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# The Slide Lecture, or The Work of Art *History* in the Age of Mechanical Reproduction

Robert S. Nelson

Around 1900 technical reproduction had reached a standard that . . . permitted it to reproduce all transmitted works of art and thus to cause the most profound change in their impact upon the public. . . . Nothing is more revealing than the nature of the repercussions that these two different manifestations—the reproduction of works of art and the art of the film—have had on art [history] in its traditional form.

—WALTER BENJAMIN, “The Work of Art in the Age of Mechanical Reproduction”

For a bit more than a century, teaching and lecturing about art has relied on photographic slides, but what is commonplace today is about to be digitalized into oblivion. New computer technologies will make classrooms “smart” and more efficient and will greatly extend access to the visual for the audiences of well-equipped and well-endowed universities and museums. In the nineteenth century when photography moved beyond the domain of science, the consequences were similar. Processes evolved quickly and in so many directions that for some time it was not

The first version of this essay was given as the keynote address for the Humanities Open House at the University of Chicago in October 1998. My thanks go to my audience on that day, especially Wayne Booth, and to W. J. T. Mitchell, Joel Snyder, and particularly Margaret Olin, who read subsequent drafts, and to my colleagues Yuri Tsivian, Tom Gunning, and Reinhold Heller for useful discussions.

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clear which systems would prevail. But the history of past technological revolutions—whether roll to codex, manuscript to printed book, or manual typewriter to computer keyboard—suggests that prior customs often continue, even as they cease to be understood.

Slide lectures, like the photographic technology that made them possible, have had a profound impact on art history; indeed, for many who have passed through university classes, art history *is* the illustrated lecture. Thus, for several reasons, now is an appropriate moment to consider the rhetorics employed and the knowledges produced by the slide lecture, first, as it is represented and practiced today and, second, as it came to be constituted in the later nineteenth and early twentieth centuries. The concern here is for art history as oral practice, an all but ignored subject for this and most other academic disciplines. How do art historians make arguments with slides? Why do audiences accept speaker and reproduction and the conclusions they offer? And, above all, what is a slide, and how does its presence condition the entire presentation?

### *Contemporary Performance*

In the slide lecture, the image, that shadow or representation on the wall, never remains mere projection, mere being, because it is part of a performative triangle consisting of speaker, audience, and image. If slides are tangible enough objects, and speakers and audiences readily recognizable subjects, their mutual interaction yields what Bruno Latour calls “quasi-objects” and “quasi-subjects.”<sup>1</sup> Together they create narratives and social bonds and transform shadows into art, monument, symbolic capital, or disciplinary data. To introduce and document this social and epistemological network it is heuristically useful to begin with a representation by an outsider to the discipline of art history, the contemporary playwright Wendy Wasserstein, for she proves to be a careful ethnographer. Wasserstein twice dramatizes a slide lecture in her Pulitzer Prize-winning play *The Heidi Chronicles*, a coming-of-age story about an art history pro-

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1. Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, Mass., 1993), pp. 88, 89.

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fessor. The first instance occurs in the prologue to act 1, the second in the prologue to act 2:

*1989. Lecture hall, Columbia University. HEIDI stands in front of a screen. Slides of paintings are shown as she lectures.*

HEIDI: Sofonisba Anguissola painted this portrait of her sister, Minerva, in 1559. Not only was Sofonisba a painter with an international reputation, but so were her six sisters. Here's half the family in Sofonisba's "Three Sisters Playing Chess," painted in 1555. *Looks up at the painting.* "Hello, girls." Although Sofonisba was praised in the seventeenth century as being a portraitist equal to Titian, and at least thirty of her paintings are known to us, there is no trace of her, or any other woman artist prior to the twentieth century, in your current art history textbook. Of course, in my day this same standard text mentioned no women "from the dawn of history to the present." Are you with me? Okay.

Clara Peeters, roughly 1594 to 1657, whose undated self-portrait we see here, was, I believe, the greatest woman artist of the seventeenth century.

*1989. Lecture hall, Columbia University. Slides are projected during the lecture.*

HEIDI: Lilla Cabot Perry, 1848 to 1933, was, along with the better-known Mary Cassatt and Berthe Morisot, a major influence in American Impressionism. Her painting "Lady with a Bowl of Violets" . . . *Pauses as wrong slide comes on the screen.* . . . Actually, the painting you're looking at is "Judith Beheading Holofernes" by Artemisia Gentileschi. Please bear with me. My T.A. is taking the law boards today.

*The correct slide comes on.* Thank you. "Lady with a Bowl of Violets." Notice how the tones move from cool blues and violets to warmer oranges lighting up the collar of the rather flimsy negligee. Change flimsy to flouncy. . . .

The painting I prefer is "Lady in Evening Dress," painted in 1911. . . . Now let's compare for a moment Cabot's "Lady" with Lily Martin Spencer's fading rose. There is something uniquely female about these paintings. . . . What strikes me is that both ladies seem slightly removed from the occasions at hand. They appear to watch closely and ease the way for the others to join in. I suppose it's really not unlike being an art historian. In other words, being neither the painter nor the casual observer, but a highly informed spectator.<sup>2</sup>

The professor's language has certain characteristics. In referring to the slides, she uses deictics, such as "this," "here," "now." These words

2. Wendy Wasserstein, *The Heidi Chronicles*, in *"The Heidi Chronicles" and Other Plays* (New York, 1991), pp. 160, 205–6.

belong to conversational situations in which speaker and listener share a common space and time and hence are usually avoided in standard academic prose. Because of this physical situation, in the second prologue Heidi can tell the audience what they are “looking at,” employing the dialogic second person. Indeed, both passages make frequent use of the first and second persons. The speaker refers to herself with the singular (“the painting I prefer”), but she also evokes the royal or professorial plural (“let’s compare”), even using both forms in a single sentence (“whose undated self-portrait we see here, was, I believe”). The first-person singular reinforces the dialogic, stressing the interaction of speaker and audience; the first-person plural joins speaker and audience, enabling the former to speak for the latter.

In the manner of an ordinary conversation, rather than a formal academic address, Heidi abruptly changes linguistic codes and conversational footings, the latter being Erving Goffman’s term for the alignment or relationship between speaker and listener. For example, in the first prologue Heidi switches quickly from an objectifying past tense (“Sofonisba Anguissola painted this portrait”) to an informal direct address of the image (“Hello, girls”), a change so abrupt as to receive quotation marks in the script even though the same person continues to speak. Academic speech resumes in the next sentence, followed by a personal recollection of a particularly influential art history survey book that might well have been used by someone, like Heidi, who attended college in the late 1960s.<sup>3</sup> Next comes another shift, the colloquial address to the audience: “Are you with me? Okay.” In only a few sentences, Wasserstein has Heidi speaking like a professor, greeting the sisters in the painting as if they were childhood friends, reverting back to the mode of a professional art historian, offering a bit of personal biography, and finally posing a question seemingly in the ordinary language of her class. Similar shifts occur in the second prologue.

