Otávio Bueno and Juha Saatsi, and to James Fowler for discussions on the Nouveau Roman.

2. Toussaint [1986, p.27]. “...the mere fact of looking altered the cat’s state, changing it from a state of limbo to a new state, either definitely alive or definitely dead...”; “selon” is “according to”, but according to what?

References


Representing and Picturing: Approaches in the Sciences and the Arts

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Introduction

Both the sciences and the arts involve activities of representation; they involve representing things. But how different, and how similar, are such activities? By examining these activities together, it is possible to learn something about the arts from the sciences, and something about the sciences from the arts. Along the way, an approach to the relationships between the sciences and the arts will also emerge. In what follows, I explore one such approach, which emphasizes the significance of structural mappings for the understanding of the sciences/arts relation, an approach advanced by Steven French, which provides a rich framework to examine the issue (French [2003]). My contribution consists in emphasizing the significance that information plays in this context.

In order to avoid unnecessary reification, I will not focus on representation per se, as a relation between a source and a target in which a source represents a target. Rather I will talk about representing: an activity that intentional agents engage with when they use suitable objects for representational purposes. It is the activity of representing rather than the relation of representation that ultimately matters, even though we can translate, back and forth, talks of representation and representing.

Representing in the Sciences

In the sciences various representational activities are invoked. I highlight four of them:

1. A theory is formulated to represent a class of appearances.
2. A model is used to represent the phenomena.
3. A diagram or a graph is created to emphasize significant features of a given process or to stress some traits in the items that are being considered.
4. A micrograph is produced to represent salient features of the sample under study.

 Needless to say, this is not a comprehensive list. The goal is simply to highlight a few important representational activities that are common throughout the sciences.

Corresponding to these four representational activities, we have four modes of representing, that is, suitable mechanisms in terms of which the relevant representations are achieved:

1. Representing via a semantic relation: This is a semantic mode of representing, in which semantic devices are used to represent. In this context, the representation is achieved via the attribution of truth, approximate truth, quasi-truth, empirical adequacy, or consistency to the relevant objects, just to mention a few of the most prominent instances. This is the way scientific theories represent.

2. Representing via structural similarity: This is a structural mode of representing, in which suitable mappings are used to represent the target. Various mappings (morphism) are established between the relevant structures and used to achieve the relevant representation. The mappings include: isomorphism, homomorphism, partial isomorphism, and partial homomorphism, again to mention just a few examples (see da Costa and French [2003] and Bueno and French [2011]). The mappings establish the respect in which the relevant structures are similar. This is the way models represent.

3. Representing via abstraction: This is the schematic rendering of a class of phenomena, which ignores certain features that are present in order to highlight others. This is the way diagrams, graphs and tables represent. Conventions play an important role in this mode of representing. Consider, for instance, a graph correlating the changing speed of a moving object and the time instants. The time line and the changing speed are both represented by lines of real numbers, each with its own axis on the graph. But the relations among the relevant variables expressed in the graph are not obtained by stipulation or convention; they are determined empirically. So the graph contains both information that is presented conventionally and information that is not. The origin of the latter is empirical, and that is crucial for the usefulness of the graph. Note also the abstraction involved in this mode of representing: the graph does not take into account a number of features that are present in the relevant phenomenon. The shape, size, volume, and color of the moving object have no explicit counterparts in the graph, in order to highlight just the relation between the changing speed and the time instants.

4. Representing via causal interaction: This mode of representing emerges from a physical connection, a causal interaction, between the source and the target. Typically, the source is an image produced,
via the use of a suitable instrument, by the interaction between the instrument and a (properly prepared) sample. It is in virtue of this interaction that the representation is made possible. This is the way micrographs represent. Consider, for instance, the representation of ribosomes in micrographs produced by transmission electron microscopes. It was by looking at the micrographs that George Palade produced in 1955 that the biological community came to believe in the existence of ribosomes (see Palade [1955]). Such objects were represented in the micrographs since the images were causally produced as the result of the interaction between the ribosomes and the electron microscope.

These four kinds of representational activities highlight different forms of representation in scientific practice. In some cases, it is possible to translate one representational activity into another. For instance, consider a graph that displays the relation between positions and times of a moving object. It is, thus, a case of representing via abstraction. The graph has semantic content. It can be taken as expressing a particular relation between positions and times. The graph may display correctly, or truly, the relevant relation, or it may fail to do so. Hence, it also represents via a semantic relation.

