Introduction to
Art Image Access
Issues, Tools, Standards, Strategies

Subject Access to Art Images

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One of the most important means of enabling users to locate art images is subject access, but providing such access is a complex and sometimes messy process. To clarify the issues, I begin by exploring two questions: What is subject access? What is an art image? During this exploration, I hope to show how the answers to these questions can affect the ways in which the subjects of art images are analyzed and access is provided to them. Then, I look at the steps involved in analyzing subjects and providing access through them to art images. Finally, I summarize the decisions that need to be made when providing subject access to art images.

What is subject access? What is an art image? The answers to these questions may seem at first to be as simple as the questions themselves, but they become complex as one considers them in depth. Let us begin by considering subject access. Subject access is access to an art image by means of the subject of that image or, more precisely, the subject of the work or works of art that image represents. The questions then become: What is the subject of a work of art? How should that subject be described in order to provide access to it?

The Subject of a Work of Art

Perhaps the most obvious aspect of the subject of a work of art is what that work depicts, what it is *of*. Looking at Edward Sheriff Curtis's photograph *The Eclipse Dance* (fig. 1), one might say that it is *of* a dance, *of* people, and even, although very faintly, *of* a solar eclipse. Although it may be obvious, the *of* aspect of a work of art is not necessarily simple. People and objects may be the first kind of *of-ness* that comes to mind, but a work of art may also depict activities or events (as, for example, a dance or a solar eclipse), places, and times. It can be useful to consider these various kinds of *of-ness* when thinking about the subject of a work of art.

Fig. 1. Edward Sheriff Curtis (American, 1868-1952). *The Eclipse Dance.* 1910-14, gelatin silver print, 14.15 x 20.3 cm (59/16 x 8 in.). J. Paul Getty Museum, Los Angeles

Furthermore, what a work of art is *of* may be described in a variety of ways. One way is to describe what the work *of* art is of in generic terms. In *Categories for the Description of Works of Art* (CDWA)[1], this way is called Description, a subcategory under the category Subject Matter. A second way is to give a specific name to what the work of art is *of*- a subcategory called Identification under the category Subject Matter in CDWA. Any one subject of a work of art can be described with a range of terms, from the broadly generic to the highly specific. For example, we can describe one of the subjects of Curtis's photograph as "dance" or less broadly as "ceremonial dance," and we can also identify it specifically as "Eclipse Dance." We see "people" who can be identified as "Native Americans" (or, in Canada, "First Nations") but who can also be identified more specifically as "Kwakuitl," and, if information were available, could be still more specifically identified by their personal names. As we can see, the range from generic to specific, from description to identification, can be more of a continuum than a dichotomy.

As another example, the subject of Frederick Henry Evans's photograph *Across the West End of Nave, Wells Cathedral* (fig. 2) could be described using terms such as "architecture," "religious buildings," "cathedrals," and "Wells Cathedral." Describing or identifying a particular subject at just one point in this range of terms will not necessarily meet the needs of all searchers for an image. One can easily imagine a set of circumstances in which describing the subject of this last image as "religious buildings" would best meet one searcher's needs, but a different set in which describing the subject as "cathedrals" would meet another searcher's needs. And, of course, one can imagine a third searcher who would best be served by identifying the subject as "Wells Cathedral."

Although any subject, whether of a text or an image, can be described in both broad and narrow terms, images are different from text in that they are always *of* a specific instance of something. Unlike a text about religious buildings, an image cannot be a purely generic depiction of "religious buildings." An image must necessarily be, if not of a particular known and named building, at least of a particular type of building or construction. It may be a church or a monastery, a nave or a cloister, but it must be something more specific than "religious buildings." This characteristic of images makes it particularly important to provide access to a subject of an image at as many points as possible within the range of terms that can describe or identify that subject.

The three subjects I have just mentioned—"Eclipse Dance," "Kwakuitl," and "Wells Cathedral"—show that activities or events, persons, and objects can be described using a continuum of terms from the broadly generic to the relatively specific. It is useful to recognize that place and time can also be described in generic terms or identified with specific terms. For time, the difference between generic and specific is between description of cyclical time and identification of a chronological time, while for place it is the difference between description of a kind of space and identification of a geographic place. The place of Evans's photograph is the town of "Wells," in the county "Avon," in the country "England." Speaking descriptively or generically, the place of the photograph is "interior." The time of Curtis's photograph is "1910–1914" it is also "daytime." If we knew more about the photograph we might be able to identify the season; it might be, for example, "spring" or "summer." It is easy to imagine circumstances in which a user would be interested in a generic description of a place depicted (for example, interiors of churches) or the identification of a particular place (for example, churches in England) or a combination of the two (interiors of churches in England).