Throughout, the monologues assume that painting is the subject of discussion. However, the stage directions clearly state that Heidi is lecturing not before paintings but slides. Even in the second prologue, when the wrong slide appears, she does not break the illusion and continues to refer to the image as “this painting.” Similarly, paintings belong unquestionably to their artist (“Cabot’s ‘Lady’”); that is, that which is viewed is understood to have been made by the artist. These statements are only possible if the slide is taken not as shadow, projected photograph, or copy of an original, but as the object itself. Illusions go further still. In the second prologue, the women depicted become actual people watching. They in turn prompt Heidi’s musing about the nature of the art historian

3. See H. W. Janson and Dora Jane Janson, *History of Art: A Survey of the Major Visual Arts from the Dawn of History to the Present Day* (New York, 1962). Also see my essay, “The Map of Art History,” *Art Bulletin* 79 (Mar. 1997): 33.

as spectator. In the conclusion of this prologue, the shadows on the screen are models for the art historian herself, thus completing the merger of object and subject. Finally at the end of the entire play a slide comes on the screen of Heidi holding her adopted daughter before a banner for a Georgia O'Keefe exhibition. Thus the audience's last glimpse of the art historian is as actual slide.<sup>4</sup>

Wasserstein's prologues serve to introduce and problematize the three agents of the slide lecture: speaker, audience, and image. In the play, as in the art history lecture, language is critical and replete with deictics. Less obvious are the tenses of art historical performances. Here Aristotle's tripartite classification of rhetoric is useful: deliberative, forensic, and epideictic, concerning things to come, things past, and things at hand and relying upon the future, past, and present tenses, respectively. Deliberative rhetoric and the future tense belong to the world of prognostic public policy and legislative agenda. These are seldom used by art history, notwithstanding the first and last paragraphs of this essay, exceptions that prove the rule. Forensic oratory and the past tense are employed to determine what took place and thus are the prime mode of historical analysis. The epideictic "has for its subject praise or blame" and is the present-oriented language of visual or literary criticism.<sup>5</sup>

Art history lectures, as in Wasserstein's play, normally move between the forensic and the epideictic, depending upon the relative proportions of historical detail and critical reaction: the more visual the analysis, the more epideictic the rhetoric. In either mode, language affirms the presence of the visual, so the slide, although a photograph, creates not the "perception of having been there," Roland Barthes's notion of the ontology of a photograph, but a reality that *is* there, Christian Metz's description of a movie.<sup>6</sup> The projected image is thus less a sign and more a simulacrum of the art object, an entity that in some way is that object itself, or, rather, a thing in itself, a past made present, even as it is understood to be past—hence the rhetorical utility of the forensic and the epideictic.

In any lecture, the reading of a text permits multiple stagings of selfhood. The lecturer might be some combination of the actor/speaker, the author, or the professional/institutional/social entity validated by and through these concepts. A professor gains legitimacy through the cogency of her arguments, the acquiescence of the audience, and the performative frame that enables her to mold the audience's vision. Often, the verbal mechanisms of this process in the slide lecture are scarcely noticed common expressions, such as "we see on the left," or "if you look

4. See Wasserstein, *The Heidi Chronicles*, p. 249.

5. Aristotle, *The "Art" of Rhetoric*, trans. John Henry Freese (Cambridge, Mass., 1994), pp. 32–35 (1.3.1–4).

6. Roland Barthes, "The Rhetoric of the Image," *The Responsibility of Forms* (New York, 1985), p. 33. See also Christian Metz, "On the Impression of Reality in the Cinema," *Film Language: A Semiotics of the Cinema*, trans. Michael Taylor (New York, 1974), pp. 3–15.

carefully, you may see." When the audience is addressed, as in Wasserstein's second prologue, "Notice how the tones move," viewers are led to see what Heidi sees and directed to the colors. Thus engaged, spectators are next affected by the speaker's application of a common formalist animation of abstract properties, the declaration that tones move from cool blues to warm oranges. By gazing as instructed, audiences are transformed into modernist spectators. On the other hand, when the lecturer presents the object to the audience, he may take another footing and gradually shift from looking at the object to speaking for it or its artist. From this rhetorical position the art historian can account for motivation and intention because he has become either the work of art or the artist or both. This ventriloquist act enables the picture to speak, to act, to desire.<sup>7</sup>

When I was a graduate student at the Institute of Fine Arts in New York, the great master of the art historical lecture was the classicist Peter von Blanckenhagen. His lectures on Hellenistic art drew large crowds, especially to hear about the Nike of Samothrace or the Barberini Faun. Seemingly without notes or preparation he would speak eloquently for an hour on each statue, and sometimes for it, making it seem as if ancient statues, whether male or female, possessed deep, rich, German-accented voices. Perhaps there was something of a German rhetorical tradition here, for Heinrich Wölfflin fifty years earlier had made a similarly strong impression on his students:

Wölfflin, the master of extemporaneous speaking, places himself in the dark and together with his students at their side. His eyes like theirs are directed at the picture. He thus unites all concerned and becomes the ideal beholder, his words distilling the experiences common to everyone.

Wölfflin considers the work in silence, draws near to it, following Schopenhauer's advice, as one draws near to a prince, waiting for the art to speak to him. His sentences come slowly, almost hesitatingly. When many of his students imitate these pauses in his speech, they imitate not just an external mannerism, because they feel that these solemn effects convey something positive. Wölfflin's speech never gives the impression of being prepared, something completed that is projected onto the art work. Rather it seems to be produced on the spot by the picture itself. The art work thus retains its preeminent status throughout. His words do not overwhelm the art but embellish it like pearls.<sup>8</sup>

According to this description, Wölfflin positioned himself in the midst of his students—either actually or rhetorically, it is not clear—and

7. See W. J. T. Mitchell, "What Do Pictures Really Want?" *October*, no. 77 (Summer 1996): 71–82.

8. Franz Landsberger, *Heinrich Wölfflin* (Berlin, 1924), pp. 93–94.

joined them in staring at the image on the screen. By his gaze and his voice, the professor drew together audience and object, first looking with them at the object and then seemingly speaking to the audience on behalf of the object, the rhetorical version of the cinematographic shot/reverse shot. The author of this appreciation, the art historian Franz Landsberger, was fully aware of the consequences of this rhetoric: Wölfflin “unites all concerned and becomes the ideal beholder.” The professor also apparently served as the ideal lecturer for his students. They imitated his speaking mannerisms, including an initial hesitancy that seems more appropriate for a seance than a classroom. As Wölfflin identified more closely with the object, he presumably used fewer deictics.