In contrast, consider a model, for instance, a model of data. It represents via the structural similarity between measured features of the phenomena and the corresponding properties of the objects under study. The model, however, is not true or false. According to the semantic approach, a model is used to define truth and falsity: ‘$x$ represents $y$’ is true in a structure $[D, I]$ in which $D$ is a non-empty set and $I$ a suitable interpretation function—if and only if, there is an object $a$ in $D$ such that $I(a) \in I(f)$. Thus, at least as understood by the semantic approach, a model does not represent via a semantic relation, since it is used in order to define such a relation.

Despite the diversity of the modes of representing, there is a way of grouping them together. Ultimately, all of the representational activities mentioned above emerge from two components: (a) suitable structural mappings between the relevant sources and targets, and/or (b) the informational content that is transferred and preserved (typically, through such mappings). With regard to representing via semantic relations, note that such relations express informational content, from which the representation emerges. As we saw, representing via structural similarity is cashed out in terms of structural mappings, and such mappings ensure the similarity between the relevant structures. Abstractions, in turn, have (partial) informational content in terms of which they represent. Finally, causal interactions have informational content that is transmitted via suitable structural mappings. Clearly, in all of these cases structural mappings and informational content play a central role.

In the sciences, structural mappings are typically partial in that only incomplete information is transferred between the relevant structures (da Costa and French [2003], Bueno and French [2011]). It is then natural to conceive of the basic features of representational activities in science in terms of partial structural mappings (partial isomorphism, partial homomorphism) and partial informational content.³

### Representing in the Arts

In the arts, we also find a variety of representational activities. I highlight five of them:

1. Representing via picturing: $x$ represents $y$ in virtue of being visually similar to $y$, and due to this similarity, $x$ is used for such representational purposes. Clearly, this is an important way in which pictures represent, including drawings, paintings, prints, and animations.⁴ Caravaggio’s The Crucifixion of Saint Peter represents a crucifixion because it is visually similar to what a crucifixion looks like and thus it can be so used. Viewers of the painting have no difficulty in recognizing what is depicted on it. Similarly, Vic Muniz’s series “Pictures of Junk” provides depictions of major paintings in the history of art, by producing configurations of junk that are visually similar to the target painting. This is the case of Saturn Devouring One of His Sons, After Francisco de Goya Y Lucientes, which looks remarkably similar to the original painting, despite the materials used: a variety of items found in junk—tires, empty boxes, gas containers, even a piano!

2. Representing via mechanical reproduction: $x$ represents $y$ because $x$ is mechanically generated in such a way that it is visually similar to $y$. The obvious examples here are photography and moving images, as found in films and videos. The transparency involved here emerges from the mechanical production of the representation, as the result of the causal interaction between the camera and the scene before it. And that is a significant difference between this mode of representing and the picturing mode just mentioned. Consider, for instance, a photograph of Jackson Pollock painting a canvas. It is produced in such a way that the visually salient features of the scene, Pollock splashing paint on a canvas, are reproduced on the surface of the photograph. Or consider a still of The Cabinet of Dr. Caligari, which reproduces a moment of what was going on in the set of the film when the camera was directed at a certain part of that set. Or, finally, consider a photograph of one of Warhol’s Oxidation Painting, which reproduces the visually salient features of the painting, its shape, colors, and patterns. In each of these cases the representation mechanically preserves the relevant content of the scene.

3. Representing via stipulation: $x$ represents $y$ because it is stipulated that it does. Consider, for instance, the example of a work, in an art gallery in London, in which an empty glass was placed on a small shelf attached to a wall with the inscription: ‘This is an oak tree’. The tree is represented by sheer stipulation, with no additional constraint on that mode of representation. Similarly, the representation of peace by a dove is effected via sheer stipulation. No mechanical or similarity requirements are introduced.

4. Representing via exemplarization: $x$ represents $y$ in virtue of being a $y$, and by being experienced by viewers as such.⁵ Consider, for instance, Yves Klein’s International Klein Blue. The canvas represents a determined blue hue by being painted in such a hue. Viewers need to experience the work in order to know what that hue is like (and what that work is like). Similarly, consider Marcel Duchamp’s Fountain, which represents a urinal by being one.