Fig. 2. Frederick Henry Evans (British, 1853?1943). *Across the West End of Nave, Wells Cathedral.* 1890?1903, platinum print, image: 15 x 10.5 cm (57/8 x 41/8 in.). J. Paul Getty Museum, Los Angeles

Why is it useful to think about the different kinds of of-ness? It is useful because it gives us a checklist of the kinds of subject—persons, objects, activities, places, times—to consider when describing or assigning subject terms to art images. Thinking about the ways in which any single subject may be described or identified within a range of generic and specific terms gives us another checklist to use when identifying possible subjects; it may also affect the very structure of the information system providing user access. For example, it seems reasonable to assume that any image of "Wells Cathedral" is also an image of "cathedrals," an image of "religious buildings," and an image of "architecture." Rather than having to assign each of these terms to each image of Wells Cathedral, would it not be preferable to assign just the specific identifying term and have a system that inferred the generic descriptive terms from the specific identification? This is what the ICONCLASS system does in assigning higher-level terms for a specific description, as discussed by Colum Hourihane in his essay in this volume. But a local authority file could also be designed to carry the broader or more generic descriptive terms each time a specific term or set of terms is applied. Patricia Harpring discusses the creation of a subject authority in her essay in this volume.

Less obvious than the *of-ness* of a work of art, but often more intriguing, is what the work of art is *about*, which corresponds to the subcategory Interpretation under Subject Matter in CDWA. Sometimes the *about-ness* of a work of art is relatively clear, as in Georg Pencz's *Allegory of Justice* (fig. 3). This image is *of* a naked woman holding a sword and scales, but the title tells us that the image is an allegorical figure representing justice or, in other words, that the image is *about* the abstract concept "justice." In Goya's drawing *Contemptuous of the Insults* (fig. 4), the *about-ness* is slightly less obvious, but it is still clear that this work of art has some meaning beyond simply what it is *of*. Indeed, a description of what it is *of*—a man, perhaps Goya himself, gesturing toward two dwarfs wearing uniforms—is not really sufficient to make sense of this image; it symbolizes something else, it is *about* something else: the relationship between Spain and France at the beginning of the nineteenth century or, more specifically, Goya's personal attitude toward the French occupation of Spain.

Fig. 3. Georg Pencz (German, ca. 1500–50). *Allegory of Justice.* 1533, pen and brown ink over black chalk, 19.2 x 15 cm (79/16 x 57/8 in.). J. Paul Getty Museum, Los Angeles
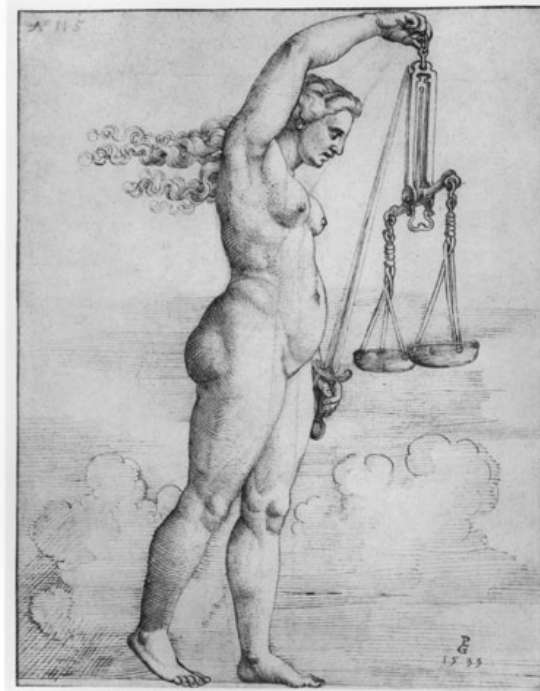

Fig. 4. Francisco José de Goya y Lucientes (Spanish, 1746–1828). *Contemptuous of the Insults.* 1803–12, brush and India ink, 29.5 3 18.2 cm (101/4 3 73/16 in.). J. Paul Getty Museum, Los Angeles

Let us look at a few more examples of ways in which both *of-ness* and *about-ness* are present in an art image. In a death scene by Gerard Horenbout (pl. 1) in a sixteenth-century Flemish book of hours, one part of the image depicts a person dying, while another part shows a decaying corpse on horseback, which symbolizes death. One could say that this work of art is both *of* death (the man in the bed is experiencing death) and *about* death (the corpse). In fact, this image is really *about* death in two different senses: the figure of the corpse personifies or symbolizes death, but the entire image or combination of scenes is *about* the omnipresence and inescapability of death.

The Destruction of Jerusalem (pl. 2) by the fifteenth-century Boucicaut Master reveals yet another kind of *about-ness*. In this image, which ostensibly depicts the siege of Jerusalem by the Romans in the first century, we see a somewhat stylized representation of a fifteenth-century French city, not a realistic depiction of first-century Jerusalem. Similarly, the people in the manuscript illumination appear to be fifteenth-century French people, not Romans from the first century or the civilian inhabitants of first-century Jerusalem. One could say that this work of art is *of* a fifteenth-century French city and *of* fifteenth-century French people, but it is *about* first-century Jerusalem and its inhabitants, *about* the Roman emperor Titus and his soldiers. Both the *of-ness* and the *about-ness* of this work of art could be of interest to users. It could be of interest to one researcher because of its depiction of a fifteenth-century city and to another because it is *about* Jerusalem. To still a third researcher, interested perhaps in what the scenery for a medieval European mystery play might have looked like, the fact that it depicts a fifteenth-century city as a representation of first-century Jerusalem would in itself be valuable.

