

From Iconicity to Homomorphism: Towards a Philosophical History of Representation in Art and Science 1880-1914



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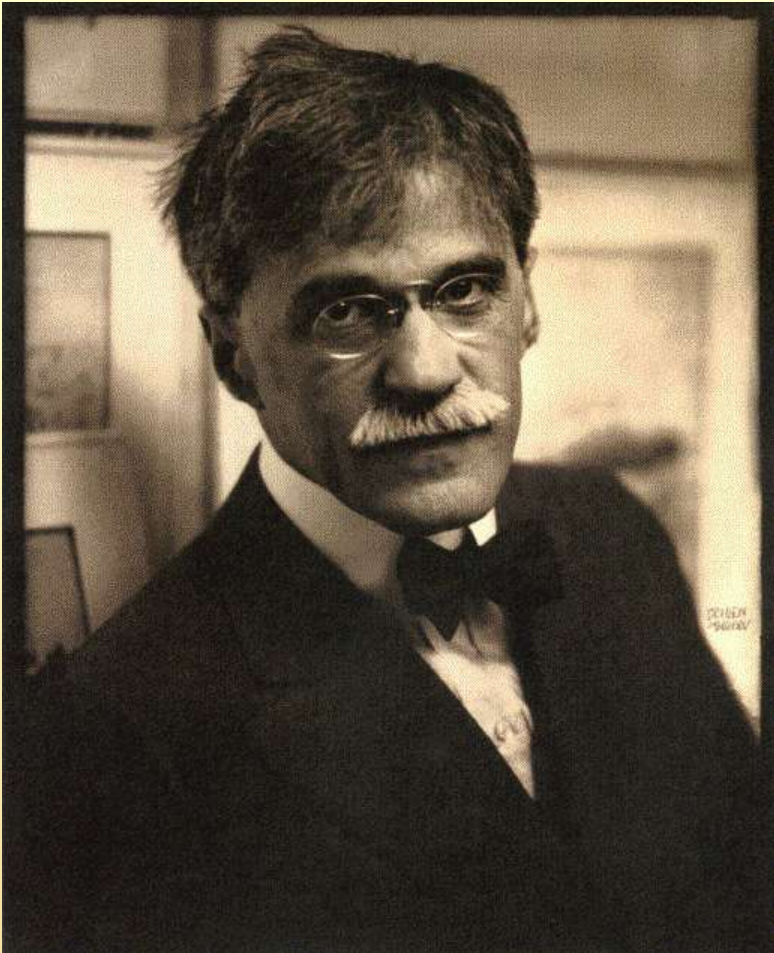
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Charles Sanders Peirce (1839-1914)

“Every sign is determined by an object, either first, by **partaking in the character of the object**, in which case I call the sign an *Icon*; secondly by being really and in its individual existence connected with its individual object, when I call the sign an *Index*; thirdly, by more or less approximate certainty that it will be interpreted as denoting the object in consequence of a habit (which term I use as including a natural disposition), when I call the sign a *Symbol*”.

(Peirce, CP 4.531)



“In one’s way of
seeing lies one’s
way of action”

A. Stieglitz

Alfred Stieglitz (1864-1946)



“The greatest dream or vision is that which is *regiven* plastically through observation of things in nature.
‘Pour les progrès à réaliser il n’y a que la nature, et l’œil s’éduque à son contact’
Max Weber”

