency the eye is like the light: it can penetrate body of matter. But true insight begins when the object that is recognized is understood as transparent. Understanding the play of transparent surfaces is understanding the inner and outer aspects of the object.

The Peripatetics and The Ishraqiyun

As a second example, consider terms in Arabic Peripatetic philosophy and Philosophy of Illumination. I will use texts by two famous representatives of the

two schools: the Arabic Peripatetic al-Farabi, who had the name "Second Teacher" (after Aristotle); and the founder of the Philosophy of Illumination (the *Ishraqiyun*) al-Suhrawardi, who developed the Peripatetics' ideas.

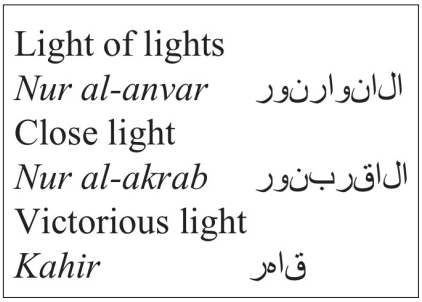
Zuhir and batin (photo 3)



visible (*zahir* ظاهر)
invisible (*batin* باطن)
Manifest or (*zahir*) and latent or invisible (*batin*) are meta-categories in Arabic philosophy. Relations of the visible and the invisible in Arabic philosophy of the 10th and 11th centuries correspond neither to the dichotomy of truth and falsehood (as in Russian philosophy) nor to the dualism of appearance and essence. The distinction of visible and invisible, *zahir* and *batin,* exists in discussions of latentness as opposed to manifestness (or visibility) in the causality of the earlier Mutakallimun (a school that includes Abu al-Hudhail al-'Allaf, al-Ash'ari, Mu'tamir and others). This question was studied in detail by representatives of Peripatetic philosophy, and the philosophy of light or illumination (the *ishraqiyun*). Here I will not consider the differences among the schools, but concentrate on what they have in common.

The ontological aspect of the relation between *zahir* and *batin* is investigated in the *Book of Gems (Kitab al-fusus* كتاب الفصوص*)*. The author of this book, Al-Farabi (878-950), is considered to be the follower of Peripatetic philosophy. In the *Kitab al-fusus,* manifestness (called *zahur* ظهور) is understood as the explicitness of all consequences — that is, grades of being — of the First Cause. Without explicitness First Cause annot be in itself; it must remain invisible. It is impossible to say that one thing can manifest the First Cause in full measure. Its latentness consists of its invisibility *as* itself.

So manifestness as visibility and latentness as invisibility are impossible without one other and lead to one other. The perception of a thing is the movement from visible to invisible and not the other way around.



Nur al-anvar, nur al-akrab, kahir

Light of lights (*Nur al-anvar* نور الانوار)
Close light (*Nur al-akrab* نور الاقرب)
Victorious light (*kahir* قاهر)
Metaphors of light and dark specific to Arabic philosophy can be found in texts by the founder of the Philosophy of Il-

lumination al-Suhrawardi, most important of them is *The Wisdom of Illumination* (*Himkat al-ishraq* حكمت الاشراق). According to the doctrine of Philosophy of Illumination everything consists of lights and their shadows, which emanated from the absolute unity of the *light of lights* (*Nur al-anvar*). For the Neoplatonic chain of emanations of minds (or intellects or angels), al-Suhrawardi substituted with his own chain of emanations of lights coming from united the light of lights, which he took to be identical with the Absolute (*almotluk* المطلق). According to al-Suhrawardi the total number of links in this chain of emanations is much more than the ten traditional grades of Peripatetic thought, which are a traditional element of Peripatetic doctrine.

The first emanation of Great Light (*nur al-a'zam*) al-Suhrawardi calls Archangel Brahman or "close light" (*nur al-akrab*). Because there is no barrier between it and the Light of Lights, the radiance of the Great Light falls directly to the Light of Lights. As a result of this fall and radiance there arises a new victorious light (*kahir* ر ه اق) on which fall both the Great Light and the First Light that are above it.

On the third light falls the second light (twice), Great Light, First Light, and so on. The perception of a thing which appears, according to the Philosophy of Illumination, as "irradiation," is the perception of a particular light that is one of the potentially endless aspects of God (*Allah* الله) or Truth (*hakika* حقيقة).

