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ABSTRACT

One of the most basic theoretical areas in the study of visual communication and visual literacy is the nature of representation. Some of the important research in this area is reviewed in this paper, and a model of representation is developed that satisfies many of the philosophical concerns. The paper begins with a discussion on the relationship between pictures and reality. This relationship depends upon the nature of the sign. Iconic and indexical signs are highly dependent on resemblance and likeness; symbolic signs, however, depend on conventional relationships that have to be learned. Discussion then moves to the model, which maps representation in terms of four types of information processing: convention, natural perception, abduction, and cognitive processing. Some philosophers argue that all observations are read in a code using conventions. In contrast, others with the so-called "objective" view suggest that the ways things look are taken to be objective properties of the visual world. A number of scholars believe that pictorial representation is a natural process that uses inborn perceptual processes to generate meanings. Another approach to understanding representation is the notion of abduction, which is a way of thinking based on hypothesis building and conjecture rather than formal deductive or inductive reasoning. Subjective vision is based on the idea that people learn to interpret visual effects; however, much of what is interpreted reflects natural cues that are recognized as part of a larger schema. Mapping the field of representation admits the validity of the different viewpoints and makes an argument for the complexity of visual representation. (Contains 16 references.) (AEF)

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A Philosophical Discussion of Representation

by Sandra E. Moriarty and Keith Kenney

Abstract

The purpose of this piece is to analyze the nature of representation, review the most critical issues—pictures and reality, resemblance or convention, and develop a model of representation that will satisfy as many of the philosophical concerns as possible. The model maps representation in terms of four types of processing—natural perception, abduction, convention, and cognitive processing.

Introduction

One of the most basic theoretical areas in the study of visual communication and visual literacy is the nature of representation. Much of the discussion of this topic comes from either philosophy or aesthetics. This paper reviews some of the more important writings in this area in an attempt to develop a model of representation. The primary works reviewed include:

- E. H. Gombrich, "The Visual Image;" "Representation and Misrepresentation"
- Nelson Goodman, *Languages of Art: An Approach to a Theory of Symbols*, "Representation Re-presented"
- Paul Messaris, *Visual Literacy: Image, Mind & Reality*
- David Novitz, "Picturing"
- Marx Wartofsky, "Pictures, Representation, and Understanding;" "Visual Scenarios: The role of Representation in Visual Perception"
- Richard Wollheim, "Representation: The Philosophical Contribution to Psychology;" Pictures and Lan-guage;" and "Art, Interpretation, and Perception"

In describing the requirements for a general theory of representation, Wollheim (1993) says it must answer two questions:

- What is it to represent? (what is the relationship between the representation and the something that it is of?)
- What, in the narrow sense of the term, is a representation?

Using his two questions to guide our analysis, we find that the major theoretical issues that need to be investigated include: Is pictorial representation based on natural resemblance or convention? What is the relationship between pictures and reality? Finally, as part of this review, we are investigating whether it is possible to develop an overriding theory of representation that accommodates the various issues and viewpoints.

Pictures and Reality

In beginning this discussion, let's first look at Wollheim's second question about what is a representation. This question investigates the nature of the image and how it does or doesn't mirror reality. The debate here seems to focus on the role of likeness, resemblance, and denotation in depiction.

The conventional approach is to define depiction as reference by a visual to something it resembles. This traditional view is expressed by Gombrich (1972, p. 88) who claims that iconicity is genuine representation. "It may be convenient here to range the information value of such images according to the amount of information about the prototype that they can encode. Where the information is virtually complete we speak of a facsimile or replica. ...Even facsimile duplication would not be classed as an image if it shared with its prototype all characteristics including the material of which it is made. A flower sample used in a botany class is not an image, but an artificial flower used for demonstration purpose must be described as an image."