Indeed, one major difference between an experienced art historian and someone from another discipline and thus less comfortable with the use of slides concerns this relationship to the slide. At a recent conference, I observed an amateur, a medical doctor by profession, as he frequently turned and spoke to the slides in his lecture. His language made constant reference to images that he regarded as present but also distant from him: “You can see,” “there are a few features here.” He spoke with a pointer in his hand but also introduced each image with the verbal equivalent, *deixis*. In another recent lecture that I attended, an archaeologist faced the audience and spoke fluently. But when he wanted to incorporate a slide into the discussion, he would turn to the screen and begin haltingly, “Well, this [hand waving].” The interjection “well” and the concomitant gesture are unsuccessful attempts to effect a transition from the verbal to the visual. Veteran art history professors, in contrast, assume from the outset that the slides are present and that the audience is looking at them.

While art historians conduct themselves according to disciplinary codes, audiences come in all types. Some are experienced and thus entirely comfortable with slides. Others, less familiar with the process, attend only to the speaker’s words, ignoring the slides, or, mesmerized by the visual, ignore the speaker. When slides from a summer vacation are shown in someone’s living room, amateur speaker meets amateur audience; in the university classroom, discipline and disciplined interact. At both sociological extremes, speakers make similar assertions to the same effect. A slide appears, and the lecturer comments that its color is not faithful to the original or describes the difficulties encountered in making this photograph, much like an anthropologist who, returning from the field, remarks about the journey, the food, and so forth.<sup>9</sup> In both cases,

9. See Clifford Geertz, *Works and Lives: The Anthropologist as Author* (Stanford, Calif., 1988), pp. 4–5. Travel photographers have long commented on their journeys and the difficult working conditions they encountered. See Carol Armstrong, *Scenes in a Library: Reading the Photograph in the Book, 1843–1875* (Cambridge, Mass., 1998), p. 287, for the work of Francis Frith in the mid nineteenth century. Then as now, such comments also legitimated image and text.



the ostensibly parenthetical remarks establish the speaker as a direct witness, someone who has been there and has returned to tell about it. Moreover, when lecturers comment on slides, they tacitly make the claim that while all present may be looking equally at the image, they know it better. If, however, the audience should sense that the speaker is not comfortable with his slides or misrepresents what everyone else can see, his legitimacy is threatened, and the performance can degenerate into incoherence. For this reason, when an incorrect slide appears in Wasserstein's second prologue, Heidi shifts immediately from standard academic prose—passive voice, third person—to the dialogic second person: “Actually, the painting you're looking at.” She thereby acknowledges the error and reconnects with her listeners, always a good pedagogical strategy.

Audiences experience slides in specific physical settings. Because of the dark room and the podium light, the speaker is spotlighted in strange ways and finds it easier to see the bright slide than the dark audience, whereas the audience can usually see speaker and picture equally well. The lighting level of the hall depends upon the technical capabilities of the space, but usually classrooms have more light for students to take notes and museum auditoriums less light so that the images can be seen better and at a greater distance. Regardless of its intensity, darkness, as in the theater, defines the limits of the performance. The darkness also promotes a closer, more intimate relationship with the image on the screen and at the same time renders the audience more anonymous. As everyone faces the brightly lit screen, the awareness of people nearby is diminished, and, for this reason, classroom discussions under these conditions suffer, the reticent student being afforded “a comfortable shelter” in the darkness, as the German art historian Adolph Goldschmidt observed long ago.<sup>10</sup> On the other hand, that shelter hid more than the shy student, to judge from one 1890 report by a Princeton student. After the professor introduced his subject of the day, the lights would be turned off, the projectors literally fired up (this was before the electrification of the machines), and adventuresome students took the opportunity to steal away in the darkness.<sup>11</sup> Those who stayed for these and other slide lectures had a good view of the image, as Herman Grimm noted with pleasure when he first began using slides at the University of Berlin in the early 1890s.<sup>12</sup>

10. Adolph Goldschmidt, “Kunstgeschichte,” in *Aus Fünfzig Jahren Deutscher Wissenschaft: Die Entwicklung ihrer Fachgebiete in Einzeldarstellungen*, ed. Gustav Abb (Berlin, 1930), p. 195. I thank Margaret Olin for directing me to this useful essay.

11. See Marilyn Aronberg Lavin, *The Eye of the Tiger: The Founding and Development of the Department of Art and Archaeology, 1883–1923*, Princeton University (Princeton, N.J., 1983), p. 27 n. 21.

12. See Herman Grimm, “Die Umgestaltung der Universitätsvorlesungen über Neuere Kunstgeschichte durch die Anwendung des Skioptikons,” *Beiträge zur Deutschen Culturgeschichte* (Berlin, 1897), p. 281; first published in *Nationalzeitung* in 1892.

The status of the third side of this rhetorical triangle, the slide itself, is crucial. Again Aristotle is useful, for while he knew nothing about slides, universities, or academic disciplines, he did write compellingly about rhetoric and the arguments it makes. For Aristotle, the most powerful sign in an argument was the *tekmerion*, or necessary sign. He illustrated the concept with the following example: a man is ill because he has fever. If the basic fact is accepted as true, that is, that the man has a fever, then it is irrefutable that he is sick.<sup>13</sup> Similarly, in the art history lecture, if slides are accepted as paintings, the normal state of affairs, then arguments based upon slides alone are persuasive, even if the evidence only exists within the rhetorical/technological parameters of the lecture itself. Such is the case, for example, when objects of greatly different sizes and from unrelated cultures are regarded as comparable because they appear side by side in the slide lecture. It is no wonder that art historians strive to get the best slides for important presentations. How the slide came to be regarded as a *tekmerion*, why art history felt the need for such agents, and in what ways these devices affect the rhetoric and practice of the discipline are questions to which I now turn.

### *Historical Practice*

Art history is about two hundred years old, but only since the end of the nineteenth century have its practices begun to coalesce into normative patterns. Certainly an art lecture in 1900 was utterly different from one given a century before, the principal difference being the speaker's ability to illustrate and thus make present the work of art. To understand the knowledges that are presently taken for granted in the slide lecture, nineteenth-century developments are crucial. Here the papers given at the Tenth International Congress of Art History in 1912 are historiographically useful. While they mark a moment just before decisive changes in European society would transform more than art history in the decades to come, they also give evidence of art historical practices that seem closer to 2000 than 1800. Today, the best known of these essays is Aby Warburg's iconographical analysis of Renaissance frescoes in Ferrara. Not only was the lecture and its subsequent publication illustrated, but on this occasion Warburg showed a colored slide, several decades before such images were to become common through other photographic processes.<sup>14</sup> The printed version of the lecture is replete with the markers of conversation—deictics and first-person pronouns—which can only in-

13. See Aristotle, *The "Art" of Rhetoric*, pp. 24–29 (1.2.14–19).

14. See Trevor Fawcett, "Visual Facts and the Nineteenth-Century Art Lecture," *Art History* 6 (Dec. 1983): 457. As to the reception and importance of this lecture, E. H. Gombrich describes it "as a climax of that meeting and of Warburg's public career" (E. H. Gom-

dicating that word and image fused in the performance: "I would like to direct your attention only to one page of the *Astrolabium*"; "in the upper portion of the fresco we see"; "let us now turn to April, the month ruled by Taurus and Venus reign."<sup>15</sup> In these examples, each sentence introduces different images. Teachers today use the same expressions.