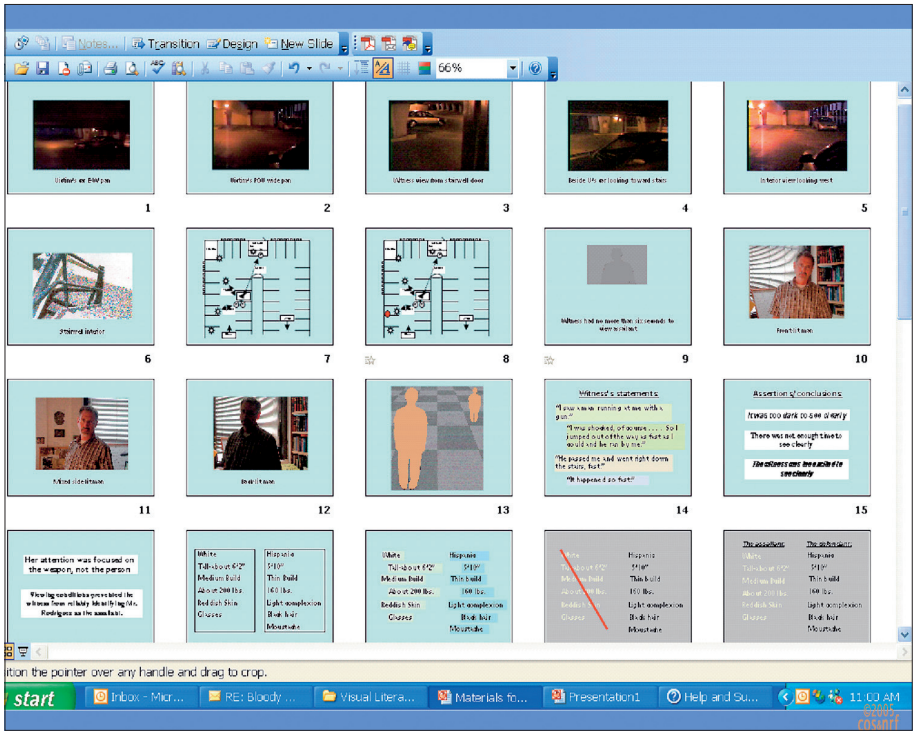
Conclusions

It is interesting to note that there are many investigations devoted to the analysis of visual metaphors in West European philosophy, but that Arabic and Russian philosophic texts have never been analyzed from this standpoint. I think that analysis of the ways of conceptualizing visual metaphors in different philosophical traditions can serve as a modest starting point for a comparative history of metaphors of visuality, and I hope I have suggested that at least some elements in Russian and Arabic philosophy are visual in a different way than the apparently "natural" visuality that is being celebrated today in the West.

For further reading

Florensky, *The Pillar and Ground of the Truth: An Essay in Orthodox Theodicy in Twelve Letters* (Princeton NJ: Princeton University Press, 1997); Florenskiy, *Анализ пространственности и времени в художественно-изобразительных произведениях (Analysis of Space and Time in Art and Pictorial Production)* (Moscow, 1993); Florenskiy, *мнимости в геометрии* (*The Imaginary in Geometry* (Moscow, 1922); Al-Suhrawardi, *Hikmat al-ishraq / Oeuvres philosophiques et mystiques de Shihabeddin Yahya Sohrawardi,* edited by Henry Corbin, *Bibliotheque Iranienne,* vol. 2 (Teheran and Paris: Institut Franco-Iranien–Librairie d'Amerique et d'Orient, 1952), 2-260; Vladimir Lossky, *The Mystical Theology of the Eastern Church* (London: J. Clarke, 1957); A. Smirnov, *Логика смысла: теор-*

ия и ее приложение к анализу классической арабской философии и культуры. (*Logic of Sense: Theory and its Implementation to the Analysis of Classical Arabic Philosophy and Culture)* (Moscow: Languages of Slavic Culture, 2001); D.M. Dunlop, "Al-Farabi's Paraphrase of the Categories of Aristotle," *The Islamic Quarterly: A Review of Islamic Culture* 4 (1957): 168-83, ans also 5 (1959): 21-37; L.I. Vasilenko, L. I., "O magii i okkultizma v nasledii o. Pavla Florenskogo" (On Magic and Occultism in the Heriage of Father P. Florensky), in *Vestnik Pravoslavnogo Sviato-Tihonovskogo Gumanitarnogo universiteta* (Moscow, 2005), vyipusk 3.


Witness's statements
Assertion of conclusions
start
11:00 AM

30

Teaching Visual Rhetoric to Law Students

Neal Feigenson and Christina Spiesel

Increasingly, Anglo-American legal advocates are combining images and words in computer animations, PowerPoint slide shows, and interactive CD-ROMs to present their evidence and their arguments (see also Chapter 7). To function effectively in this digital multimedia world, law students and lawyers need to develop a critical visual intelligence that enables them to anticipate the cognitive and emotional effects of word/image displays and to respond to their adversaries' presentations. They will rarely have time to research the images that they and others make, and they must be prepared to exercise their own judgment under time pressure rather than to rely on "authoritative" readings — quite different from the discipline of art history or the legal convention of arguing from precedent.

The goals of the workshop

We have several years' experience teaching visual literacy and argumentation in a one-semester course for law students, and in a considerably more condensed format to practicing lawyers. These law students and lawyers may or may not have had any prior visual training or art education. We expect that, by the end of our course, they will be able to draw on a wide range of verbal and visual materials to inform their construction of sophisticated and persuasive multimedia arguments in hypothetical (but highly realistic) cases. The teaching that is designed to get them to that point is guided by the following principles:

1. Students best learn visual literacy primarily by doing visual work (as opposed to merely being told about or shown it) and then articulating responses to what they and their classmates have done. (I.e., the learning is mainly bottom-up and experiential — which is quite nontraditional in legal education.)

2. Students best develop a reciprocally creative and disciplined approach to visual work by doing both non-case-specific (i.e., in our course, not tied to a specific legal task) and case-specific projects.

3. Students use a particular visual technology most effectively when they see it as one among many tools in a wide-ranging visual rhetorical toolkit rather than as a presentational imperative. Particular technologies come and go; a critical visual intelligence cuts across these and, following Aristotle's definition of rhetoric, chooses the one(s) most suitable to the task at hand.