In other words, a visual is "of something" and, according to Wollheim, that "ofness" de-mands that every representation have an objective. Wollheim (1993b, p. 161) identifies three misinterpretations of the ofness thesis:

1. The Figurative thesis: for every representation, its object can be described in figurative terms.
2. The Existential thesis: for every representation, there must exist an instance of the kind that the something represented can belong to—i.e. there can't be representations of unicorns.
3. The Portrayal thesis: for every representation, there is a particular

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something that is represented: every representation is a portrait.

In other words, the "ofness thesis" does not deny that the object can be imagined, such as a unicorn or fictional characters.

A number of scholars including Nelson Goodman (1988, p. 122) consider resemblance to be a dogma from which we must free ourselves. He observes, "To suppose that the distinction between pictorial or 'iconic' and other symbols rests on resemblance is nevertheless a prevalent and pernicious mistake." His point is that resemblance cannot account for the difference between symbols that depict and those that do not. Goodman sees all depictions as symbolic, and therefore they must be analyzed within the context of culture and learning. The relationship is not based on "ofness" but on "standing for" and the stands for relationship, which is basically a symbolic one, does not need resemblance. Goodman also reflects Gombrich's (1972, p. 82) viewpoint who sees the visual as symbol: "What a picture means to the viewer is strongly dependent on past experience and knowledge. In this respect, the visual image is not a mere representation of "reality" but a symbolic system."

Goodman (1988, p. 122) argues that likeness is neither required nor enough for pictorial depiction. Likeness is not a matter of how many properties two things have in common. Likeness varies with the comparative importance among the common properties and thus with interest, context, and custom. A picture may count as realistic to the extent that it depicts in the accustomed way. Although he admits that resemblance is intricately related to realism, in his view, realism is an artifact of current pictorial practice:. "Both the realism and the likeness may increase or diminish or vanish entirely with a change in custom."

Goodman (1988, p. 126) admits that pictorial representations are both iconic and symbolic. As a matter of fact, he asserts that pictures must always be analog symbols and that the pictorial and the analog are clearly related. He argues that the basic notion of reference, or symbolization, the relation between a symbol and whatever it stands for in any way, governs pictorial representation (p. 124). The pictorial relationship, in other words, is based on denotative notions of a visual "standing for" something else and that is the meaning of representation.

In contrast, David Novitz (1975, p. 155) argues that Goodman and others who deny the importance of resemblance misunderstand the difference between how a picture is produced and how it is used: "Insistence on the claim that picturing is fundamentally denotative because pictures stand for what they picture is the result of a failure to discern the crucial distinction between pictures and their production on the one hand, and the use made of pictures on the other." In other words, he feels pictures do not stand for things without being used to do so; it is an intentional relationship. He believes that picturing does not work by denotation; to say what a picture is of is just to say what kind of picture it is, but is not to say what it denotes. The word "representation" can be used both to mean *a picture* and *to picture*, i.e. the use made of the picture as an illustration, a warning, a map, etc.

Because of his reluctance to assign denotation to visuals, Novitz (1975, p. 150) admits to taking the unfashionable position that "visual resemblance is a necessary condition for picturing, and that recognition of such resemblance is a necessary condition for determining what a picture is of."

We feel that the answer is not one of resemblance or symbolism but that there are different types of images and they are represented, as well as interpreted, in different ways. One way to categorize the nature of the visual is in terms of C.S. Peirce's (1991, p. 181-183, 251-252) three categories of signs: iconic, indexical, and symbolic. This schema is broad enough to include both Goodman and Novitz. Peircean semiotics defines an icon as similar to is subject; in other words, iconic signs carry some quality of the thing they stand for, as a portrait stands for a person. Most often an iconic sign is a representation such as a drawing or photograph where likeness or resemblance is a determining characteristic. Iconic visuals are highly denotative. An indexical visual is physically connected with its object, an indication or sign or cue that something exists or has occurred—a footprint means someone just walked by or smoke means there is a fire. Iconic visuals are also denotative but they operate as a puzzle with the viewer involved in an observational guessing game to make sense of the connection and identify the object. Symbolic visuals, however, arbitrarily stand

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for something through a process of consensus as a word stands for a concept. A symbol, such as a leaf on a flag, is linked by convention with its object. We learn that a maple leaf stands for Canada. Symbols, therefore, are more conventional and their meanings are more open to connotative interpretations.