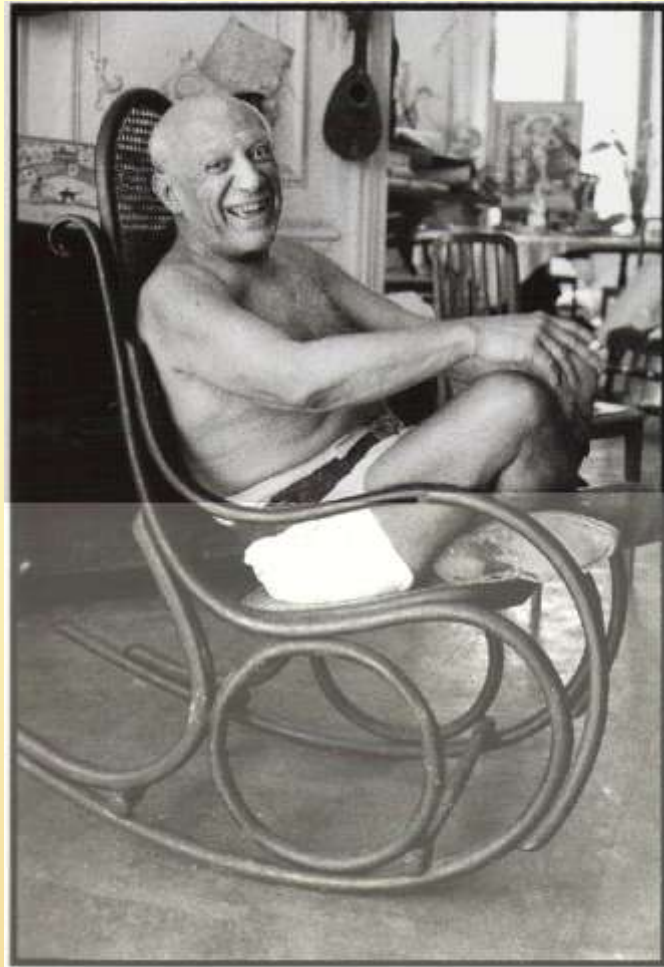
Max Weber (1881-1961)



André Derain (1880-1954)

“I began at that time [1899] to copy Ghirlandaio, which made quite a stir in the [Louvre] Museum. The visitors wanted to have me stopped doing *caricatures* of pictures. Many were horrified. Some came to see how the copy was getting along. Others were so interested that they came every afternoon to see how far I had got”.

André Derain



Pablo Picasso (1881-1973)

“The artist’s studio
should be a
laboratory. There, one
does not make art in
the manner of a
monkey, one invents.
Painting is a play of
the mind”.

Pablo Picasso



“X-Rays must have had something to do with the Cubist rendering of the interior of solid objects”.

S. Kern, *The Culture of Time and Space 1880-1918*, p. 147

G. Braque (1910), *Violin and Palette*. The Solomon R. Guggenheim Museum, New York



“There is no flesh, only a simplified anatomy, the up and down, the arms and legs”

Pierre Cabanne, *Dialogues with M. Duchamp*, p. 33

“A form passing through a line would traverse a line...therefore I felt justified in reducing a figure in movement to a line, rather than to a skeleton. Reduce, reduce, reduce was my thought”

J. J. Sweeney, *Eleven Europeans in America*, p. 20

M. Duchamp (1912) *Nude Descending a Staircase*. Philadelphia Museum of Art



“The Work of Art is a
Stuffed Crocodile”

Alfred Jarry



Jarry's *Ubu* at the Royal Court Theatre, London, in 1966



A. Jarry "Véritable portrait de Monsieur Ubu", in: *Le Livre d'Art* no. 2, April 1896



“Contemporary science is founded upon the principle of induction: most people have seen a certain phenomenon precede or follow some other phenomenon most often, and conclude therefrom that it will ever be thus. Apart from other considerations, this is true only in the majority of the cases, depends on the point of view and is codified only for convenience – if that!”

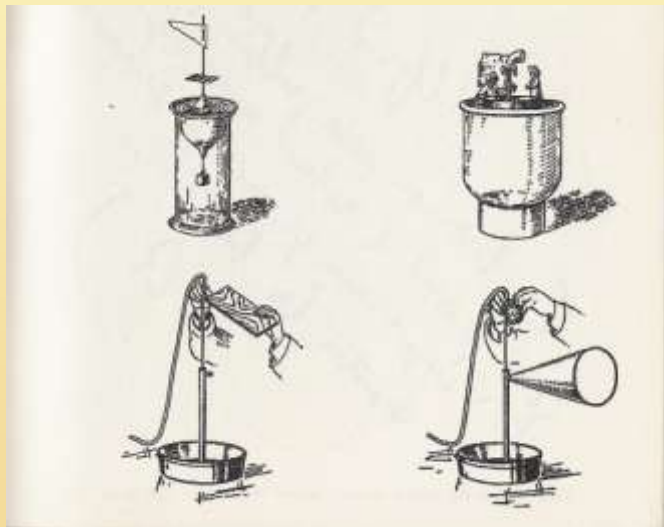
A. Jarry, *Faustroll*, Book II,
Chapter 8