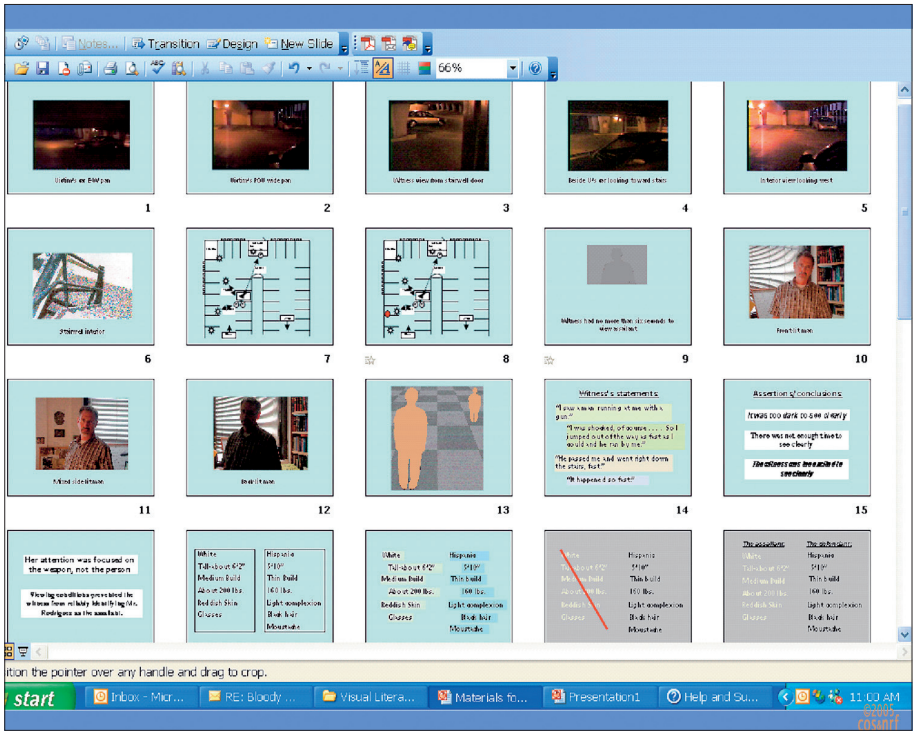
4. An open and collaborative classroom setting develops future professionals' abilities to work in groups, to learn from focus groups and colleagues, and thus to refine their verbal/visual "texts" to make them more effective for their intended audiences.

The workshop

Participants in our workshops are invited as a group to use PowerPoint as a tool for thinking visually and exploring different word-image combinations. We place them in the role of attorneys representing the defendant in a simulated criminal case — an assault and robbery in a parking garage at dusk — and ask them to construct a visual argument, in the form of a PowerPoint slide show, that would be used to accompany an oral closing argument on behalf of the defendant.

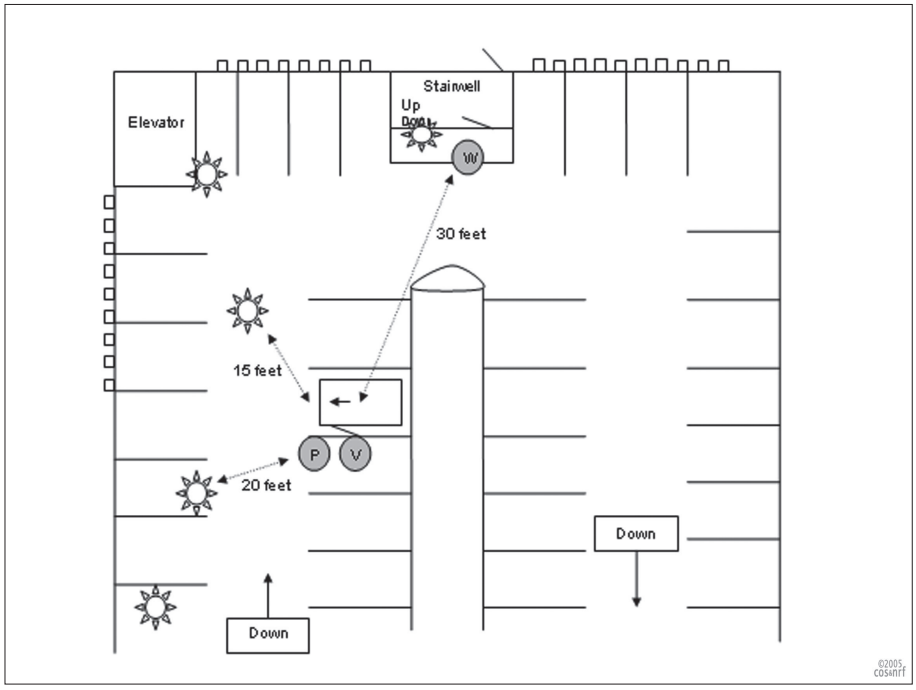
The case poses issues of eyewitness identification readily understandable by non-lawyers. These include how viewing conditions in the garage (for instance poor lighting, the rapidity of the crime) may have undermined the reliability of the witness's later identification of the defendant as the perpetrator, and how the many discrepancies between the witness's initial description of the assailant to the police and the defendant's actual physical characteristics (e.g., height, weight, race) implied that the defendant could not have been the person the witness saw. We give participants a brief description of the case and their role, and then provide them with a menu of materials that they can incorporate into their visual argument, including photos, video clips, and diagrams of the crime scene, document excerpts, sample texts, and other information from the case file (photo 1). Working as a group, participants suggest elements to be incorporated into each slide; we construct the slides as they variously direct. As each new element is proposed, the group reviews and discusses the display, and thus progressively reconfigures, deletes items from, and adds more elements to the work in progress.