The relationship between the picture and reality, then, is not one way or the other; it depends upon the nature of the sign. Iconic and indexical signs are highly dependent upon resemblance and likeness; symbolic signs, however, depend upon conventional relationships that have to be learned. There may still be some learning involved in making the connection between the visual and what it represents, but with iconic and indexical visuals, the relationship is less arbitrary and more experiential. Arthur Danto (1992, p. 15-31) notes that in interpreting artwork, this ability to see the objects portrayed in paintings is not something we have to learn in the same way we learn to combine letters into words. Socially conditioned learning is more important for symbolic visuals which are highly arbitrary.

Figure 1
The Visual Continuum

iconic -> indexical -> symbolic

Resemblance or Convention

This debate focuses on whether the meaning of visual images is established through recognition or convention. This is really a question of how we "see" meaning in visuals, or how we process visual information. The focus of this question is on the operations used by viewers, not on the intentions of creators of images.

Convention

Some philosophers argue that all observation is theory laden. In other words, all observations are read in a code using conventions that the observer has internalized. Goodman (1976), for example, argues that visuals represent a code; like language, rules govern the code that controls these arbitrary relationships. The confusion comes because these rules and codes are largely internalized which make them look like natural processes. Goodman argues that pictures are just as arbitrary in their connection to what they represent as language is and that, therefore, a visual can serve as a picture of almost anything if a culture wills it so.

Natural Perception

In contrast, the objective view (sometimes called the naive or essentialist view) suggests that the way things look are taken to be objective properties of the visual world, waiting to be perceived by any passing eye. The camera, in this view, simply duplicates what the eye sees, the retinal image. As Wartofsky (1980a, p. 8) explains, "Thus it is tacitly assumed that the camera records 'objectively' the way things look, and that this sort of 'seeing' is indeed the duplicate of the eye's own work." Wartofsky does not recommend this view as he makes the point in throughout his work that what the viewer of photographs sees is in the eye of the beholder rather than in the lens of the camera.

But others propose a more sophisticated view of natural perceptual processing. A number of scholars believe that pictorial representation is a natural process that uses inborn perceptual processes to generate meanings. They believe people make the connection by seeing resemblances which are not arbitrary, but natural. Even though there is a learning process, it involves perceptual experiences rather than social or cultural conditioning. We recognize a picture of a squirrel because it has some characteristics in common with squirrels we have seen in our natural environment.

Catherine Elgin (1988) also says that pictorial representation is thought to be natural—a matter of resemblance between image and object. This resemblance, moreover, is taken to be an objective matter, visible to the human eye and evident to all who look. Linguistic representation on the other hand, is considered convention—working by rules and stipulations that secure the connection between words and the world. Richard Wollheim (1993) also notes a difference between words and pictures. In his view, words follow rules or conventions, however, pictures do not. He argues, for example, that the relationship between the word bison and the animal is arbitrary, not so for pictures.

Paul Messaris (1994) suggests that people make sense of pictures largely on the basis of their reproduction of real-world informational clues. While he does not

subscribe to the objective reality view, he also does not believe that learning to make sense of visuals is comparable to learning to use language. He explains, "the representational conventions of images, unlike those of language, are typically based on informational cues that people learn to deal with in their everyday encounters with their real visual environments" (p. 27).