Being able to speak about an image that is equally accessible to speaker and audience permits a deeper and more detailed visual analysis than was possible before photography, as can be observed in a comparison with the vaguer and less specific lectures that Sir Joshua Reynolds delivered to the Royal Academy in the late eighteenth century. In the earlier era, when art lecturers wanted to be more precise in their references they had few choices, none good. They might assume, like Reynolds, that the audience would have seen the paintings mentioned on prior Grand Tours, or if the material was thought to be obscure they might urge listeners to include a detour to an overlooked collection on their next trip.<sup>16</sup> They could make careful reference to paintings in local or national collections, as J. M. W. Turner did when he lectured to the Royal Academy in 1811. Prints might be used, even though they introduced distortions and failed to convey color or the effects of light and shadow.<sup>17</sup> Moreover, when prints or, later, photographs were circulated in a larger group, as Goldschmidt remembered from his student days, "they reached most students when the subject had long since turned to something else, and one had to choose whether to listen or to recall to mind what had already been said."<sup>18</sup> In major centers some illustrative material might be

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brich, *Aby Warburg: An Intellectual Biography* [Chicago, 1986], p. 192). Warburg's involvement with photographic media is explored in Philippe-Alain Michaud, *Aby Warburg et l'image en mouvement* (Paris, 1998).

15. Aby Warburg, "Italienische Kunst und internationale Astrologie im Palazzo Schifanoja zu Ferrara," *L'Italia e l'arte straniera, Atti del X congresso internazionale di storia dell'arte in Roma* (Rome, 1922), pp. 182, 185, 186; trans. Peter Wortsman, under the title "Italian Art and International Astrology in the Palazzo Schifanoia in Ferrara," in *German Essays on Art History*, ed. Gert Schiff (New York, 1988), pp. 240, 242, 244.

16.

"It is our misfortune, however, that those works of Carrache which I would recommend to the Student, are not often found out of *Bologna*. The *St. Francis in the midst of his Friars* [and other paintings by the artist] . . . in the Zampieri palace, are all worthy the attention of the student. And I think those who travel would do well to allot a much greater portion of their time to that city than it has been hitherto the custom to bestow." [Sir Joshua Reynolds, *Discourses on Art*, ed. Robert R. Wark (New Haven, Conn., 1975), p. 33]

17. "I have only the opportunity of placing before you some of the subjects by prints which may in some manner point out the general lines and some of the light and shadow of the subject, but the colour must be attempted by description" (Jerrold Ziff, "Backgrounds, Introduction of Architecture and Landscape: A Lecture by J. M. W. Turner," *Journal of the Warburg and Courtauld Institutes* 26 [1963]: 134).

18. Goldschmidt, "Kunstgeschichte," p. 194. A similar problem is recalled from the early days of art history at Princeton; see Lavin, *The Eye of the Tiger*, p. 27 n. 24.

available on site. For example, the Royal Academy's copies of Raphael's cartoons were hung in its Great Room, where lectures were given. Consequently when Turner, the Professor of Perspective, referred to the cartoons in his lecture, his language switched to that which future audiences of slide lectures would come to expect: "In this cartoon we may judge."<sup>19</sup>

Otherwise, Turner's presentations were accompanied by his large collection of drawings, which were at least as interesting as his lectures.<sup>20</sup> But it was professors of architecture who took special interest in visual aids, incorporating large drawings, plans, sections, and models of buildings. According to Trevor Fawcett, whose article on nineteenth-century art lectures is fundamental, the "most impressive" of the presentations at the Royal Academy were those given by the architect and professor C. R. Cockerell.<sup>21</sup> Contemporary reports of these lectures note that Cockerell attracted a large following, who appreciated "the passion, amounting almost to a prejudice, with which he views and entertains everything pertaining to architecture." For illustrations, Cockerell hung up "two large sheets, or rather assemblage of sheets . . . shewing in comparative juxtaposition most of the famous structures of antiquity, the one in elevation, the other in section."<sup>22</sup> At every lecture, he displayed his "drop-scene," a large drawing fourteen by ten feet with the most important buildings of the world.<sup>23</sup> A smaller version survives, titled *The Professor's Dream* (1848) (fig. 1).

This last detail may have been literally theatrical, for in the mid nineteenth century someone standing and lecturing before a large tableau would have brought to mind popular entertainments of the day. These provide one context for the art lecture before photographic slides. For centuries, of course, speakers had worked with pictures. Throughout Europe and Asia, itinerant entertainers had long performed at markets and fairs, telling stories and singing ballads before large multipartite pictures. In the simplest staging, the singer-storyteller stood on a bench (hence the German name *Bänkelsänger*) and pointed to pictures with a wand (fig. 2).<sup>24</sup> In the nineteenth century, elite versions of the same format employed the panorama, one or more large painted scenes, usually of distant and exotic subjects. To one side stood the lecturer/entertainer, who gestured toward the painting (fig. 3). In London at midcentury, the period of Cockerell's lectures, the great master of the panorama presentation was Albert Smith. His *The Ascent of Mont Blanc* (1852) became "one of the biggest hits

19. Ziff, "Backgrounds, Introduction of Architecture and Landscape," p. 134.

20. See Fawcett, "Visual Facts and the Nineteenth-Century Art Lecture," p. 448.

21. *Ibid.*, p. 448.

22. Quoted in David Watkin, *The Life and Work of C. R. Cockerell* (London, 1974), pp. 106–7.

23. *Ibid.*, p. 107.

24. See Victor H. Mair, *Painting and Performance: Chinese Picture Recitation and Its Indian Genesis* (Honolulu, 1988), pp. 111–31, figs. 33, 34, 36, 40–42.