We organized one such workshop at the conference that was the starting point of this book; the group of participants at the conference workshop generated many ideas for visualizing the argument, engaging in a lively discussion of both the impact of individual slide designs and the pros and cons of alternative argument strategies. Some favored a paradigmatic approach, beginning with words that framed the argument as a whole (e.g., the viewing conditions argument, fol-



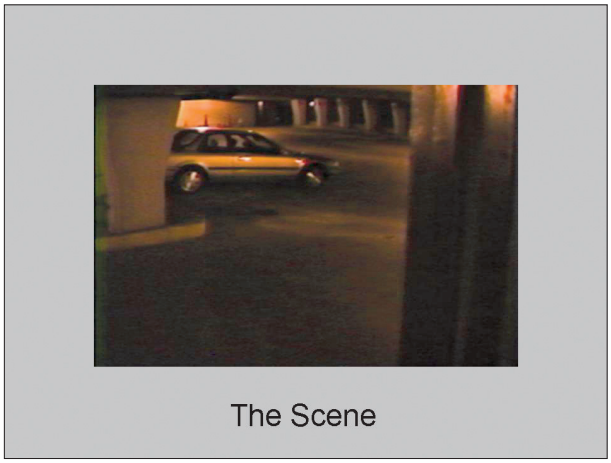
lowed by the argument based on the discrepancies) and complemented by a diagram of the crime scene that laid out the spatial relationships among perpetrator, victim, and witness. Some, by contrast, preferred a narrative, even cinematic, approach that immediately plunged the audience into the ill-lit garage where the crime occurred. The group sought to accommodate the two strategies by starting with the diagram (reproduced on the next page) and then using a video clip to put the audience at the crime scene (a frame is shown at the bottom of the next page). By the end of the time allotted for the workshop, however, the group was unable to concur on a complete argument sequence.

It is instructive to compare the conference participants' (incomplete) construction with the visual arguments that emerged from two other iterations of the workshop which we offered on other occasions. Both of these other slide sequences began with a view of the garage to launch the contention that viewing conditions prevented any reliable identification of the perpetrator; both then designed text, with or without images, to emphasize the discrepancies between the witness's description of the perpetrator and the defendant's actual characteristics. Otherwise, however, the two sequences followed very different visual logics.



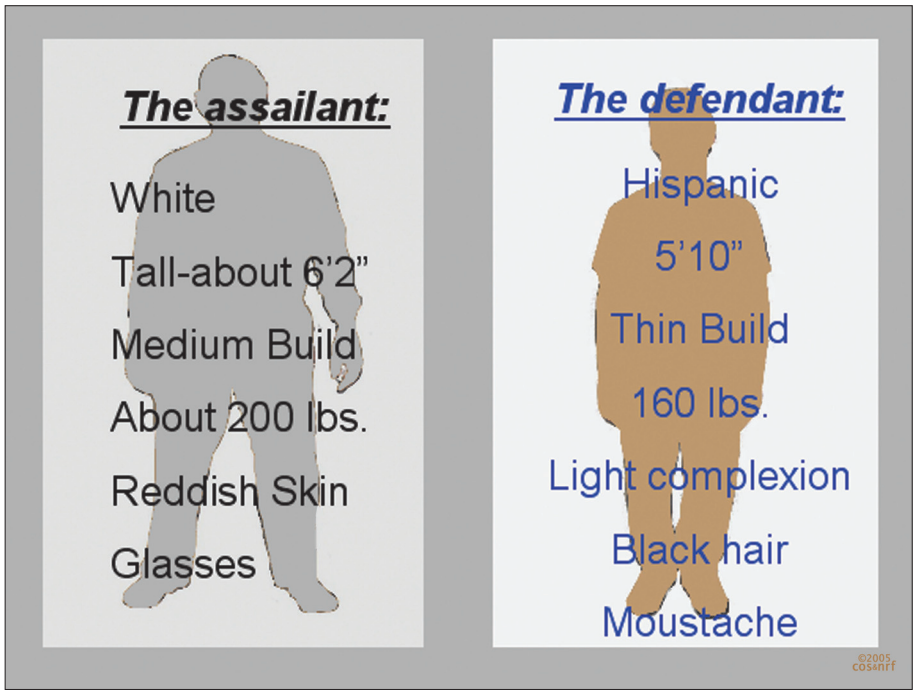
Interior view looking west

©2005, cosanrf



The first sequence

The first sequence began with a still photo of the garage from the witness's point of view (above). The addition of a simple caption, "The Scene," cued the audience to anticipate a dramatic presentation — in this case, a visual closing argument conceptually located at the crime scene. The second slide presented contrasting