The Birth of Esau and Jacob by the fourteenth-century Master of Jean de Mandeville (fig. 5) is similar to the previous example. This image depicts fourteenth-century European people, clothing, furnishings, and childbirth customs, but it is intended to represent an event that would have occurred several thousand years earlier on a different continent. In other words, it is *of* babies and midwives and baths and beds in medieval Europe, but it is *about* the biblical Esau and Jacob and their mother Rebecca.

In these last five examples, the works of art were, one might say, designed or intended as allegories or symbolic expressions, and their *about-ness* can perhaps be seen as an essential element of their subject analysis. But there are other works of art in which *about-ness* may be more tenuous, less clear, and perhaps even an unnecessary element of subject analysis. Consider the photographs by Evans and Curtis. Are these works of art *about* anything? Whether they are perceived as *about* something, and what they are perceived as being *about*, may depend to a great extent on the background of the person beholding the work of art. Is Evans's photograph *about* peace or timelessness or oppressive severity? Is Curtis's photograph *about* superstition or respect for nature? Is it *about* the human impulse to explain and control natural phenomena? When determination of *about-ness* requires highly subjective judgment, should that determination be included in providing subject access to art images? Should the inclusion of *about-ness* in subject analysis be limited to works of art that are clearly allegorical or symbolic in nature? These questions need to be considered when providing subject access to art images.

Fig. 5. Master of Jean de Mandeville (French, act. 1350–70). *The Birth of Esau and Jacob* from Peter Comestor, *Bible Historiale* (Vol. 1), trans. Guiart des Moulins, MS 1, fol. 29v (detail). Ca. 1360–70, tempera colors, gold, and ink on parchment, leaf: 35 x 26 cm (133/4 x 101/4 in.). J. Paul Getty Museum, Los Angeles

Why is it useful to identify the ways in which a work of art can be *of* or *about* a particular subject? It is useful because it leads us to consider the various aspects of the subject of a work of art, to which aspects it is worth providing access, and whether it is necessary to make distinctions between and among these various aspects. Is it necessary or useful to make a distinction between an image that is *about* death and one that is *of* death? Is it appropriate to provide access to *about-ness* that is highly subjective? If such access is provided, is it necessary or useful to make a distinction between an image that contains an allegorical or symbolic personification *of* death or justice and one that is *about* death or justice in a more subjective sense? Is it necessary or useful to make a distinction between historically accurate representations *of* Jerusalem and representations that are better described as being *about* Jerusalem? These questions also need to be considered when providing subject access to art images.

Some images, such as Horenbout's *Death Scene*, the Boucicaut Master's *The Destruction of Jerusalem*, and the Master of Jean de Mandeville's *The Birth of Esau and Jacob*, accompany, illustrate, or are in some way about literary works.

Death Scene accompanies the Office of the Dead[2], *The Destruction of Jerusalem* appears in the manuscript *Des cas des nobles hommes et femmes*[3], and *The Birth of Esau and Jacob* prefaces the portion of the biblical Book of Genesis that describes that event. These literary works can be seen as another kind of description of the subject *of* the work of art, and therefore access to art images through the names of literary works may be considered, when appropriate, as providing an additional form of subject access.[4]

Although I am focusing on subject access to art images in this essay, I think it is useful to discuss briefly a category of access that is not, strictly speaking, subject access but is sometimes thought of in conjunction with, or even overlaps, subject access. This category of access, called Object/Work-Type in CDWA, describes not what the work *of* art is of or *about* but the kind of work that it *is*. The category Object/Work-Type can overlap with Subject for two reasons. The first is that, in some cases, the subject matter of an image can also be its Object/Work-Type. For example, "landscape" describes subject matter in the painting *Mythological Scene* by Dosso Dossi (pl. 3), although this image is, however, not a "landscape" in the Object/Work-Type sense. A painting from, say, the Barbizon School (a group of mid-nineteenth-century landscape painters) is both "a landscape" in the Object/Work-Type sense and depicts a "landscape" in the Subject sense.

The second reason that Object/Work-Type can overlap Subject is that, in the case of one work of art being depicted in another work, the term used to describe the Object/Work-Type of the depicted work becomes the term used to describe a Subject of the work in which it is depicted. In Evans's photograph of Wells Cathedral, "cathedral" is an Object/Work-Type of the depicted building, but since the photograph is *of* a cathedral, "cathedral" becomes a Subject of the photograph, not its Object/Work-Type; the Object/Work-Type of the artwork in hand is "photograph." Or, one might have an etching that depicts an artist at work in his studio surrounded by his paintings. Such an image would have "etching" as its Object/Work-Type, but "paintings" as a Subject. One searcher may want images that *depict* paintings; another searcher may want artworks that *are* paintings. Failing to distinguish between artworks that *are* paintings and artworks that depict (that is, are *of*) paintings diminishes the potential for precision in retrieval: searchers looking for just those images that are *of* paintings or just those artworks that *are* paintings will not be able to specify or retrieve only those images they want.