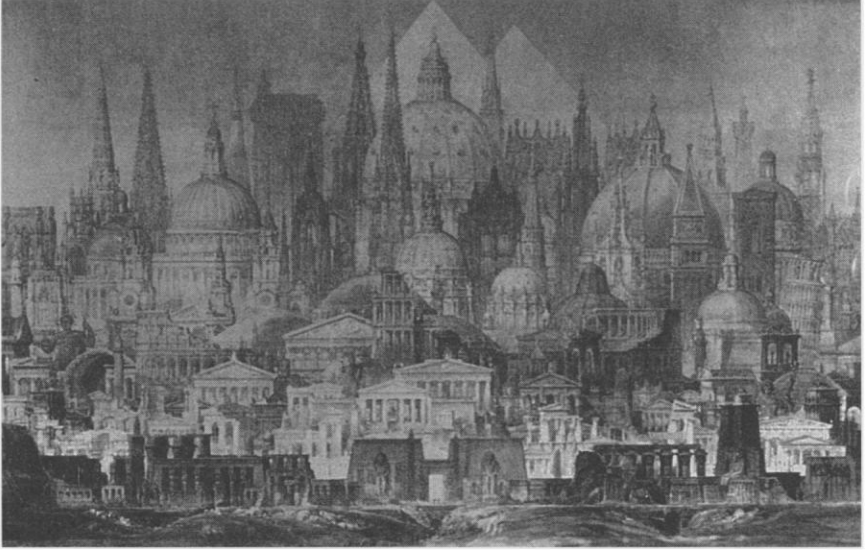


FIG. 1.—C. R. Cockerell, *The Professor's Dream* (1848). From David Watkin, *The Life and Work of C. R. Cockerell* (London, 1974), fig. 16.



FIG. 2.—*Bänkelsänger*. Daniel Chodowiecki, *Reformation of Morals* (1787). From David Kunzle, *The Early Comic Strip: Narrative Strips and Picture Stories in the European Broadsheet from c. 1450 to 1825* (Berkeley, 1973), p. 401.

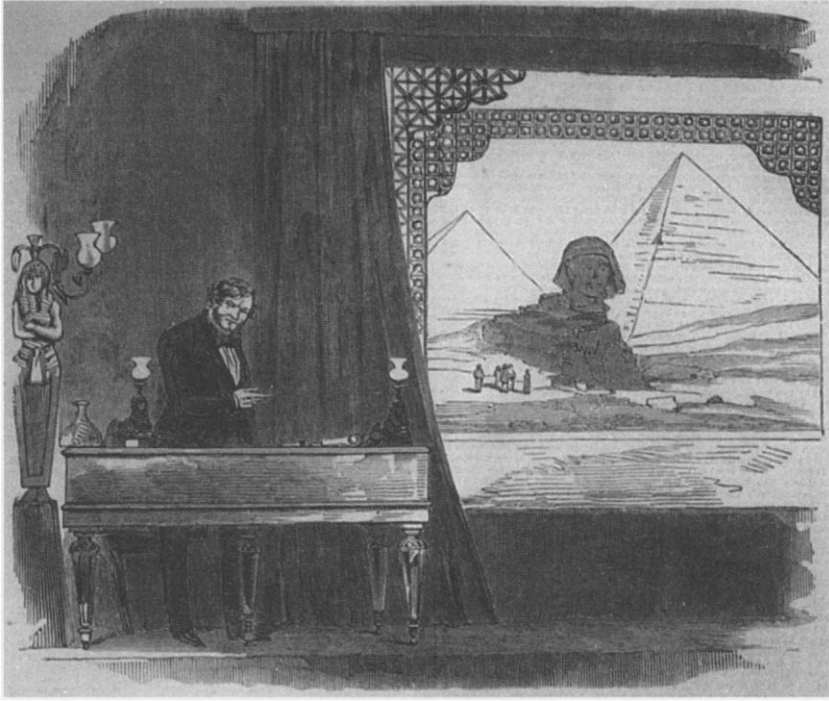


FIG. 3.—Mr. Albert Smith's Entertainment—'The Overland Mail,' at Willis's Rooms. From *Illustrated London News*, 8 June 1850, p. 413.

of the whole Victorian era" before closing after two thousand performances in 1858.<sup>25</sup>

In contextualizing the art lecture, Fawcett emphasized scientific lectures rather than popular entertainments, but the difference is not profound because scientific demonstrations had also become a popular form of entertainment and instruction in the nineteenth century. What science lectures of the period had in common were impressive props—experiments and specimens—that provided the evidence necessary to an argument.<sup>26</sup> Some employed the magic lantern, a variant on the camera obscura and a popular apparatus that was invented in the seventeenth century. By the later eighteenth and into the first half of the nineteenth century, the magic lantern was being used to produce theatrical performances of magic and phantasmagoria, which were popular in Europe and America. Its special effects included projected and reflected images, painted slides, smoke, and so on, often designed to simulate ghostly horrors, and the phantasmagoria has been interpreted as a precursor of pop-

25. Richard D. Altick, *The Shows of London* (Cambridge, Mass., 1978), p. 475.

26. See Fawcett, "Visual Facts and the Nineteenth-Century Art Lecture," p. 446.

ular cinema.<sup>27</sup> But the magic lantern was also employed for various subjects from the comic to the scientific.<sup>28</sup> Charles Dickens describes an astronomy lecture that he was compelled to attend in his youth on his birthday. A "low-spirited gentleman," brandishing a "wand," spoke in the dark about the stars, using transparencies of the stars projected onto the screen and "tapping away at the heavenly bodies . . . like a wearisome woodpecker." The young Dickens promptly fell asleep, waking "cross, and still the gentleman was going on in the dark . . . cyphering away about planes of orbits."<sup>29</sup>

The problem of soporific speakers thus has a long history, but what is noteworthy about the dramaturgy of these nineteenth-century performances is that they display several features of the later slide lecture: speaker or narrator with a wand; stage; diverse audiences, both popular and elite; and darkness in the case of the magic lantern shows. All that is missing is a simulation of the artwork to compare with the presence and reality of a scientific experiment or the terrifying illusion of the phantasmagorical demonstrations. It was the photograph, of course, that made the difference and provided evidence so powerful that for André Malraux, "the history of art has been the history of that which can be photographed."<sup>30</sup>

In the first decades after its discovery, the photograph was regarded as "truth-telling," the "pencil of nature," and "evidence of a novel kind,"<sup>31</sup> interpretations that correspond to what semioticians later termed an *index*.<sup>32</sup> Above all, photography was fact, as Lady Elizabeth Eastlake wrote in a celebrated appreciation from 1857:

Photography . . . is the sworn witness of everything presented to her view. What are her unerring records in the service of mechanics,

27. See X. Theodore Barber, "Phantasmagorical Wonders: The Magic Lantern Ghost Show in Nineteenth-Century America," *Film History* 3 (1989): 73–86; Altick, *The Shows of London*, pp. 217–20; and Charles Musser, *The Emergence of Cinema: The American Screen to 1907*, vol. 1 of *History of the American Cinema* (New York, 1990), pp. 16–28.

28. One sign of the magic lantern's importance to scientists is the technical paper by H. Morton, "The Magic Lantern as a Means of Demonstration," *Journal of the Franklin Institute* 83 (1867): 55–58, 204–6, 282–84, 354–56, 409–12.