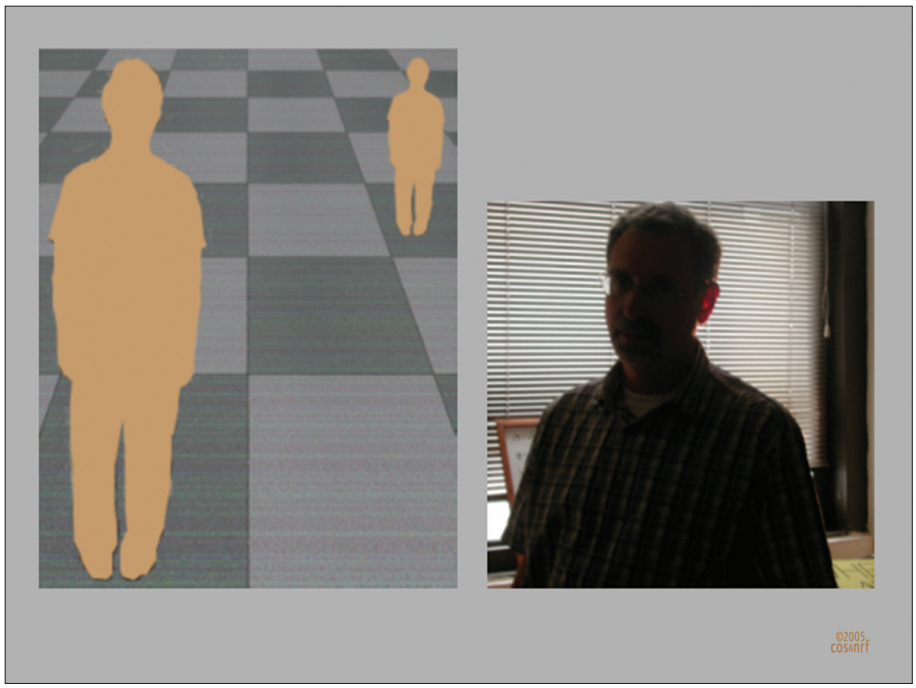


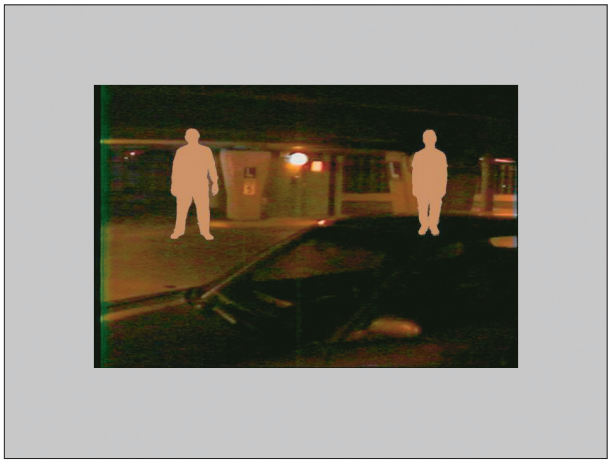
lists of the features of the assailant as the witness initially described him to the police and the defendant's actual features, as if to argue that viewing under such poor lighting conditions (as depicted in the first slide) could naturally lead to great discrepancies between an eyewitness's description of the assailant and the person whom the police happened to arrest. The simple text lists provided in the workshop materials were animated and overlaid on contrasting silhouettes of two men, underscoring the divergence between the man the witness saw at the scene and the defendant.

The third slide consisted of a pair of demonstrations: how small a figure seen at 30 feet (the initial distance between witness and perpetrator) appears compared to a figure seen at close range, and how indistinctly the facial features of a back-lit person (such as the perpetrator as seen by the witness) can be seen (shown below).

The sequence concluded by returning to the dark garage interior, this time in a video clip, on which perspectivally small versions of the silhouettes of the perpetrator and the defendant were superimposed (see the illustration on the next page).

This final montage culminated a highly conceptual approach to the case that relied on visual demonstrations of arguments (e.g., the difficulty of perceiving clearly in poor lighting) rather than being confined to a strategy of simple veri-





similitude. The repetition of the iconic silhouettes — first linked to text, then to a diagram, and finally placed back in the crime scene — artfully constructed a visual through-line for the entire argument: Given that place and those conditions, a witness might readily think that she saw one man but actually have seen another, very different man.

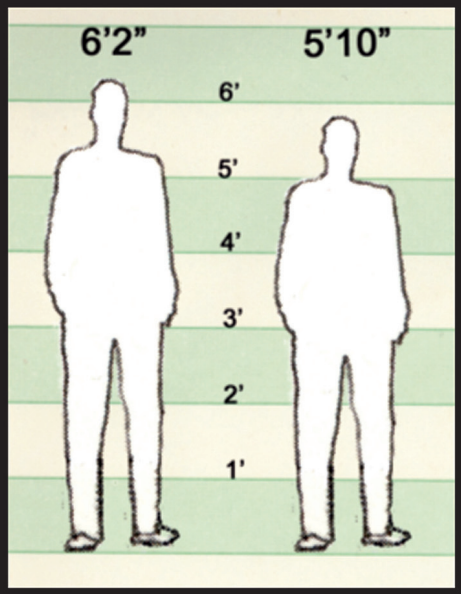
The second sequence

The second sequence, like the first, began in the poorly lit garage, but with a video clip rather than a photo, thus immersing judge and jury in the crime scene even more vividly (top illustration on the page). This sequence then moved to the contrasting lists of physical characteristics, presented without the silhouettes or other iconic adornment (bottom of the next page). A third slide combined an animated text of the witness's initial description of the assailant with a diagram comparing the described height to the defendant's actual height, thus emphasizing both the witness's confidence in her own initial identification and the vast differences between that description and the defendant (top illustration on the page 285).

At this point this workshop group, which consisted of law professors and law students, observed a subtle rhetorical problem in the otherwise effective argument strategy so far: How to get the jury to reject the witness's identification of the defendant as the perpetrator without seeming to disparage the jury's natural tendency to identify psychologically with the victim and the witness (rather than with the perpetrator or the defendant)? In other words, the first three slides explained that poor viewing conditions can undermine eyewitness accuracy, but also posed a question: How could a presumably reasonable and clear-headed

The assailant:	***The defendant:***
White	Hispanic
Tall-about 6'2"	5'10"
Medium Build	Thin build
About 200 lbs.	160 lbs.
Reddish Skin	Light complexion
Glasses	Black hair
	Moustache

When the police came I told them the guy was a tall white male, about 6' 2", medium build – about 200 lbs, with a reddish complexion and glasses.



Second photo array

witness be so wrong? The group nicely resolved this dilemma with a final slide (created from additional case materials): The photo arrays that the police showed to the witness, and on the basis of which she identified the defendant as the perpetrator, were biased to elicit just that response (bottom illustration on the previous page). The entire argument sequence thus combined words and images to construct a compact problem-solution narrative — the story of a mistaken eyewitness and a falsely accused defendant — that tied together all of the defendant's major contentions in a way that would lead the jury both to decide in the defendant's favor and to feel a comfortable sense of resolution in having done so. This is the very objective of legal argument, and participants achieved it by envisioning it: They combined words and images in different ways and revised their own creations until they saw their "theory of the case" in front of them.