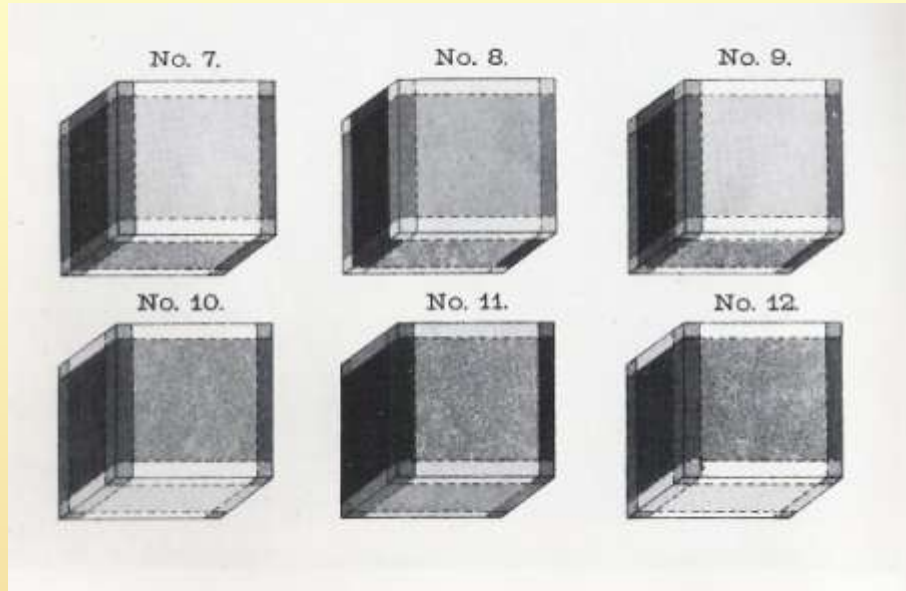
Sir C. V. Boys

“My sieve, then, floats like a boat, and can be laden without sinking to the bottom. Not only that, it possesses this advantage over ordinary boats – as my learned friend C.V.Boys has remarked to me – that one can allow a thin jet of water to fall on it without submerging it. If...a wave should break over the side, the liquid will simply pass through the mesh and rejoin the external waves”

A. Jarry *Faustroll*, Book I, Chapter 6



Drawings from Boys' *Soap Bubbles and the forces Which Mould Them* (1890)



C.H. Hinton (1904) *The Fourth Dimension* – Frontispiece.

“I cannot help thinking that somewhere in the extensions of the postulates which mathematicians have proposed may lie some one which will give an account of space conformable to our obvious acquaintance with it, and yet capable of opening up a new way of thought...”

C.H.Hinton, Letter to William James, (October 1895), in: I. Skrupskelis and E.M.Berkeley (eds). *The Correspondence of William James* , vol. 7, p. 89.

numéros des sommets correspondants de l'hypercorps, se rapportent également aux deux ou aux quatre points dont ils sont