29. Charles Dickens, "The Uncommercial Traveller," *All the Year Round*, 6 June 1863, p. 349.

30. André Malraux, *Museum without Walls*, trans. Stuart Gilbert and Francis Price (New York, 1967), p. 111.

31. Cuthbert Bede, "Photographic Pleasures," in *Photography in Print: Writings from 1816 to the Present*, ed. Vicki Goldberg (New York, 1981), p. 84; William Henry Fox Talbot, commentary on pl. 3, *The Pencil of Nature* (1844; New York, 1969), n.p.

32. See Armstrong, *Scenes in a Library*, p. 13, and *passim*. Early photography's indexicality is basic to her study, as it is to the first chapter, "'Stern Fidelity' and 'Penetrating Certainty,'" of Christopher Pinney, *Camera Indica: The Social Life of Indian Photographs* (Chicago, 1998), pp. 17–71. On the general notion of the photograph as index, see Mitchell, *Iconology: Image, Text, Ideology* (Chicago, 1986), pp. 58–63.

engineering, geology, and natural history, but facts of the most sterling and stubborn kind? . . . What are her representation of the bed of the ocean, and the surface of the moon . . . but facts which are neither the province of art nor of description, but of that new form of communication between man and man—neither letter, message, nor picture—which now happily fills up the space between them? . . . Her business is to give evidence of facts, as minutely and as impartially as, to our shame, only an unreasoning machine can give.<sup>33</sup>

In 1859 Oliver Wendell Holmes declared that in the future photographic images, like books, would be collected in vast libraries and made available to artists, scholars, and workmen, a prediction finally realized in the internet.<sup>34</sup> Already in 1851 a campaign was begun to photograph the work of Raphael, and during the next two decades photographic collections for art historical use were established in Germany.<sup>35</sup>

Photographs are not slides, however, and the technical processes for rendering a photographic image on glass for projection followed by a decade or so the invention of the basic medium. But slides were shown to great acclaim at the midcentury Crystal Palace exhibition.<sup>36</sup> Like photographs, slides were initially expensive but then dropped in price and became available in comparatively large numbers. Soon lectures with photographic slides began to displace the older popular entertainments dependent upon painted slides or painted panoramas, a process that would be greatly accelerated with the invention of the cinema at the end of the century.<sup>37</sup> Regarded as far superior to the old painted slides, the photographic versions of distant people and places created strong impressions on audiences. Showmen traveled about America putting on performances, and commercial firms arose to supply them with images. Because of the general acceptance of the photograph's ability to represent faithfully and accurately, the tenor of slide shows shifted from illusion to realism, from phantasmagoria to science.<sup>38</sup>

Art historians were slow to exploit the new potentials of the photo-

33. Elizabeth Eastlake, "Photography," in *Classic Essays on Photography*, ed. Alan Trachtenberg and Amy Weinstein Meyers (New Haven, Conn., 1980), pp. 65–66.

34. See Oliver Wendell Holmes, "The Stereoscope and the Stereograph," in *Photography in Print*, p. 113.

35. Jennifer Montagu, "The 'Ruland/Raphael Collection,'" *Visual Resources* 3, no. 3 (1986): 167–83. An important general study is Anthony Hamber, "The Photography of the Visual Arts, 1839–1880: Part I," *Visual Resources* 5, no. 4 (1989): 289–310, "The Photography of the Visual Arts, 1839–1880: Part II," *Visual Resources* 6, no. 1 (1989): 19–41, "The Photography of the Visual Arts, 1839–1880: Part III," *Visual Resources* 6, no. 2 (1989): 165–79, and "The Photography of the Visual Arts, 1839–1880: Part IV," *Visual Resources* 6, no. 3 (1990): 219–41. For Germany, see Heinrich Dilly, *Kunstgeschichte als Institution: Studien zur Geschichte einer Disziplin* (Frankfurt am Main, 1979), pp. 151–54.

36. See Musser, *The Emergence of Cinema*, pp. 29–30.

37. See Altick, *The Shows of London*, p. 482.

38. See Musser, *The Emergence of Cinema*, pp. 31–42.



graphic slide, in part because of the initial limitations of photographic images, especially their inability to represent all colors uniformly.<sup>39</sup> But reproductive techniques, including photographic slides, were discussed at the First International Congress of Art History in Vienna in 1873 and gradually introduced into university classes in Germany during the following decades. The widespread use of the slide projector depended upon not only the invention of the photographic slide but also the electric light, which afforded a strong, steady light source, developments that came together by the end of the 1880s.<sup>40</sup> By 1912 the principal departments in America possessed multiple slide projectors and thousands of lantern slides.<sup>41</sup> Some professors, especially Herman Grimm in Germany, readily took to the new technology.<sup>42</sup> Others resisted. Charles Eliot Norton, the first professor of art history at Harvard from the 1870s to the 1890s and a follower of Ruskin, lectured to classes of as many as twelve hundred students but introduced slides only in 1896, shortly before his retirement.<sup>43</sup>

Wölfflin, the aforementioned master of the slide lecture, made good use even of performance miscues and wrote an essay about the formal possibilities of studying slides that had been reversed in the projector.<sup>44</sup> He is also credited with the practice of showing two slides at one time, the hallmark ever since, it seems, of an art historical lecture. But, as we have seen, already at midcentury the English architectural historian Cockerell was lecturing from two large drawings. By the turn of the century double projections had probably become common. While teaching at Halle from 1902 to 1912 Goldschmidt, for example, gave his lectures in a large auditorium of the main university building and had a "skioptikon," or slide projector, constructed to his specifications, as he put it, "so that two glass slides could be projected next to one another, and were able to be changed independently of one another. This seemed to me

39. See Wolfgang M. Freitag, "Early Uses of Photography in the History of Art," *Art Journal* 39 (Winter 1979–80): pp. 119–20. Yellow was a particular problem; see Montagu, "The 'Ruland/Raphael Collection,'" p. 170.

40. See Dilly, "Lichtbildprojektion—Prothese der Kunstbetrachtung," *Kunstwissenschaft und Kunstvermittlung*, ed. Irene Below (Gießen, 1975), pp. 158–66.

41. See the report of E. Baldwin Smith, "The Study of the History of Art in the Colleges and Universities of the United States" (1912), in *The Early Years of Art History in the United States: Notes and Essays on Departments, Teaching, and Schools*, ed. Craig Hugh Smyth and Peter M. Lukehart (Princeton, N.J., 1993), pp. 12–36.

42. The enthusiasm that Grimm evinces in his essay, "Die Umgestaltung der Universitätsvorlesungen über Neuere Kunstgeschichte durch die Anwendung des Skioptikons," pp. 276–395, has much in common with the rhetoric of the internet prophets of our day.

43. See Agnes Mongan, "Harvard and the Fogg," in *The Early Years of Art History in the United States*, p. 47, and Freitag, "Early Uses of Photography in the History of Art," p. 122.