Outcomes

For educators in visual studies, communication studies, and other curricular areas, our interactive workshop provided three main rewards. First, it gave participants ideas for helping students to experience the fluidity with which images and words can be made to interact and the various meanings those interactions produce, an essential insight for understanding effective communication and persuasion in law or any other domain of today's visual culture. Second, the workshop modeled how teachers can flexibly deploy the resources of the most widely available presentation software in the world without being constrained by the program's too-familiar defaults. Third, we demonstrated a teaching method that began with prepared materials but did not significantly confine participants' responses to those materials; rather, the structure and the task freed participants to be inventive, to exchange their visual ideas with others, and to revise their work in light of their own and the group's shared perceptions.

Visuality in the law

The strategic uses of visual rhetoric in law is a field made possible in part by the confluence of literary theory and law, starting with Stanley Fish's work in the 1980s. One of the other books to come out of the Cork conference, *Visual Literacy,* contains an essay by Richard Sherwin, of the New York Law School, on the elaborate problems posed by such things as videos of crimes that may, or may not, be faked "art films" inspired by films such as *The Blair Witch Project.* In this book, Chapter 7 deals with the investigation of a complex incident, which is now — as the event recedes in history and memory — increasingly dependent on intricate visual reconstructions. Visual rhetoric in law is a rapidly growing field, and an excellent opportunity for fields such as literary theory, sociology, psychology, rhetoric, art, and art history, to begin a wider conversation. It is an invitation

to a genuinely interdisciplionary, and preeminently *visual* conversation: and in that respect a fitting note on which to end.

For further reading:

Christopher Buccafusco, "Gaining/Losing Perspective on the Law, or Keeping Visual Evidence in Perspective," *University of Miami Law Review* 58 (2004): 609-651; *Visual Persuasion in the Skakel Trial: Enhancing Advocacy through Interactive Multimedia Presentations,* edited by Brian Carney and Neal Feigenson *Criminal Justice* 19 no. 1 (2004): 22-35; Costas Douzinas and Lynda Nead, *Law and the Image* (Chicago: University of Chicago Press, 1999); Neal Feigenson, "Digital Visual and Multimedia Software and the Reshaping of Legal Knowledge," in *Images in Law*, edited by W. Pencak and A. Wagner (London: Ashgate, c.2007); Jennifer Mnookin, "Reproducing a Trial: Evidence and its Assessment in *Paradise Lost*," in *Law on the Screen,* edited by A Sarat, L. Douglas, and M. Umphrey (Stanford, CA: Stanford University Press, 2005), 153-200; Christopher Ritter, *Creating Winning Trial Strategies and Graphics*. Chicago: American Bar Association, 2004); Christina Spiesel, "A *Las Meninas* for the Law," in *Images in Law*; and Spiesel and Feigenson, "Law in the Age of Images: The Challenge of Visual Literacy, in *Contemporary Issues of the Semiotics of Law*, edited by A. Wagner, T. Summerfield, and F. Benavides (Oxford: Hart Publishing, 2005), 231-55.

Afterword

So that ends the sample of thirty departments, thirty different ways of making and interpreting images. I will not add to the theorization I offer in the Introduction, except to say that I hope the "particulate" form of this book now makes sense. The world of visual practices is wide and deep, and if we are to understand it, we have to explore, like the first generations of linguists did, and learn to speak some of the languages used outside the enclave of the humanities.

It may surprise some North American and other English-language readers that this book is published by Wilhelm Fink. Among North American scholars, the normal protocol is to try to publish with a North American university press. If I were a younger scholar, and this was my first book, I would not have published it outside the US, and even within the US I would have tried to publish with one of the very small number of "top" academic presses interested in the history of art and science: University of California, Yale, Princeton, Cornell, Harvard, MIT, Johns Hopkins, Penn State Press, or the University of Chicago. For some scholars I know, that list is even shorter. If they can't place their books with one of those presses, they may wait for opportunities to place chapters in the equally small number of major journals, or in specialized anthologies. The only alternatives to the short list of US presses are normally Cambridge, Oxford, Routledge UK, Yale (London), and perhaps Reaktion. A North American scholar working with French materials might also seek to co-publish her book with Minuit, Flammarion, Gallimard, or another French publisher. A North American scholar working on a German subject might try to find a publisher in Germany. But even in those cases, the books would be co-published (for example, by Flammarion and Yale University Press); and in fact very few English-speaking scholars in the humanities try to co-publish on the Continent. This book is doubly unusual, therefore, because it is not being co-published in the United States.

The reasons are somewhat delicate, but worth exploring. First it needs to be said that English speakers often read only in English. Some European publishers are not considered serious even if they publish in English, and even if they are based in England. Ashgate, Palgrave, and Sage, for example, are popular among scholars in the UK, but they might be considered second-tier choices by scholars in the US. A North American art historian, seeing a book published by Ashgate or Palgrave, might well assume that the manuscript had been rejected by North American presses. (That notion is, in my experience, wholly confined to North America, and no such stigma attaches to Ashgate or Palgrave in the UK.) This cultural prejudice and scholarly isolationism means that even excellent German presses such as Wilhelm Fink, Wagenbach, Suhrkamp, and Riemer are virtually invisible, and largely unknown, in North America. (And so are newer presses such as Turia und Kant and Diaphanes, which are very roughly like Macula in

France and Reaktion in the UK: that is, they might be inadvisable choices for young scholars in the US who need a major press for their first publication.[1]) Because they generally do not sell many books, German academic publishers do not advertise widely, retain aggressive international distributors, or attend book fairs. As a result, German academic publishers are not well represented in North American academic conferences or university bookstores. (That non-participation is also due to the different ethos of academic publishing in Germany, which is less commercially oriented than in the US. This book is has a very small print run and is subsidized in order to keep the retail price at a reasonable level. However, the subsidy alone would put it out of reach of most young scholars in the US or UK who were looking to publish their first book.[2]) Those few Continental presses that are known in the US, Australia, and the UK — Prestel, for example, which has offices in New York — are considered to be less scholarly.