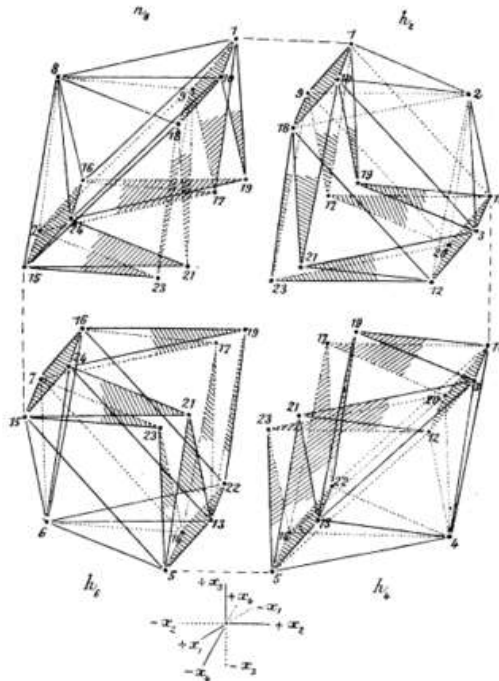


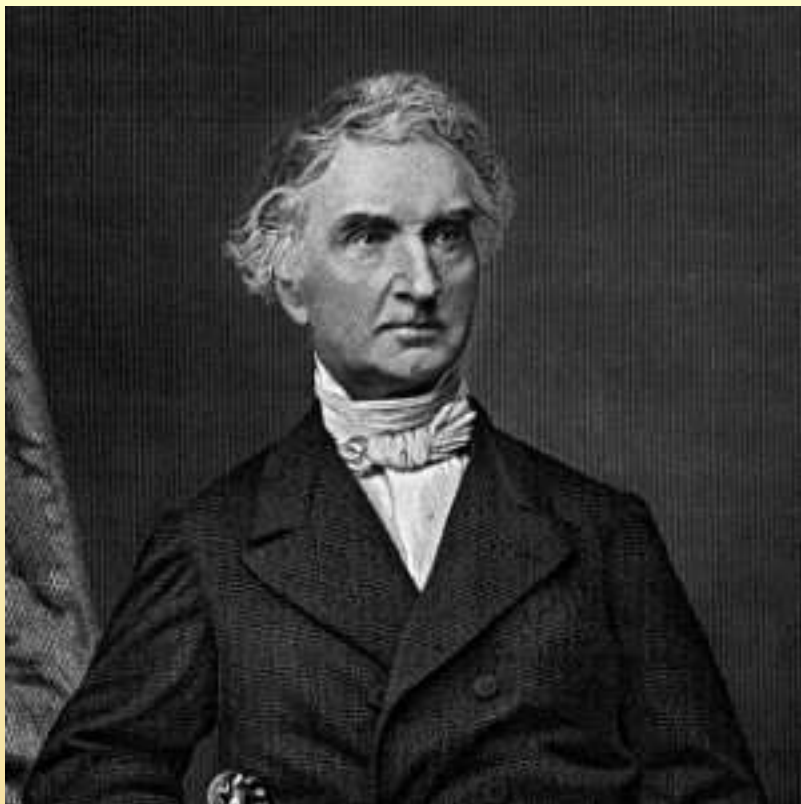
Fig. 41. — Perspective cavalière des seize octaèdres fondamentaux.

voisins; nous ne les avons écrits qu'une fois, et il appartient au lecteur de faire, le cas échéant, le triage des numéros se rapportant à l'un ou à l'autre de ces points. Chaque carré de A ou C,

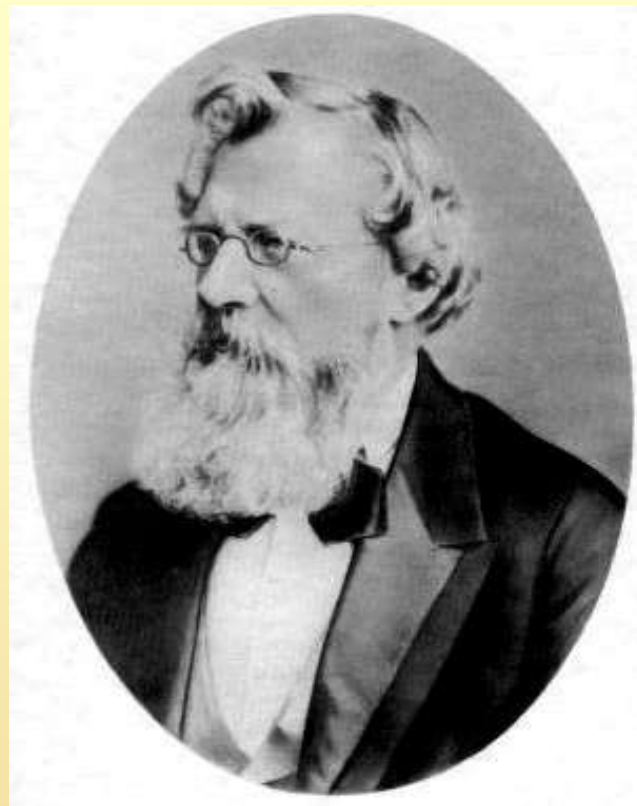


Pablo Picasso. *Les Femmes d'Alger (O Version O)* (1907) New York, The Metropolitan Museum of Modern Art

Esprit Jouffret (1902) Projections of four dimensional solids onto a two-dimensional surface



Justus von Liebig (1803-1873)



A. W. Hofmann (1818-1912)



“Analytic and synthetic reasoning would inform his seminal photograph “The Steerage” and lead to his understanding of Cézanne’s modernism. Furthermore, Stieglitz would identify his gallery as an experimental laboratory on a Liebig-inspired model: its simplest and most effective technique was a staged series of exhibitions; its apparatuses were provocative works of art; and its journal was Camera Work”