44. See Heinrich Wölfflin, "Über das Rechts und Links im Bilde," *Gedanken zur Kunstgeschichte: Gedrucktes und ungedrucktes* (Basel, 1941), pp. 82–90. I thank Reinhold Heller for this reference.

unconditionally necessary to the comparative observations for the students, since when one sees images one after the other, one holds in mind only the very coarse stylistic differences.”<sup>45</sup> Writing in 1931, Wölfflin appreciated the slide lecture because of the possibility of continuously supporting the spoken word with pictures. Compared to its printed form, the slide lecture allowed details, enlargements, variants, and exceptions to be shown in greater numbers and without detracting from the main argument, because the “Grundakkord,” the basic chord—what we, shifting metaphors, call the anchor slide—could be struck (shown) again and again.<sup>46</sup>

The foregoing examples indicate that the two German professors were constructing or orchestrating arguments that at their foundation were visual, not verbal. Both men were as much directors of a visual production as their technological ancestors, those traveling showmen with their phantasmagorical exhibitions, although doubtless the art historical special effects were tamer. Words and images have merged: no prints or photographs to pass around the room, no allusions needed to one’s next Grand Tour. For Wölfflin, the slide lecture was superior to the printed book because it could take the linear path of the page, but it might also assume a more complicated structure. Moreover, in the oral presentation, the speaker was able to “make use of exaggerations for the purposes of clarification (and entertainment), in as much as it is in his power to retract them at any moment.”<sup>47</sup>

This attention to the creation of visual/verbal arguments goes far beyond what even the greatest lecturers of the earlier periods, such as Reynolds or Ruskin, could have achieved. The effects achieved depend, of course, upon the new technology, but they may also owe something to the genre expectations and practices of the dominant “screen practice” of the day, cinema. The relationship extends beyond editing techniques because silent film of the day was, of course, not always silent. Not only music but also spoken words accompanied the images and jointly produced a narrative. Like lecturers accompanying the panorama or the magic lantern, the silent film narrator stood beside the images and offered commentary in ways that were culturally specific and adapted from local customs of telling stories with pictures.<sup>48</sup>

The ascendance of the slide lecture and its characteristic means of disseminating knowledge had many consequences for art history. Grimm noted that it permitted students and citizens to see a greater range and number of images, for example, the entire narrative cycle of a Renais-

45. Adolph Goldschmidt, 1863–1944: *Lebenserinnerungen*, ed. Marie Roosen-Runge-Mollwo (Berlin, 1989), p. 126. I thank Margaret Olin for this reference.

46. Wölfflin, *Italien und das deutsche Formgefühl* (Munich, 1931), p. v.

47. *Ibid.*

48. See Musser, *The Emergence of Cinema*, pp. 198–99, 216–18, and the issue *Le Bonimenteur de vues animées/The Moving Picture Lecturer of Iris*, no. 22 (Fall 1996).

sance church, and that it permitted a more direct engagement with the artwork. Moreover, restorations and forgeries could be better studied. Formerly Grimm had begun his lectures with a critique of the written sources; now he showed the artwork. For him, the advantage was that history no longer overwhelmed the artwork. Art and artist were thereby saved from historicity, for the artwork could be displayed on the wall independent of time.<sup>49</sup>

Indeed, formal methods in art history rely on photographs, and Heinrich Dilly is correct to see the slide lecture as integral to Wölfflin's formalist arguments about art.<sup>50</sup> However, the iconographical research of scholars such as Warburg also depended upon large collections of illustrative material. Yet the photograph/slide was more than the basis of the new visual archives being compiled at the turn of the century. For Grimm, the skioptikon was an exact instrument like the microscope of the natural sciences, a metaphor that was widespread in the period.<sup>51</sup> Anton Springer, one of the most prominent German professors of the 1880s, referred to photographs as the discipline's microscope and a means for giving it a scientific foundation.<sup>52</sup> Giovanni Morelli, the principal figure in the early history of connoisseurship, declared that just as the botanist was surrounded by his plants, the mineralogist, his stones, and the geologist, his fossils, "so the art-connoisseur ought to live among his photographs and, if his finances permit, among his pictures and statues."<sup>53</sup> In 1893 Bernard Berenson wrote that "when this continuous study of originals is supplemented by isochromatic photographs, such comparison attains almost the accuracy of the physical science."<sup>54</sup>

These scientific metaphors reveal art history's aspirations and photography's role in attaining them. Photographs, especially the great enlargements and details afforded by slides, permit the artwork to be probed deeply and art history to approach certain methods of the natural sciences, ones that also had larger cultural status and currency. This is one reason why Carlo Ginzburg could join together in an article Morelli, Freud, and Sherlock Holmes and examine one manner of scientific analysis of the day.<sup>55</sup> But photography also permitted science itself to become

49. See Grimm, "Die Umgestaltung der Universitätsvorlesungen über Neuere Kunstgeschichte durch die Anwendung des Skioptikons," pp. 278–82, as discussed in Dilly, "Lichtbildprojektion," pp. 164–65.

50. See Dilly, "Lichtbildprojektion," pp. 166–70.

51. See Grimm, "Die Umgestaltung der Universitätsvorlesungen über Neuere Kunstgeschichte durch die Anwendung des Skioptikons," p. 352.

52. See Kathryn Brush, *The Shaping of Art History: Wilhelm Vöge, Adolph Goldschmidt, and the Study of Medieval Art* (Cambridge, 1996), p. 28 n. 43.

53. Giovanni Morelli, *Italian Painters: Critical Studies of Their Works*, trans. Constance Jocelyn Ffoulkes (London, 1900), p. 11.

54. Quoted in Freitag, "Early Uses of Photography in the History of Art," p. 119.

55. See Carlo Ginzburg, "Morelli, Freud, and Sherlock Holmes: Clues and Scientific Method," *History Workshop* 9 (Spring 1980): 5–36.

more positivistic. A recent study by Lorraine Daston and Peter Galison has explored the introduction of photography into scientific atlases during the later nineteenth century. In this context, photography supported a new objectivity because it was understood by scientists, not just Lady Eastlake, to be mechanically produced, without human intervention and interpretation, and thus objective.<sup>56</sup>

For art history the ability to produce objective representations of works of art, especially in great abundance in the slide lecture, permitted new types of arguments. Now inductive as opposed to deductive reasoning was possible. Instead of proceeding from *a priori* conceptions, such as that the acme of artistic development was the High Renaissance (Vasari) or ancient Greece (Winckelmann), Wölfflin, Warburg, and Goldschmidt built their visual arguments upon carefully observed particulars, be they iconographic motifs or formal characteristics. In the process, older rhetorics disappeared, above all the grand ekphrastic tradition of describing works of art that had been inherited from antiquity. Traditionally, the objective of an ekphrasis was to render present the work of art by means of personal response, usually that of the speaker, but also other persons and even animals; hence Winckelmann's sometimes highly personal and emotional response to Greek art or Vasari's emphasis on the lifelikeness and psychological intensity of paintings.<sup>57</sup> Both were trying to make present what manifestly was not, whether paintings in distant Italian cities or statues from a country never visited. With photography and especially with the slide lecture's ability to fuse words and images, the artwork is present in the discursive space—hence the use of deictics—and it requires less verbal evocation or description. As Wölfflin put it after rhetorical fashion had changed, words no longer overwhelmed art.