5. Representing via description: $x$ represents $y$ by providing a description of $y$. This is the way in which novels, poems, and short stories represent. The characters involved need not exist, of course. But that does not prevent one from describing what has happened to them. Consider, for instance, Paul Auster’s detailed and vivid descriptions, in The Book of Illusions, of silent movies from the 1920’s that have never been filmed (Auster [2002]).

Is there a unified account of representational activities in the arts? Prima facie, representational activities seem to be far more diverse and multifarious in the arts than in the sciences. Recall that in the sciences representational activities involve structural mappings and informational content. Some representational activities in the arts do involve these components too. For instance, both pictures and photographs have informational content, which is transmitted via suitable structural mappings. For instance, the similarity between
the Gran Canal in Venice and Canaletto’s painting is grounded on
suitable mappings between the two.

Similarly, exemplarization and description also have informational
content, which is, in some cases, transmitted via suitable structural
mappings. Klein’s International Blue provides information about
the particular hue of blue it is. We get to know it by experiencing
the painting, and we distinguish it from other hues of blue, since
mappings between the various colors need not preserve their hue.
The description of the behavior of compulsive gamblers in Dosto-
evsky’s The Gambler similarly has informational content (Dostoevsky
[1867/2007]). We learn about that behavior by reading the descriptions
that compose the novel.6

However, it is unclear that representational activities via stipulation
have informational content. What is the informational content of
reducing peace by a dove? What is the informational content of
stating of an empty glass that it is an oak tree? Information does not
seem to be the appropriate category in these cases. Irony, puzzlement,
unsettlement are more appropriate. Here we have a representational
activity in the arts that has no counterpart in the sciences.

Clearly, sheer stipulation plays no cognitive role in the sciences as
a mechanism of representation. A crucial feature of scientific repre-
sentation is its informational role. But a mere stipulation is unable to
convey relevant information, since one is free to make any stipula-
tion whatsoever: What is needed, instead, for scientific purposes, are
informative representations, those whose content convey relevant
information.

Representing in the Sciences and in the Arts: A Comparison

The main difference between scientific and artistic representational
activities, from an abstract perspective, is now clear: the informational
content that is typically expected in the former but not necessarily
required in the latter. Artistic representations often are informative,
and in many cases are even expected to be so—historic novels, as we
will see, are an obvious example— but they are not expected to be that
way in every instance. That is a significant difference between the two
types of representational activities: they have different constraints
on their goals. An informational constraint is crucial for scientific
representation, but it is not generally present in artistic ones.

The information encoded in scientific representations is typically
about the subject matter or the relevant domain of inquiry (cover-
ing some empirical information about the world). The information
encoded in artistic representation is significantly less constrained.
In some instances, the artwork may be intended to convey a certain
tone to the viewer rather than a determined informational content.
Consider, for instance, the huge panels that Rothko created for the
Four Seasons restaurant in New York City (they can now be viewed
at the Tate Modern in London). With their maroon and dark red
tones, Rothko intended to create an oppressive environment, so that
restaurant guests would feel trapped in a windowless room. And the
effect of standing among such panels is indeed quite oppressive. Of
course, there is information conveyed by Rothko’s panels, but the
information is not direct and specific about a certain domain, as one
would get from a scientific representation; rather it is suggestive only,
and this is, in part, the reason for its ability to create a determined
mood in the viewer.

One could say that Rothko’s panels are what they are: particular
instances of certain colors. They provide the opportunity to experi-
ence such colors and their unique hues. In this sense, there is infor-
mation in the panels. This is correct as far as it goes, but it does not

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go very far. After all, the goal was not simply to display a certain
shade of maroon and dark red, but rather to produce a given mood
in the viewer. That is a very different goal than anything found in
scientific representations, which are not concerned with inducing
moods in viewers.

There is no doubt that many artistic representations are cognitive
in nature. They do provide us with knowledge of a certain subject
matter (Young [2001]). We would not be able to have a very clear
sense of how Rembrandt’s looks have changed over the years if he
had not painted in amazing detail the series of self-portraits that he
did. These portraits not only produce certain moods in the viewers,
they give them a unique perspective on how Rembrandt looked in
different moments of his life. They also show us how the painter saw
himself over the years, and the changing outlook he bestowed upon
himself over time. It is an extremely rich source of information about
the painter and his own self-understanding. Significant cognitive
goals are clearly met here.