What Is an Art Image?

The foregoing discussion of works of art depicted in other works of art returns us to the big question: What is an art image? An art image may *be* a work of art; it may be an image of a work of art; or it may be both a work of art *and* an image of a work of art.[5] Pencz's *Allegory of Justice* represents an image—a drawing—that is a work of art; *Sarcophagus with Lid* (fig. 6) is an image—a photograph—of a work of art—in this case, a marble sarcophagus. The image itself—the photograph—is not a work of art, although it depicts a work of art—the sarcophagus. The image that is Evans's photograph *Across the West End of Nave, Wells Cathedral* is *itself* a work of art and in addition *depicts* the work of art that is Wells Cathedral. It is both a work of art *and* an image of a work of art. Curtis's photograph *The Eclipse Dance* is itself a work of art, but it is also an image of masks that can be considered to be works of art in their own right. Although the details of the masks cannot be seen in this image, the image does give useful information regarding these masks, as it shows them in the context of their use. An image that gives context to a work of art can be as valuable as an image that depicts the work more clearly—such as a photograph of a mask in a museum's collection that shows every detail precisely—but lacks context.

Fig. 6. Attic Workshop. *Sarcophagus with Lid* (front). Ca. 180–220, marble, body: 134 x 211 x 147 cm (53 x 831/16 x 58 in.); lid: 100 x 218 x 95 cm (391/2 x 86 x 371/2 in.). J. Paul Getty Museum, Malibu, California
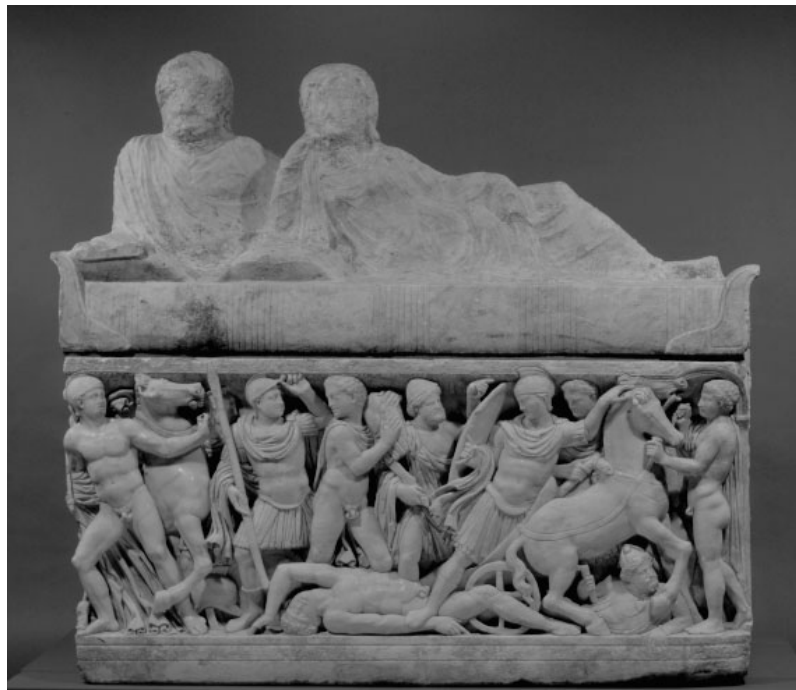
Why is it important to note that an art image may be not only a work of art itself but also an image of another work of art? First, the name of a given work of art (for example, *Wells Cathedral*) or a term that describes the type of work (for example, "masks") may become, as we have seen, subject terms when that work is depicted or represented in another work of art. It can be useful to consider whether one wishes to distinguish between artworks that are depicted in other artworks and those same artworks depicted in images that are not themselves generally regarded as works of art. For example, in providing access to images of Wells Cathedral, would one wish to try to distinguish between Evans's "artistic" photograph and photographs taken merely to document what the cathedral looks like? It seems doubtful that one would wish to make this distinction, although one would, of course, wish to provide access to Evans's photograph itself as a work of art. And if one does not wish to make this distinction, then the terminology and format of the access provided should be the same, whether the image that represents the work of art in question is simply recording that work or is a work of art in itself.

The situation in which a single term can describe Object/Work-Type in one context and Subject in another context can be generalized as follows: the same term can, in certain circumstances, describe or identify different aspects of works of art. For instance, "Goya" can identify a specific subject of a work of art, and "Goya" can also identify the creator of a work of art. In the case of *Contemptuous of the Insults*, "Goya" is both Subject and Creator of the work of art. One can easily imagine that a person seeking images *of* Goya would like to have them separated from works of art created *by* Goya; however, someone seeking works *by* Goya might be very pleased to be made aware of images that are *of* Goya. The point is that it may be useful to employ the same vocabulary to describe a person or object, whatever the role of that person or object vis-à-vis the art image may be, but it is at the same time necessary to provide a means for organizing such a retrieval based on metadata elements or categories of access.[6] Using consistent vocabulary promotes recall of relevant images; providing the means for organizing the retrieval based on category promotes precision. Categories can be differentiated from one another by placing them in different fields in a database record or otherwise identifying them as different metadata elements.