If a photograph of a work of art reduces the aura of the original, as Benjamin argued, a slide in use is another matter. The speaker's talents may actually burnish the sublime or revivify the original through details, comparisons, and the other tricks of the trade that Wölfflin and the best lecturers of our day employ. Also enhanced in the process is the slide's indexicality, the sense that it has direct physical relationship with the referent, that it is the work of art, as Wasserstein's play and everyday art history classes affirm. But ironically the photographic slide's very power to make art present in the lecture hall distorts it at the same time because, to state the obvious, the original is not present. The artwork is not only

56. See Lorraine Daston and Peter Galison, "The Image of Objectivity," *Representations*, no. 40 (Fall 1992): 81–128. These matters are further discussed in Galison, "Judgment against Objectivity," and Joel Snyder, "Visualization and Visibility," in *Picturing Science, Producing Art*, ed. Caroline A. Jones and Galison (New York, 1998), pp. 327–59 and 379–97.

57. See Svetlana Alpers, "Ekphrasis and Aesthetic Attitudes in Vasari's *Lives*," *Journal of the Warburg and Courtauld Institutes* 23 (1960): 190–215. A useful accounting of ancient and medieval ekphrasis is Liz James and Ruth Webb, "'To Understand Ultimate Things and Enter Secret Places': Ekphrasis and Art in Byzantium," *Art History* 14 (Mar. 1991): 1–17.

detached from history, as Grimm favored; it is also divorced from neighboring images, attendant sights, sounds, or smells, and the community, traditions, and functions of the original.

Slides, even more than photographs, change artworks into what Fawcett correctly termed “visual facts” or what Lady Eastlake described as “facts of the most sterling and stubborn kind.”<sup>58</sup> It is this move that also brings art history closer to other more positivistic, inductive disciplines of the nineteenth century and thereby makes relevant Mary Poovey’s recent book about the transformations in the study of economics, statistics, and social sciences. For her, the quintessential modern facts are numbers because “they have come to seem preinterpreted or even somehow non-interpretative at the same time that they have become the bedrock of systematic knowledge.”<sup>59</sup>

The reliance on similar factual entities—the artwork as photograph and slide—has long rendered art history and its lectures evocative and persuasive. And use of photographic slides has had the not insignificant effect of increasing the demand for art history lectures in universities and museums. Once, artists and genteel antiquarians wrote and lectured about art, which artists reproduced in engravings and lithographs. Then, from the late nineteenth century, art historians and photographers prevailed, as Reynolds and Turner and the makers of drawings and prints gave way to Warburg and Wölfflin and hosts of anonymous photographers.<sup>60</sup> A division of labor and education eventually led to a distinction between the creation and the analysis of a work of art, a process that for this and other reasons continues in the present day division of departments of art into art history and fine or studio art.

If regarded unselfconsciously as disciplinary bedrock, photographs and slides of artworks inhibit conversations with other disciplines and impede the utilization of critical theories. Moreover, through its simulation of objects, the art history lecture creates replications of the past and as such is yet another step in a long process of translation or dislocation. First the work of art was removed from its original context, either to a museum or to the status of public monument; then it was replicated in photographic archives and illustrated books and through slides reanimated in myriad classrooms. For several generations these processes have remained stable, even if historical and cultural contexts have varied greatly. Over the same period, slide lectures, art historical pedagogy, and the photographic technology that supports both have also changed little.

58. See Fawcett, “Visual Facts and the Nineteenth-Century Art Lecture.”

59. Mary Poovey, *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society* (Chicago, 1998), p. xii.

60. Engravings and photographs of art works are usefully compared in William M. Ivins, Jr., *Prints and Visual Communication* (New York, 1969), pp. 135–57. Trevor Fawcett provides more nuanced detail about this transition in “Graphic versus Photographic in the Nineteenth-Century Reproduction,” *Art History* 9 (June 1986): 185–212.

Today social and legal sanctions curtail the appropriation of actual objects, while the pace of technical innovation accelerates. The result is the transformation of traditional scholarly discourses, the proliferation of webpages for museum collections and university classes, and the creation of innovative cybernetic environments for past artifacts.<sup>61</sup> While it would be rash to pronounce on future inventions and their effects on pedagogy, it seems safe to conclude that the language and reference of the art lecture will adapt to the new technologies, as *Bänkelsänger* and painting formerly gave way to professor and skioptikon, and as dialogue and deictics today are yielding to hypertext, HotSpot, and Powerpoint. Whereas ekphrasis and epideictic oratory once endeavored to place a living object in front of an audience, new art historical rhetoric will try to put audience and probably art historian inside a virtual object, further collapsing the distinction between object and subject and potentially reenacting the phantasmagoria of the magic lantern shows.

Where will the art historian stand in cyberspace, and what codes, disciplinary, performative, or otherwise, will control the content and guarantee the reliability of art presentations? Will not the new ability to seamlessly merge text, image, and sound dissolve distinctions between written and oral, past and present, primary and secondary, and art and criticism, and will it not also become difficult to write about these developments solely from within a print culture that fostered these categories? If so, is someone like Turner, artist and analyst, to become the paradigmatic art historian of the future, simultaneously cyberartist and humanist? Or will art history and other humanistic disciplines remain on the margins of technological development because of institutional parsimony or conservatism so that the knowledges that it produces are derivative of technology and the manifold assumptions that support it? Because of all of the above, will the discourse of art history become increasingly American—at the moment the center of the computer industry—as Germany and its great optical industries dominated the discipline in the later nineteenth century? And with every word written or accessed will the gap widen between the technological haves and have-nots, in spite of the outpouring of postcolonial criticism? Or will computers continue to increase in power and decrease in cost at a prodigious rate and with the proliferation of internet resources thus provide greater equality of opportunity for teachers and students throughout the world?

61. One example of the new form of scholarly discussion is the new online review for art history, *CAA reviews*: <http://www.caareviews.org/contents.html>. Six months after its founding in October 1998, it was receiving thousands of hits each week. Others are the various projects being undertaken to create “magic classrooms” at Princeton University. See the Piero Project/ECIT—Electronic Compendium of Images and Texts at <http://mondrian.princeton.edu/art430/art430.html>