Geraldine Kiefer, *Alfred Stieglitz and Science*, p. 67

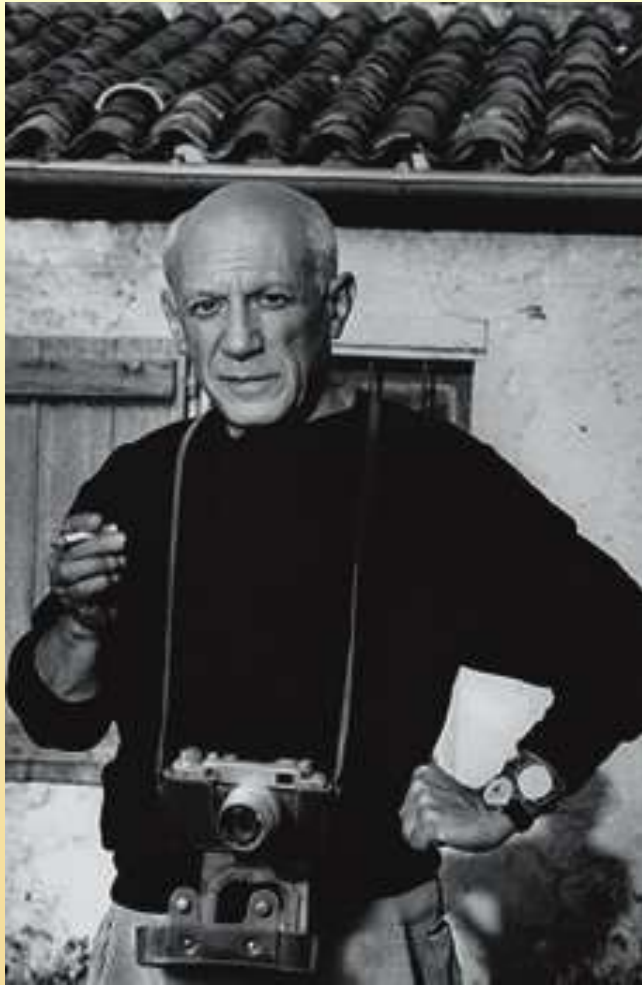
Alfred Stieglitz (1907) *The Steerage*



Alfred Stieglitz (1907) *The Steerage*

“A round straw hat, the funnel leaning left, the stairway leaning right, the white draw-bridge with its railings made of circular chains—white suspenders crossing on the back of a man in the steerage below, round shapes of iron machinery, a mast cutting into the sky, making a triangular shape. I stood spellbound for a while, looking and looking and looking. Could I photograph what I felt, looking, looking and still looking? **I saw shapes related to each other. I saw a picture of shapes and underlying that the feeling I had about life**”

A. Stieglitz, “Four Happenings”, p. 128



“This photographer is
working in the same
spirit as I am”