A second reason for pointing out that an art image may contain representations of works within works is that it may be desirable to provide subject access to each separate work of art represented by a single image and to associate the subject access for a particular work with just that work–not with a work that it represents or in which it is represented. Consider *Sarcophagus with Lid*. The sarcophagus can be considered the Subject of the photograph, but it is also the Object/Work-Type of the work of art represented. Depicted in the photograph is the side of the sarcophagus that represents an event from the Trojan War: Hektor's body being dragged behind Achilles' chariot. But the sarcophagus is decorated with subjects not shown in this particular photograph, so that "Odysseus," depicted on an unshown end, is a Subject of the sarcophagus but not of this specific image of it. It may be desirable to provide access to all the subjects of the sarcophagus, while making it clear which of these subjects is actually depicted in this particular image of the sarcophagus. The desire to provide thorough access to the subjects of a work of art, yet identifying which subjects are actually depicted in a given image of that work of art, can influence the choice of a structure or metadata schema for providing subject access to art images. The VRA *Core Categories, Version 3.0*, provides a category-Record Type-that "identifies the record as being either a Work record, for the physical or created

object, or an Image record, for the visual surrogates of such objects."[7] Identifying records in this way could make it possible to distinguish between the subjects of a work of art and the subjects of an image of that work.

Providing Subject Access to Art Images

Next I discuss the four steps necessary to provide access to art images through these subjects. Although these steps are listed separately and sequentially, they are not independent of one another or even performed in the order listed here. Choices made in one step influence the choices made in another. In the first step, decisions are to be made regarding which of the subject aspects discussed above should be used in providing access to the art images, whether and which distinctions will be made between and among these various aspects, and what the depth of the subject analysis should be. In the second step, someone or something must be identified to provide the analysis of the subjects of the image. In the third step, vocabulary and a metadata structure or format for recording that analysis must be selected. In the fourth step, an information system must be chosen or developed for providing access to the subjects that have been analyzed and recorded.

Subject Aspect Decisions

How does one decide which subject aspects of art images should be used to provide access to them? Although available resources are always a factor in such a decision, the major factor should be what kinds of access are most useful. Unfortunately, it is very difficult to design research to assess accurately the usefulness of different kinds of access. Usefulness will inevitably depend on who needs the access, as well as on the nature of the art image.

Some researchers have analyzed queries made of large picture or stock-shot files, queries made chiefly in support of illustration or commerce.[8] The items were not, for the most part, art images, and the purpose of the queries was generally not the support of research. The results showed that the queries tended to be satisfied by an analysis of what an image is *of*, not by what an image is *about*. My research suggests, however, that *about-ness* is a determinant of relevance of art images in approximately 20 percent of art history research.9 This means that approximately 20 percent of art history research might benefit from providing access by what a work of art is *about*.

I also found that *of-ness* was a determinant of relevance of art images in approximately 35 percent of art history research, suggesting that providing access by the *of-ness* of an art image would be even more useful than providing access by its *about-ness*. In addition, Lucinda Keister suggested, because *about-ness* is subjective and someone interested in the *about-ness* of an image can generally specify certain *of-ness* subjects that it should contain, it is more useful to provide access by the *of-ness* of the image. Then the researcher can browse through a retrieved group of images and make his or her own determination of *about-ness*.[10] In support of the position that *about-ness* can be at least partly defined by *of-ness*, Layne's analysis of research in art history suggests that in approximately half the cases in which *about-ness* was a determinant of relevance, *of-ness* was also a determinant.[11]It might be possible to choose to index the *about-ness* of art images that are clearly personifications or symbols, as for example "justice" for Pencz's *Allegory of Justice*, "Spain-Relations-France" for Goya's *Contemptuous of the Insults*, "death" for Horenbout's *Death Scene*, and "Jerusalem" for *The Destruction of Jerusalem*, but not to index it for more tenuous and subjective instances, such as Curtis's *The Eclipse Dance*.

With regard to the usefulness of another form of subject access discussed earlier, namely, the literary work that an image is *about*, Layne's analysis of research in art history suggests that such literary works are determinants of relevance for approximately 15 percent of art history research. This relatively small percentage may be more an indication of the percentage of works of art that are about literary works than an indication that it is of limited usefulness when providing access. Indeed, I would say that whenever a work of art is about a literary work, it would be useful to provide access through the name of that literary work.[12]

Once it has been decided to index different kinds of subjects, as for example *of-ness* and *about-ness*, how does one decide whether the distinctions between or among these different kinds should be preserved and codified for use in providing access? The disadvantage of codifying distinctions is that a considerable amount of time and effort would be required, and different people can come to different conclusions about borderline cases. For example, is *The Birth of Esau and Jacob* an image of "childbirth," interpreting "childbirth" broadly as the activities that surround that event, or is it really *about* "childbirth," since the actual emergence of a child into this world is not depicted? Yet, there are advantages to codifying distinctions. As mentioned earlier in a slightly different context, codifying distinctions increases precision in retrieval, as it makes it possible to retrieve, for example, just those images that are *of* "death" and to exclude those images that are *about* "death." It also permits the subdivision of large sets of retrieved images based on these distinctions. For example, a search on "death" as a subject could result in a retrieval of images subdivided into groups based on whether the image explicitly depicts "death" or is about the theme of "death."