Esthetics scholar Arthur Danto (1992) also takes issue with the idea of convention and uses a number of experiments with the visual perception of animals (sheep, pigeons) to show that animals respond to pictures at a level far above flat stains of color. He believes that visual perception is much too important to animal survival to be deeply penetrated by theory (rules and codes). Pictorial competence is natural. Pictorial perception takes place at a level "beneath the threshold of interpretation:" it is external and purely associational. We don't have to learn to see. Danto suggests that because animals do not have the motor ability to draw, this may in some way affect how they perceive pictures (pp. 15-31)

Abduction

Another approach to understanding how we make sense of representations is Peirce's notion of abduction, which is a way of thinking based on hypothesis building and conjecture rather than formal deductive or inductive reasoning. Umberto Eco and Thomas Sebeok (1983) make the argument that the roots of abduction lie far back in time with hunters and trackers who could read the signs of nature, much as Sherlock Holmes does. Medicine, in its procedures for detecting symptoms is another area that uses abductive thinking. (Conan Doyle was trained in medicine and used one his medical professors as the model for Sherlock). Visual interpretation of representations may be described as abductive in that it begins with observing clues in the visual (perception) and moves to a conclusion by hypothesizing relationships and patterns (cognition, convention) through massive parallel processing. Abduction builds on natural perception at both the iconic and indexical levels and sets the stage for more complex forms of cognitive processing, particularly the type of cognitive and conventional processing needed to make sense of symbolic visuals. In this sense, abduction lies midway between natural perception and cognitive processing.

Information Processing

Gombrich's (1984) idea of "subjective vision" is not the same as the natural perceptual processing or conventional processing that have traditionally been the focus of the debate. His approach embeds representation in cognitive or information processing theories, and particularly schema theory, which explains how mental models and maps work. Critics of Gombrich's book, *Art and Illusion*, however, are concerned because he doesn't come down squarely in favor of natural perception. They seem to be arguing that Gombrich is saying that visual representation is all code and that notions of reality and of nature and mimesis have no place. All that remains are different systems of conventional signs which are made to stand for an unknowable reality—an out and out relativism (p. 195).

Gombrich (1984) rejects the idea of mimesis as based on the 'transcription' of nature and concentrates instead on the subjectivity of vision. He quotes another interpretation of his book by an archaeologist as seeing representation as the end product on a long road through schema and corrections. "It is not a faithful record of a visual experience but the faithful construction of a relational model" (p. 196).

Gombrich's (1984) subjective vision is based on the idea that we do learn to interpret visual effects, however, much of what we are interpreting reflects natural cues that we recognize as part of a larger schema. He points to the creation of certain visual effects which were discovered by trial and error in certain societies under the pressure of novel demands made on the image. This new emphasis on what might be called the 'trigger effects' of certain devices by which the image-maker can give the impression of depth, of sheen, or of facial expression has also enabled me to reformulate the problem of 'conventions' in representation. This processing of the patterns, however, is based on the recognition of visual elements which serve as the first step in relating an image to a meaning. He says to his critics: "...what would have been the use of talking at such length about 'schema' and 'correction' and 'making' and 'matching' if there were no

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standards whatever by which to correct or match an image?" (p. 197).

Many of these conventions—say the highlight or the streaks behind a figure to suggest movement—are rooted in certain easily acquired tricks which secure a given response that may be inborn or is very easily learned. Gombrich (1984, p. 198) suggest that we look for the roots of representation in biology and animal behavior and describes it as, "Our twin nature, posed between animality and rationality."

Marx Wartofsky (1980b) takes the information processing view a step further. He suggests that not only is our vision subjective, i.e. a product of the way we have interpreted things in the past, but it is also shaped by the process. Our representations, in other words, become maps for our seeing. He explains, "seeing the world perspectivally is the product of specific modes of visual praxis, and that perspective representation is therefore not a 'correct' rendering of the way things 'really look,' but rather a choice of seeing things in a particular way."(p. 132) He explains, "...to talk of the 'convention of linear perspective' in pictorial representation is not to talk of a simply arbitrary model of representation, but of a culturally achieved rule or canon of representation" (p. 133).