North American scholars intent on their careers, who need to be taken seriously among their academic colleagues, generally avoid presses other than the University of California, Yale, Princeton, Cornell, and the others I've mentioned; and books published by any other presses — and especially those on the Continent — will be looked on skeptically, as if they are either irrelevant or second-rate because their authors had failed to publish with a first-rank US publisher.

Why, then publish this book with Wilhelm Fink? For three reasons.

1. Most research on science and non-art images is done in German-speaking countries and in Scandinavia. The word *Bildwissenschaft* has recently been revived, by Horst Bredekamp and others, to describe an historical approach to the study of images that stresses non-art and technical images.[3] (In English-language scholarship, *Bildwissenchaft* has recently been given an entirely different valence.[4]) Images outside of art have been theorized by a number of German, Austrian, and Swiss scholars including Joël Sakarovitch, Wolfgang Pircher, Karin Leonhard, and especially Peter Geimer.[5] In Basel, Gottfried Boehm and others have initiated a project called Eikones, which also aims at an inclusive study of all images.[6] In Scandinavia a similarly inflected study of non-art images is called "visual studies," and it goes by other names as well — "iconic criticism," "image studies," "image science."[7] It's pertinent, also, that the "iconic turn" in German scholarship (associated with Boehm, who coined the expression in 1994) is different from the "pictorial turn" in English-language scholarship (associated with W.J.T. Mitchell, who coined it in 1992).[8]

The names do not matter as much as what is studied. Visual studies in English-speaking countries, and in places influenced by them, is restricted much more tightly to fine art and popular art. There are several emergent differences between scholarship inspired or informed by the "iconic turn" and scholarship informed by the "pictorial turn," among them the wider sense of *Bild* in German, as opposed to English *picture;* but in effect, the German literature of the last ten years has been significantly more involved with the particulars of "epistemic" or "tech-

nical" images outside of art. As I mentioned in the Introduction, this book was originally to have been published along with the proceedings of a conference called "Visual Literacy." The conference proceedings, which will appear as two separate books — *Visual Cultures* and *Visual Literacy* — reflect the state of visual studies in mainly Anglophone countries. Despite the wide range of papers, there is virtually no science in those two books. (The principal exception is an essay by Matthias Bruhn and Vera Dünkel, members of the unit called "Das Technische Bild" at the Humboldt-Universität in Berlin.[9]) The near-absence of non-art images from the two other conference books is not happenstance, but structural: the number of scholars in North America and the UK who study non-art images is very small. One might name Lisa Cartwright among visual studies scholars, and there are Martin Kemp, Linda Dalrymple Henderson, John Gage, and a half-dozen others in art history. Journals like the *Journal of Visual Culture* are uniformly uninterested in image-making outside of mass culture and fine art.

This book, therefore, is partly a response to visual studies as it is known in Anglophone countries. I am concerned that the field restricts itself too much to images in popular culture and fine art. The wider world of image-making practices is usually only acknowledged by pointing to the social construction of science — its entanglement in politics, gender, identity, and the society that provides its institutional structures. What is missing in that approach is really nothing less than the visual languages of science and other non-art practices. This book is meant as a sampler of the kinds of complexity that inhere in visual practices when they are considered in detail. Hence the first reason for publishing with Wilhelm Fink: Germany is in the part of the world where visual studies has the best chance of becoming the broad-based, university-wide field that it should be.

2. There is a custom in publishing in the humanities, according to which books should be continuous narratives, uninterrupted by problem sets, equations, and graphs. In the long-standing tradition of humanist scholarship, such books are for the "general reader"; they are intended to be non-technical even if they involve special lexica and jargon. I sent this book, in manuscript, to two prominent university presses in North America, before I decided a German press is more appropriate. In both of the US presses, the Acquisitions Editors rejected the manuscript on the grounds that it was too technical. As I mentioned in the Introduction, one editor said it was too "particulate," by which she meant not sufficiently woven into a single continuous narrative. (She recommended I write the thirty chapters into a single text on the model of the Introduction.) As I argued in the Introduction, it is wholly appropriate and deliberate that this book is partly fragmentary, "particulate," and technical. Those qualities are meant as responses to the uniformly non-technical, undetailed exposition of non-art images in more Anglophone scholarship.

3. In the US and other countries, some university presses are inclined away from elementary pedagogy. They see it as their purpose to produce professional-level research and books that drive disciplines forward. Textbooks are mainly thought to be the domain of specialized publishers. One of the US editors who saw this book in manuscript thought it might make a good first-year textbook, but felt that the pedagogic purpose made it unsuitable for a university press. Of course there are exceptions to this rule (many university presses in the US also publish textbooks) but for the most part, textbooks are handled by non-university, "trade" publishers. This book is again a special case. I would be glad if it were used as a textbook: I used a working version of it to teach this material in Ireland, to first-year undergraduates, with some of the authors as guest speakers. It is certainly amenable to that approach. But it is also intended as an experiment, a way of pushing a little on the field of visual studies to see what it might look like if it takes first-year education seriously. For that reason I thought an academic publisher would be appropriate.