There is still a decision to be made with respect to the depth of subject analysis. Some images, for example *The Destruction of Jerusalem* and *Death Scene*, are particularly rich in the number of people, objects, and activities depicted. Other images, such as The *Eclipse Dance*, may show people, objects, and activities, but not very distinctly or clearly. In images such as these, does one provide subject access to every single person, object, and activity depicted? Stated another way, how does one make decisions regarding the depth of indexing? An image indexing

project for the Bibliothèque Nationale in Paris, now more than twenty years old, developed guidelines that still seem valid today: index anything that is clearly depicted; also index anything that is not clearly depicted if the mere fact of its presence in the image is informative; do not index parts of a whole if the whole is indexed and the parts are implicit in it.[13]

Let us look at how these recommendations regarding depth of indexing might affect the subject analysis of a couple of art images. For *Allegory of Justice*, it might mean that "naked woman" would be indexed, as well as "sword" and "scales," but not "face" or "breast" or "arm" or "leg," as those body parts are implicit in "naked woman." For *The Eclipse Dance*, it might mean that "masks" would be indexed, although they are not distinctly depicted, as their mere presence in the image is of interest. The goals or focus of a particular institution can also affect depth of indexing. An institution focusing on architecture might, for example, want to provide more detailed indexing for Evans's *Across the West End of Nave, Wells Cathedral*, than would an institution focusing on the history of photography.

It may not, however, be necessary or even desirable to index at a level of detail that narrows retrieval to a very few images. Browsing through a set of possibly relevant images may be a better way for a searcher to identify desired images than a highly specific search.[14] For the art historian, for whom comparison is an essential method of research,[15] providing a larger set of possibly relevant images may lead to connections and comparisons that otherwise might not have been made. In addition, practical factors—including time, money, and the knowledge and skills of the staff performing the subject analysis—affect the depth of subject indexing possible for a particular collection.

Performance of Subject Analysis
Who or what performs the analysis of the subject in a work of art? For some years there has been strong interest in automated analysis of images, and there have been various attempts to use pattern recognition techniques and iterative methods to identify and retrieve relevant images. To date, none of these efforts has been particularly successful in retrieving images from heterogeneous groups or in identifying objects, such as horses, that can be depicted in a variety of poses, from many different angles, and under various lighting conditions.[16] Automated systems are most successful in analyzing homogeneous sets of images and in selecting images based purely on color, composition, and texture. Such elements are relatively easy to codify and therefore relatively easy for a computer to identify.[17] With what appears to be significant effort, some systems have had some success in identifying image types such as landscapes that tend to have certain common compositional and color characteristics.[18] But it is safe to say that content-based—that is, automated—image retrieval is still far from being even remotely useful to art historians or art researchers.

A key to the possibly intractable problems involved in attempting to substitute computer analysis for human analysis may be found in an unlikely source: an article by the neurologist Oliver Sacks concerning the problems encountered by a man, blind almost from birth, whose physical ability to see was restored to him when he was middle-aged.[19] This man was unable to "see" properly, unable to distinguish, for example, his black-and-white dog from his black-and-white cat. Sacks postulates that this difficulty occurred because the process by which humans learn to interpret what their eyes see is a complex one that takes place as the brain develops during childhood and involves senses other than sight.

Subject analysis by humans is expensive and time-consuming, however, and studies have suggested that human indexers are not necessarily consistent in their analysis of subjects.[20] There are, however, various methods by which consistency among humans can be promoted, including the use of controlled vocabularies, guidelines for subject analysis, and even checklists or picklists of possible subject aspects. The ideal at this time would seem to be to let humans do what they do best and to let computers do what they do best. In other words, let humans identify the subjects of an art image and let computers identify color, shape, and composition. For example, if human indexers were to identify the subjects of art images, a computer could, if desired, then analyze a large retrieved set of images with the same subject (for example, "cathedrals," "dance," "sarcophagi") for similarities in shape, color, or composition.[21]

Choice of Vocabularies and Format
To provide efficient, accurate subject access to images, vocabularies and a metadata format must be selected, and decisions must be made regarding the depth of the subject analysis.

The generally acknowledged advantages of controlled vocabularies have been discussed elsewhere,22 and the specific vocabularies that may be most appropriate for subject access to art images are discussed in the other essays in this publication. There are, however, three aspects of subject access that are particularly important to vocabulary choice for art images and should be kept in mind when deciding on vocabularies for providing access to art images. The first aspect, discussed earlier, is that an image *of* something is always of a particular instance of that something (for example, "Wells Cathedral"), although it may be sought because it is an image *of* something that can be described more broadly or generically (for example, "religious architecture" or "cathedrals"). Regarding vocabulary choice, this means that to avoid indexing each subject of each image with every possible broader term for that subject, it is important to have a vocabulary with a syndetic structure that provides good links from the broadest to the narrowest

terms, links that lead from the generic to the specific. This is why thesauri, which have an explicit syndetic structure, are increasingly popular in projects that attempt to provide good user access to visual materials.