He argues that the way we have allowed the depiction of perspective to evolve now affects how we see perspective in real life. "To say that human vision is an artifact is to say that it is the product of human activity, and not simply of biological adaptation or natural selection....the activity is not arbitrary because it is guided by the teleological character of making, or construction. It is, however, conventional activity, and its products are conventional in the sense that they are the products of human choice and skill, and they are made for the sake of satisfying culturally and historically evolved and changing needs and wants" (pp. 132-133).

In an article on how cameras "see," Wartofsky (1980a) argues that our perceptual process is socially and culturally moderated: "The general thesis I am proposing is this: that human vision—visual perception, if you like—is an artifact. It is the product of our own making. Starting with the mammalian eye, in biological evolution, we have transformed visual perception by means of transformations of our visual praxis—the ways, or modes, of our visual activity. The instrument of this transformation is the pictorial representation." "We see by way of our picturing" (p.8).

"As we accept a style, or adopt a particular mode of pictorial representation—so does our actual perception of things change" (p. 9). He uses cave paintings to demonstrate. The mammoth doesn't appear in real life to have outlines around it although the cave painters drew it that way. "Yet we can all "see" the outline of a shape; We have no trouble visually abstracting from a living or even a moving subject, what its linear contours are. However, this is something we have learned to do visually by virtue of our practice of representing such shapes by means of drawn outlines. The caveman's art was revolution in many ways, but not least in that it created the visual ability to see such outlines in nature. The mammoth, so to speak, had no outline-shape for human visual perception until mammoth-drawings invented it." The choices we have made in representation (drawing, photography, lenses, etc.) are the "means of which we have created and transformed human vision" (p. 8).

This has been a debate about the type of processing—natural perception or convention—used to make sense of visual images. Even Wartofsky's and Gombrich's information processing viewpoint is criticized for not coming down strongly in one camp or another. We propose that all three viewpoints are right—that visual perception is complex and involves more than one kind of processing activities. The processing differences range from natural perceptual activities based on inborn experiential responses to the processing of conventions and arbitrary symbols and

Figure 2
The Processing Continuum

natural perception -> abduction -> convention -> cognitive processing

then to more complex information processing activities that involve manipulating mental models of meanings. Wollheim (1993, p. 163) acknowledges that the relationship between natural and conventional processes is more like a continuum than a distinction. He observes that "the smaller the increment of information that a theory insists on if we are to move from knowing that something is a representation to knowing what it represents, the more "*natural*" account it gives of representation. The larger the increment of information that it specifies as requisite, the more *conventionalist* account the theory gives of representation."

Gombrich (1972, p. 89) also illustrates a unstated understanding of these two types of processing when he describes how we can classify theories of representation according to the naturalness that they assign to the representational relationship. He says that, on one hand, interpreting photos must be learned—interpreting photographs is an important skill that must be learned by all who have to deal with this medium of commun-ication: the intelligence officer, the sur-veyor or archaeologist who studies aerial photography, etc. However, he also says that "there is no doubt that organisms are 'programmed' to respond to certain visual signals in a way that facilitates survival." Gombrich refers to these at "automatisms" and cautions about comparing animal behavior to human reactions. (p. 85)

If we admit the idea that processing represents a continuum of increasingly more complex mental activities, then we might see the natural or perceptual approach that aims at recognition as the simplest approach followed by convention which demands a knowledge of rules and codes. The most complex form of processing then is cognitive which, as Gombrich describes it, is based on the interplay of perceptual and conventional activities.

A Theory of Representation

We mentioned in the beginning of this paper that Wollheim (1993) established two criteria for a theory of representation. It must answer the questions: What is it to represent? and What is a representation? That logic has guided this analysis of the points of view in the various debates which also seem to center on how representations work and their relationship to an object. Therefore, it is a logical next step to use this same schema to develop a model that represents a more inclusive way of describing representation.