Interview with Marius de Zayas
(1914), quoted in Kiefer, p. 394



P. Picasso (1907) *Les Femmes d'Alger (O Version O)*. New York, Metropolitan Museum of Modern Art

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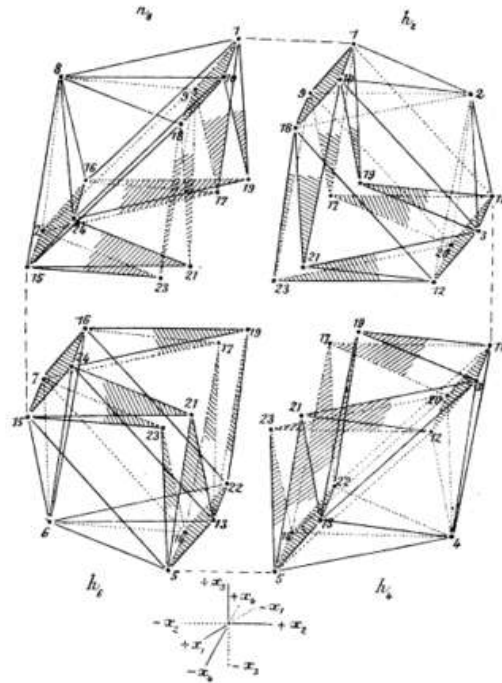
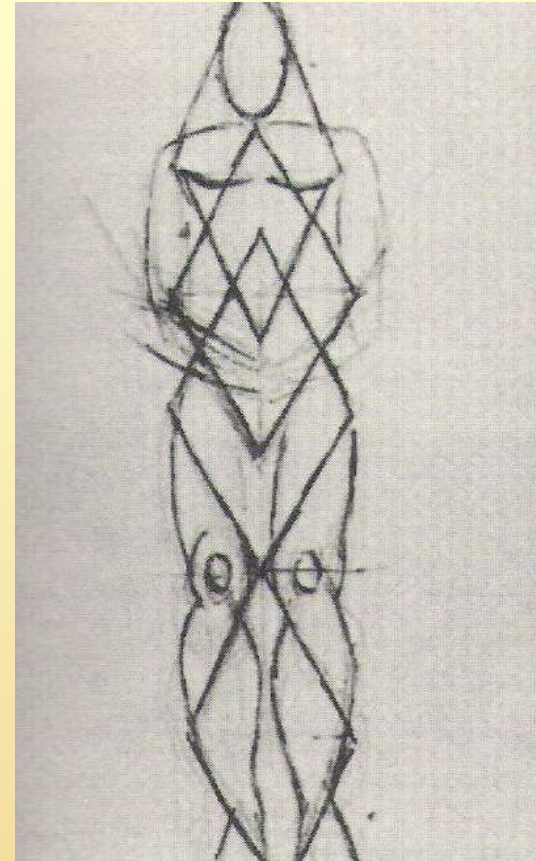


Fig. 41. — Perspective cavalière des seize octaèdres fondamentaux.

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Esprit Jouffret (1902) Projections of four dimensional solids onto a two-dimensional surface

P. Picasso (1907), preparatory drawing for *Les Femmes d'Alger*



P. Picasso (1909-10) *Portrait of Ambroise Vollard*. Pushkin Museum, Moscow

“Often Maurice Princet joined us...He conceived mathematics like an artist and evoked continua of n dimensions like an aesthete. He liked to interest painters in the new views of space opened by Victor Schlegel and succeeded in doing this”

(J. Metzinger, *On Cubism*, p. 43)

“M. Princet is an “insurance man” and very strong in mathematics. M. Princet calculates like Inaudi. M. Poincaré [*sic*] read Henri Poincaré in the text. M. Princet has studied at length non-Euclidean geometries and the theorems of Riemann, of which Gleizes and Metzinger speak rather carelessly. Now, then, M. Princet one day met M. Max Jacob and confided to him one or two of his discoveries relating to the fourth dimension. M. Jacob informed the ingenious M. Picasso of it, explained his intentions to M. Apollinaire, who hastened to write them up in formularies and codify them. The thing spread and propagated...Cubism, child of M. Princet, was born”

L. Vauxcelles, *Le Père du Cubisme*, p. 11



P. Picasso (1907) Self-Portrait.
Národní Gallery, Prague



African Mask, Musée Picasso,
Paris



Grebo Mask,
Musée Picasso,
Paris



[An icon] only
conveys its
signification by
exciting in the mind
an image, or, as it
were, a composite
photograph of
images..."

Peirce, CP 2.317



“A diagram, indeed, so far as it has a general signification, is not a pure Icon; but in the middle part of our reasoning we forget the abstractness in great measure, and the diagram is for us the very thing. So, in contemplating a painting, there is a moment when we lose the consciousness that it is not the thing, the distinction of the real and the copy disappears, and it is for the moment a pure dream –not any particular existence and yet not general. At that moment we are contemplating an Icon”.

Peirce, CP, 3.362.



A. Derain (1907) *Bathers*. The Museum of Modern Art, New York



“...Derain and Picasso became friends and the almost Immediate consequence of their association was the birth of Cubism, which is the art of painting with elements borrowed, not from visual, but from conceptual reality”

G. Apollinaire, *Art and Curiosity: The Beginning of Cubism* (reprinted in L. Breunig, *Apollinaire on Art*, p. 260)



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to copy Ghirlandaio,
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A. Derain (1910). *Still Life with Stone Jug*. Private Collection, Paris.



A picture of a corner of the Steins' sitting room

“Leo and Gertrude Stein graciously received art students, students of philosophy and languages...writers, young poets, musicians and scientists...

Lengthy...discussions on the most recent developments and trends in art took place, with Leo as moderator and pontiff.