There are additional cases of cognitive goals being integral to artistic
representations. Historic novels provide an obvious case, where the
wealth of information about certain historical events is enriched by the
point of view offered by the novel. Consider, for instance, how much
the readers of Mario Vargas Llosa’s The War of the End of the World
can learn about the devotion people had toward Antonio Conselheiro and
what it was like to live in the Canudos community at that time
(Llosa [1981]). Even though we are not dealing here with pictorial
representation, we are still dealing with artistic representation that
clearly displays a cognitive role, complementing in rich ways the
detailed historical description of the Canudos War offered in Euclides
da Cunha’s magnificent Rebellion in the Backlands (da Cunha [1902]),
which chronicles that tragic event in Brazilian history.

Two additional examples: As noted, Canaletto’s detailed paintings of
Venice provide a rich source of information about the architecture of
the city at the time he produced the paintings. His attention to detail
and careful rendering of the city yield a wealth of information about
the way it looked then. Ancient Egyptian art also provides a rich
source of information about the customs and traditions in Ancient
Egypt, even though its original goal was of a religious nature. Their
art now becomes cognitive for us.

Conclusion

There is much in common between the representational activities in
the sciences and in the arts. In fact, there is far more in common than
we may initially have thought, given the role played by informational
content and structural mappings in both fields. However, not every
representational activity in the arts is constrained by informational
content. This marks an important difference between the sciences
and the arts.

By examining together the representational activities of the sciences
and the arts, two points become clear: (a) We learn something about
the arts from the sciences: significant features of the arts are cognitive
in nature in that informational content and structural mappings are
central to much (although not all) artistic representation. (b) We learn
something about the sciences from the arts: informational content and
structural mappings do not exhaust all possible representations.

Finally, via informational content and structural mappings an app-
proach to the relationship between the sciences and the arts emerge.
Even when these components are not invoked (e.g. in representation
via stipulation) the relevant contrast is still made in terms of them
(e.g. we are not dealing with information but irony). In this respect,
informational and mapping components are still crucial, as they should be.

Notes

1. An earlier version of this paper was presented at the workshop “What Can the Philosophy of Science do for the Philosophy of Art (and Vice Versa)” on October 19, 2012 at the University of Leeds. I would like to thank Steven French for organizing the event and for many helpful discussions and suggestions. Thanks are also due to Dean Rickles, George Darby, and Steven French, whose stimulating papers were presented at the workshop, as well as the audience who attended it, in particular, Juha Saatsi, for extremely helpful feedback. Needless to say, any mistakes and infelicities that remain are my own.

2. A source is an item via which the representation is achieved, and a target is that which is being represented.

3. The latter can be formulated in terms of a hierarchy of partial models, which encompass partial information (see Bueno [1997]).

4. For critical responses to this mode of representing, see Lopes [1996] and Hopkins [1998].

5. Keith Lehrer examines exemplarization in detail in Lehrer [2011]. I am using the concept inspired by his work.

6. In the arts, it is common to combine different representational activities. Here are some examples. Theater can be thought of as a combination of exemplarization and description, where actors and actresses embody certain traits of the characters they represent. Some forms of poetry, such as that written by E. E. Cummings, elegantly combine description and a form of quasi-picturing, by carefully selecting how each letter and word is displayed on the page so that they resemble the objects they describe. Orlan’s carnal art, in turn, combines exemplarization and picturing, since the artist’s body becomes the artwork, which, in turn, resembles selected features of classical paintings.

References

French, S. [2003]: “A Model-Theoretic Account of Representation (Or, I Don’t Know Much about Art … But I Know It Involves Isomorphism)”, Philosophy of Science 70, pp. 1472-1483.

The 2015 John Fisher Memorial Prize

The American Society for Aesthetics is pleased to announce the guidelines for the 2015 John Fisher Memorial Prize, intended to foster the development of new talent in the field of aesthetics. The competition is limited to those persons who have completed the terminal degree in their field and are in the early stages of participation in their profession. Persons in doubt about their qualifications are encouraged to consult the editors of JAAC in advance at <jaac@cmich.edu>. Entrants should include with their entry a statement indicating how they qualify. Entry is not limited to members of the ASA.

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