Wollheim's (1993) psychological theory of representation spells out the nature of the resemblance relationship as well as the intention of the creator and the competency of the viewer. In his view of an object and its representation, "a necessary condition of R representing x is that R is a configuration in which something or other can be seen and furthermore one in which x can be seen. Sufficiency is reached only when we add the further condition that R was intended by whoever made it to be a configuration in which x could be seen. And this condition must be understood in such a way that whoever made the representation was in a position or had the required competency to form and act on this intention." In other words, Wollheim's account of representation invokes two psychological factors: the visual experiences of the spectator and the fulfilled intentions of the artist.

Gombrich (1972, p. 88) also speaks of the intention of the creator and how it relates to the viewer's perception. "However faithful an image that serves to convey visual information may be, the process of selection will always reveal the maker's interpretation of what he con-siders relevant....Interpretation on the part of the image maker must always be matched by the interpretation of the viewer. No image tells its own story." However, he also makes the point that these two do not necessarily match: "The information extracted from an image can be quite independent of the intention of its maker" (p. 87). Basically, he says that a picture is not a picture of everything that we can see in it. Some of the perceptions may be in error or idiosyncratic. The fulfilled intentions of the artist provide a curb on what we can see in a picture. Of course, the visible surface of the picture still bears the meaning.

In his analysis of the psychological approach, Gombrich (1972, p. 89) refers to the important role of the 'beholder's share:" the contribution we make to any representations from the stock of images stored in our mind, the "hidden assumptions" with which we approach an image. He concludes, "It's only when we lack memories that this process can't take place."

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Novitz (1975) pointed out that there is a difference between what a picture is and how it is used reflects the two sections of this review. The first discussion focused on how we derive meaning from visuals through three different types of processing—how it is used. The second discussion looked at the nature of the visual representation and its relationship with reality—what the picture is. In developing a theory of representation, we feel these two ideas can be brought together.

After reviewing the complexity of representation in terms of both the visual elements being represented and the processing demanded by their interpretation, we are able to map the field of representation relative to the nature of the visual and the type of processing. The following figure illustrates our view of the representation debate which we see as not being adequately articulated by either the natural, the conventional, the viewpoints. At the first level the process is one of recognition of iconic information using natural perceptual processes to identify things that have been seen before. The critical characteristic is resemblance and that can vary in terms of the amount of information required to establish resemblance. At the second level, understanding indexical meanings, as well as iconic, reflects a type of thinking identified as abduction. At the third level, the process is one of interpretation and the critical characteristic is the ability to learn arbitrary codes, rules, and symbols. The fourth level involves using all the tools of representation to aid information processing and to change the way we process visual information.

This presentation answers both questions that Wollheim said were necessary in a theory of representation: What is it to represent? (What is the relationship ...between the representation and the something that it is of?) and What is a representation? It does so by identifying two continua—the level of processing and the type of visual—and the relationships between them. The result is an analysis of visual representation in terms of four levels of complexity.

The first level which is focused on the recognition of iconic visual information represents the two viewpoints most commonly found in the literature. The second level which emphasizes indexical visual information is, as well as iconic, is a new way of looking at visual representation . The third and fourth levels are focused on the interpretation of meaning in more symbolic or arbitrary visuals. The fourth level is the one we have articulated based on the work of Gombrich and Wartofsky and which we feel depicts the most complex form of representation because it admits the possibility that the act of representing can actually change the subsequent perceptions of representations. All four levels are used as visual strategies for making sense of various types of visuals.

The value of this approach to a theory of representation is that, in admitting the validity of the different viewpoints, it

Figure 3
Mapping Representation

Type of processing	*iconic*	*indexical*	*symbolic*
Level I: perception	X	X	
Level II: abduction	X	X	X
Level II: convention		X	X
Level III: cognition	X	X	X

doesn't take any side in the various debates but instead makes an argument for the complexity of visual representation. In other words, they are all right—to a degree and in various situations. What is presented here is not a definitive statement one way or the other, but instead a map of the field of representation that acknow-ledges that there are differences in the types of representation and then explains how different processing approaches—natural perception, abduction, convention, and cognition are all important and used in different ways to derive different types of meanings from different types of visual representations.

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