The second aspect of vocabulary choice for art images is that any given image may be of interest to different disciplines with different vocabularies. For example, *The Birth of Esau and Jacob* might be of interest to historians of medicine who might wish to use a medical vocabulary, rather than a more general vocabulary, when searching for images. Clearly, it is not practical to use all possible vocabularies when providing subject access to art images, but if it is known or intended that a particular collection of art images will be used by a particular discipline, it may be worth considering the use of a specialized vocabulary in addition to a general vocabulary. For example, an image of tulips might be indexed as "tulips" or even "flowers" for general users, but scientific species names such as *Tulipa turkestanica* might be used as indexing terms if botanists are among the intended users.

The third crucial aspect of vocabulary choice for art images is, as discussed earlier, that the same term can describe or identify different metadata categories or access points for works of art. "Goya," for example, can identify a Creator or a Subject of a work of art or, in some cases, both. The terms "painting" or "landscape" can describe an Object/Work-Type or a Subject of a work of art or, in some cases, both. The terms "painting" or "landscape" can describe an Object/Work-Type or a Subject, as we have seen above. If different vocabularies are chosen for each metadata category, the terms could be slightly different, depending on the category of access, and this may not be desirable. So in choosing a vocabulary for subject access it is important to coordinate this selection with the choices of vocabulary for other categories of access in the same information system.

The advantages and disadvantages of various formats for describing art images are discussed elsewhere in this book, as are specific vocabularies and classification systems. There are, however, two previously discussed aspects of the subjects of art images that affect the choice of format for providing access to these subjects. The first aspect is that different kinds of subjects may exist in an image, which means that there is the possibility of distinguishing among them. If there is a desire to distinguish, for example, between subjects that describe the *about-ness* of an art image and those that describe or identify its *of-ness*, then the chosen format needs to support that distinction. The second aspect is that a single image may represent more than one work of art. In this situation there may be a need to associate subjects with the appropriate work of art, and the format used to describe the art image would have to make this association possible. As mentioned earlier, the *VRA Core Categories* permits the distinction between *work* and *image*. Conceivably, this distinction could be used to associate one set of subjects with, for example, Wells Cathedral, and another set of subjects with Evans's photograph of that cathedral.

Choice and Design of a System

The fourth step is the selection or design of an information system for retrieving and displaying art images. What I mean here by "information system" is software that stores, indexes, retrieves, and displays records, and ideally, the images that these records describe.

What should a good information system do with respect to subject access to art images? It should take thorough advantage of the syndetic structure of vocabularies to permit retrieval at varying levels or degrees of specificity and to promote refinement of searches, broadening or narrowing them as a searcher may require. A searcher looking for images of "dances" should be able to retrieve the image *The Eclipse Dance* and should also be able to refine the search so that it is limited to images of "ceremonial dances." A searcher looking for images of Wells Cathedral should be able to refine the search, broadening it to include "cathedrals" or "cathedrals in England."

A good information system should be able to take advantage of distinctions among kinds of subjects and between subject and other categories of access, always assuming that these distinctions are present in the metadata schema or format that has been chosen to describe the images, but ideally without forcing the searcher to be aware of these distinctions in advance. Although the information system should recognize the distinction between the Creator and Subject categories of access, or between Subject and Object/Work-Type, it should permit the searcher who has employed a search term common to both categories to be made aware of that term's use in both categories while still preserving the distinction between the categories. For example, consider a menu-based information system in which the user of the system is given a list of categories of access from which to choose, categories such as Title, Object/Work-Type, and Subject. In such a system it might be more useful to provide the user with the selection "Persons" (which would include persons as subjects, as well as creators) rather than "Creators." Once the search is performed, the results could be grouped by the role the person had vis-à-vis a particular work of art: creator, subject, owner, and so on. In a system offering a search on "Persons," a search on "Goya" would retrieve both works by Goya and works of which he was a subject, but the results of the search would be presented as two separate groups, enabling the searcher to select either group or both. In a system offering instead Creator and Subject as separate choices, the searcher must first decide into which category "Goya" fits, and if Creator is chosen, the searcher may remain unaware of images of which "Goya" is a subject.

Regarding the display of images retrieved by a search, a good system should make it possible to view several images at the same time and to browse among retrieved sets of images. Ideally, the searcher should be able to rearrange

retrieved images to enhance comparisons among images. As I mentioned earlier, comparison is an essential element of art history research. Ideally, the searcher should also be able to refine or reorganize retrieved images based on characteristics other than subject, and analyses of some of these characteristics, in particular color, composition, and texture, could be performed by the system itself at the time of need.

Conclusion

Let us review, in the form of questions to be answered, the decisions to be made when providing subject access to art images.

- Having considered the various kinds of subjects—*of, about* (or levels of description, identification, and interpretation), and literary works that an art image can be *about*—through which of them will you provide access?