Those are the reasons this book was published in Germany. I hope that this gesture suggests that visual studies should be as international as possible. The kinds of visual studies practiced in the US, Canada, Australia, New Zealand, and the UK (and in countries influenced by them) can learn a lot from the highly detailed, technophilic visual studies practiced in German-speaking countries and in Scandinavia. The opposite is also true: the emphasis on politics and identity that are the cornerstones of English-language scholarship have already had interesting effects on German-language writing. There are also ways of practicing visual culture beyond the ones I have mentioned. There is a kind of visual studies in South America that comes in part from communications theory and semiotics, and a kind in the People's Republic of China that intersects with aesthetics and cultural heritage. By publishing this book in Germany, I hope to suggest that the conversation on visual studies can be broader and more challenging than it sometimes has been.

It seems to me that restricting visual studies to art and popular culture risks missing a tremendous opportunity. Visual studies can become the place where images and visuality are studied for the entire university, and not just for the humanities. To do that, it is necessary to spend time considering unfamiliar visual practices *in detail*, and not as examples of other practices to which they may not be directly related.

Notes to Afterword

1 I thank Wolfram Pichler for pointing me to Turia und Kant and Diaphanes.

2 This book has a print run of 500, augmented with 100 personal copies for distribution. A typical visual culture or science studies book in the US would have a print run of 2,000 to 3,000, approximately 280 copies of which go to the principal university libraries in the US and UK.

3 See first Bredekamp and Pablo Schneider, "Visuelle Argumentationen — Die Mysterien der Repräsentation und die Berechenbarkeit der Welt," in the book of the same title, edited by Brekedamp and Schneider (Munich: Wilhelm Fink, 2006), 7-10; and for an excellent example of the confluence of technical and historical analysis of images, see his *Darwins Korallen: Due frühen Evolutionsdiagramme und die Tradition der Naturgeschichte* (Berlin: Klaus Wagenbach, 2005). Bredekamp's argument about *Bildwissenschaft* was made for an English-language readership in "A Neglected Tradition? Art History as *Bildwissenschaft*," *Critical Inquiry* 29 no. 3 (2003): 418-29. See further *Bildwissenschaft: Disziplinen, Themen, Methoden,* edited by Klaus Sachs-Hombach (Frankfurt a.M.: Suhrkamp, 2005); and the review by Carolin Behrmann and Jan von Brevern, in *ArtHist: Netzwerk für Kunstgeschichte im H-net,* 9 November 2005, www.arthist.net/DocBookD.html, November 2006, which has an interesting summary of aproaches to pictures.

4 The word *Bildwissenschaft* was appropriated by W.J.T. Mitchell in a talk given at the conference that originally was to be published along with the material in this book. In *Visual Literacy* (New York: Routledge, 2007), Mitchell uses the word to describe some fundamental properties of visual interpretation. It is a newly-minted sense, however, not meant to be connected to the German usage.

5 I thank Wolfram Pichler for bringing my attention to Sakarovitch and Pircher. See Sakarovitch, *Epures d'architecture: de la coupe des pierres à la géométrie descriptive XVIe-XIXe siècles* (Basel: Birkhäuser, 1998*); Kunst, Zeichen, Technik: Philosophie am Grund der Medien,* edited by Marianne Kubaczek and Wolfgang Pircher (Münster: LIT, 2004); *Ordnungen der Sichtbarkeit: Fotografie in Wissenschaft, Kunst und Technologie* (Frankfurt a. M.: Suhrkamp, 2002); *Was ist ein Bild?,* edited by Gottfried Boehm (Munich: Wilhelm Fink, 1994). For Leonhard see for example "Was ist Raum im 17. Jahrhunderts? Die Raumfrage des Barocks: Von Descartes zu Newton und Leibniz," in *Visuelle Argumentationen: Die Mysterien der Repräsentation und die Berechenbarkeit der Welt,* edited by Horst Brekedamp and Pablo Schneider (Munich: Wilhelm Fink, 2006), 11-34; and Leonhard, *Das gemalte Zimmer: Zur Interieurmalerei Jan Vermeers* (Munich: Wilhelm Fink, 2003).

6 Eikones (National Centres of Competence in Research [NCCR] "Bildkritik" or "Iconic Criticism") is a Swiss National Science Foundation project, which began in October 2005. As of autumn 2006, it was divided into six modules, studying different aspects of the image including images in literature, architecture, anthropology, science, and engineering. The modules were organized according to a range of conceptual frameworks: iconophilia and iconoclasm, the "power of images," the generation of meaning, image politics, visualization, the epistemic image (principally scientific images), memory, aporetic images, and a number of others. As of this writing (March 2007) the project is in early stages, and most of the material is unpublished aside from NCCR publicity materials, which are partly on the website, www.eikones.ch.

7 For references see my *Visual Studies: A Skeptical Introduction* (New York: Routledge, 2003), chapter 1.

8 In the German literature, see *Iconic Turn: Die neue Macht der Bilder,* edited by Hubert Burda and Christa Maar (Cologne: DuMont Literatur und Kunst, 2004), and the review by Carlin Behrmann and Jan von Brevern, in *ArtHist: Netzwerk für Kunstgeschichte im H-net,* 2 November 2005, www.arthist.net/DocBookD.html, November 2006. In addition to sources cited above, see *Logik der Bilder: Präsenz — Repräsentation — Erkenntnis,* edited by Richard Hoppe-Sailer, Claus Volkenandt and Gundolf Winter (Berlin: Reimer, 2005), especially the introduction "Logik der Bilder," pp. 9-16.

9 The essay is in the book *Visual Literacy* (New York: Routledge, 2007).

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