Here one felt free to throw artistic atomic bombs and many cerebral explosions did take place”.

Quoted in Percy North, *Bringing Cubism to America: Max Weber and Pablo Picasso*, p. 60.



M. Weber (191) *Interior of the Fourth Dimension*,
National Gallery, Washington
D.C.

“In Weber’s scheme, the fourth dimension represents the limitless size of the universe. As such, it is the source of physical size in general. Thus, the size of an object varies, in the viewer’s eyes, to the extent that it partakes of the fourth dimension”.

W. Bohn, *In Pursuit of the Fourth Dimension: Guillaume Apollinaire and Max Weber*, p.168.



M. Weber (1915) *Rush Hour*,
New York, National Gallery,
Washington D.C.

“An Artist should hope to evoke with grains of matter the very atoms of colour and time. He should feel as though he empowered the silent with speech and the static with motion; and should seem to angle the light and to impregnate the three dimensions with a spiritual fourth dimension. If not spiritually conceived or transfigured by great inspiration, matter is dead”.

M.Weber “The Equilibrium of the Inanimate” in: *Essays on Art*, p. 70.

Goodman's nominalist critique of resemblance

“No degree of resemblance is sufficient to establish the requisite relationship of reference. Nor is resemblance necessary for reference; almost anything may stand for almost anything else. A picture that represents –like a passage that describes– refers to and, more particularly, denotes it. Denotation is the core of representation and is independent of resemblance”

(Goodman, 1962:5)

To function appropriately, some of the features of the model will be essential to the representation of the things for which it stands, whereas others will be irrelevant: “There is not such thing as a perfectly faithful model; only by being unfaithful in some respect can a model represent the original” (Black 1962, p.220). Even analogue models can be viewed as ‘Iconic’, but in a more abstract way: “the analogue model shares with its original not a set of features or an identical proportionality, but, more abstractly, the same structure or pattern of relationships” (Black 1962, p. 222). The dominating principle here is that of isomorphism, but to insist that “every incidence of a relation in the original must be echoed by a corresponding incidence of a correlated relation in the analogue model” is too strong a demand... What is required is some weaker notion that picks up just some relevant subset of the relations concerned.

S. French and N.C.A. Da Costa, *Science and Partial Truth*, p. 47



“Every algebraic equation is an icon, in so far as it exhibits, by means of algebraic signs (which are not themselves icons), the relations of quantities concerned”.

Peirce, CP 2.282.

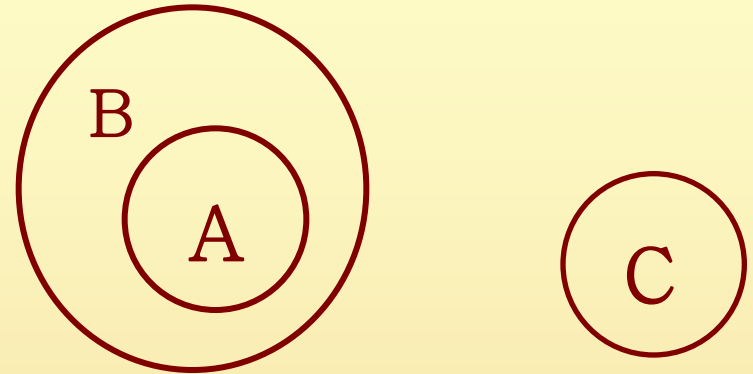
“Mathematical reasoning consists in constructing a diagram according to a general precept, in observing certain relations between parts of that diagram not explicitly required by the precept, showing that these relations will hold for all such diagrams and in formulating this conclusion in general terms”

Peirce, CP 1.54

The visual effectiveness of iconic representations

“A great distinguishing property of the Icon is that by the direct observation of it other truths concerning its object can be discovered than those which suffice to determine its construction”.