- If you are providing access to more than one kind of subject, do you want to codify the distinctions between or among them?

- What level of analysis, or what depth of indexing, do you want to provide?

- What vocabularies will you use to record your subject analysis?

- What metadata schema or format will you use to describe art images?

- What type of information system will you use to retrieve and display the art images?

I hope that this essay, together with the others in this volume, provides the conceptual framework and information necessary to answer these questions in ways that improve subject access to art images.

Notes

1. *Categories for the Description of Works of Art* (CDWA), <http://www.getty.edu/research/conducting_research/standards/cdwa>, a metadata schema for art objects and their visual surrogates, outlines many metadata categories of which Subject Matter is one. The Subject Matter category is subdivided into Description, Identification, and Interpretation. In her essay in this volume, Patricia Harpring uses CDWA as the metadata framework for cataloguing or indexing art images. For a fuller discussion of the many aspects of the subject of an image, see Sara Shatford, "Analyzing the Subject of a Picture: A Theoretical Approach," *Cataloging and Classification Quarterly* 6, no. 3 (1986): 39–62.

2. A devotional service for the dead in the Roman Catholic liturgy, the Office of the Dead is often included in books of hours.

3. An early fifteenth-century French translation of Giovanni Boccaccio's *De casibus virorum illustrium*, a fourteenth-century collection of stories about exemplary heroes and heroines from biblical, classical, and medieval history.

4. An example of providing access to images through related textual works is the Princeton Index of Christian Art, which has for some time provided citations to the biblical passages that are the source for many of its images.

5. Strictly speaking, one can say that any image that is not the physical original—that is, any image that reproduces a work of art—is an image or visual surrogate of that work. Useful as this concept of a reproduction is when describing the non-subject attributes of a reproduction (for example, it permits description of the medium of the reproduction as distinct from the medium of the original), it is of limited usefulness when providing subject access. For further reading, see Sara Shatford, "Describing a Picture: A Thousand Words Are Seldom Cost Effective," *Cataloging and Classification Quarterly* 4, no. 4 (1984): 13–30.

6. See the glossary entry for *access point*.

7. *VRA Core Categories*, Version 3.0, <http://www.vraweb.org/vracore3.htm>.

8. See for example, P. G. B. Enser, "Query Analysis in a Visual Information Retrieval Context," *Journal of Document and Text Management* 1, no. 1 (1993): 25–62; and also James Turner, "Representing and Accessing Information in the Stock-Shot Database of the National Film Board of Canada," *Canadian Journal of Information Science* 15, no. 4 (1990): 1–22.

9. Sara Shatford Layne, *Modelling Relevance in Art History: Identifying Attributes that Determine the Relevance of Art Works, Images, and Primary Text to Art History Research* (Ann Arbor, Mich.: University Microfilms, 1998), 235.

10. Lucinda Keister, "User Types and Queries: Impact on Image Access Systems," in Raya Fidel et al., *Challenges in Indexing Electronic Text and Images* (Medford, N.J.: published for the American Society for Information Science by Learned Information, 1994), 7–22.

11. Layne, *Modelling Relevance in Art History*, 235–36.

12. Layne, *Modelling Relevance in Art History*, 242.

13. Maxime Préaud and Michel Rio, "Images sans histoire: Méthode de description des images et classement informatique," in Paola Barocchi, Fabio Bisogni, and Laura Corti, eds., *First International Conference on Automatic Processing of Art History Data and Documents, Pisa, Scuola Normale Superiore, 4–7 September 1978: Conference Transactions* (n.p.: n.p., [1978]), 2:256.

14. See Christine Sundt's essay in this volume, note 5.

15. Richard Brilliant, "How an Art Historian Connects Art Objects and Information," *Library Trends* 37, no. 2 (1988): 120–29.

16. B. Holt and L. Hartwick, "Retrieving Images by Image Content, the UC Davis QBIC Project," *Aslib Proceedings* 46, no. 10 (1994): 243–48.

17. R. Rickman and J. Stonham, "Similarity Retrieval from Image Databases—Neural Networks Can Deliver," in *Storage and Retrieval for Image and Video Databases, 2–3 February 1993, San Jose, California*, Proceedings of SPIE, vol. 1908 (Bellingham, Wash.: SPIE, 1993), 85–94.

18. See, for example, D. A. Forsyth, "Computer Vision Tools for Finding Images and Video Sequences," *Library Trends* 48, no. 2 (1999): 326–55.

19. Oliver Sacks, "To See or Not to See: A Neurologist's Notebook," *New Yorker*, 10 May 1993, 59–73.

20. Karen Markey, *Subject Access to Visual Resources Collections: A Model for Computer Construction of Thematic Catalogs* (New York: Greenwood, 1986), 61–66.

21. A prototype system of this sort is described in Yong Rui et al., "Information Retrieval Beyond the Text Document," *Library Trends* 48, no. 2 (1999): 455–74.

22. See, for example, R. G. Henzler, "Free or Controlled Vocabularies," *International Classification* 5, no. 1 (1978): 21–28.