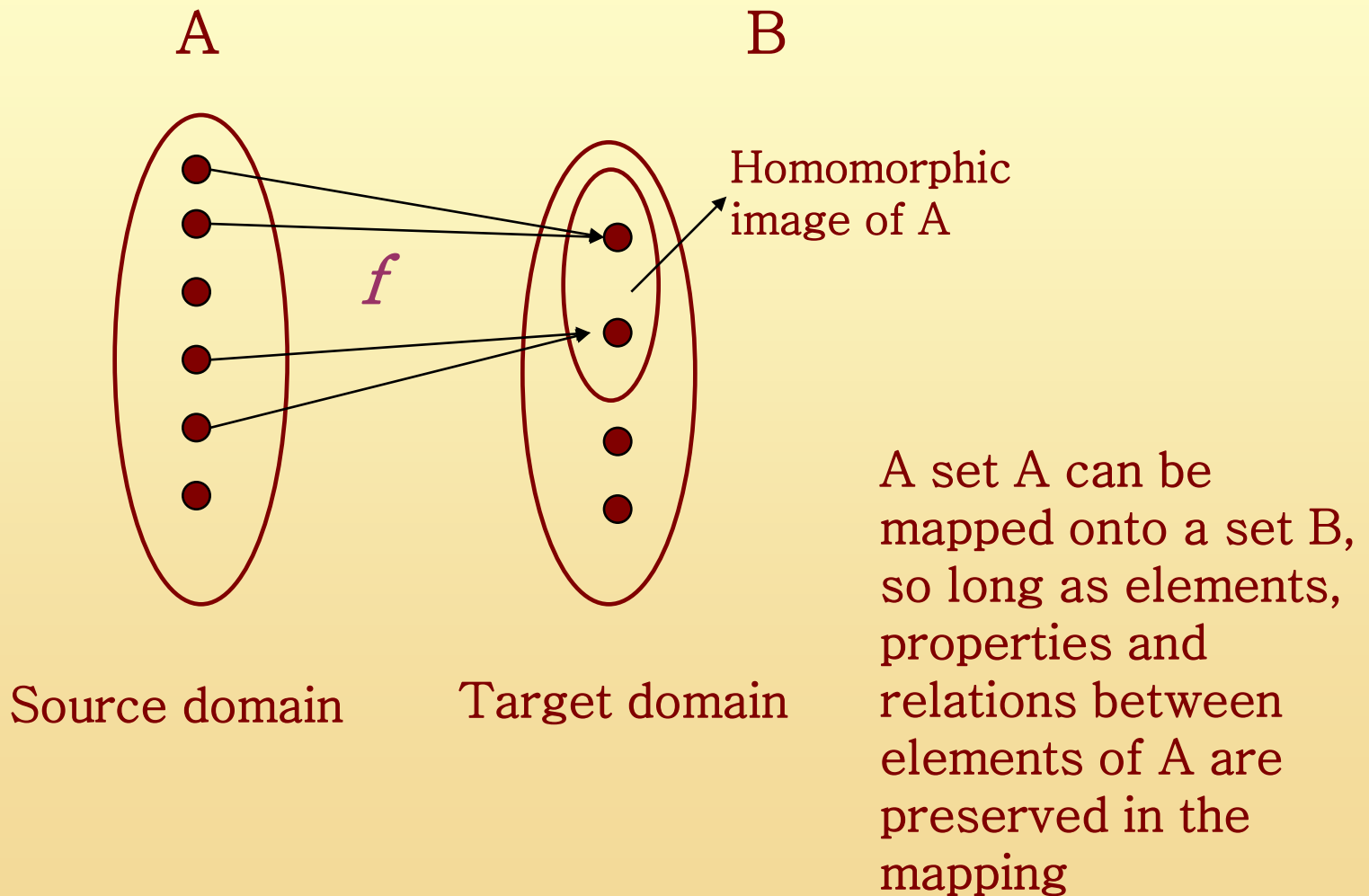
Peirce, CP 2.279



All A are B
No B is C

(No A is C)

Iconicity as Homomorphism



- Elements of a source domain A represent elements in a target domain B, with different elements of B represented by different elements of A;
- f is a mapping or function between A and B such that:
 - If elements in A stand in some relevant relation R, then there is a relevant relation R' among elements of B to which they are assigned by f ;
 - If an element in A has a relevant property P, then there is an element in B with the corresponding property P'.
 - If a relation R in A has some structural property (symmetry/asymmetry, reflexivity/irreflexivity, transitivity etc.), then the same property holds for R' in B.

Barwise and Hammer (1995), pp. 71-72.



Pablo Picasso, *Cubist Portrait of Fernande with Box and Apple* (1909). Pencil on paper. Private Collection.



Pablo Picasso, *Fernande in a Mantilla* (1909). Private Collection. Photograph Published in *Camera Work*, December 1910.



Thank You!

Comments Welcome
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