Post-photography and beyond

From mechanical reproduction to digital production

Göran Sonesson

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For a long time now, photography has been the modern way to make an image; is has been the rapid way, because it is the mechanical way; and also the easily repeatable way; and finally, it has been the truthful way, the only way for the picture to be true, both to its object and to its cause. In return, photography has acquired the reputation of being somewhat soul-less, unable to convey the personal characteristics of its originator. In these last days of photography, however, in which its has finally gained its aura, theory has caught up with inventions, calling rapidity mechanography, repeatability typicality, truthfulness indexicality, and soul-lessness lack of illocutionarity. The eagles of Minerva are ready to fly.

But is there really a world after photography? The postphotographic world can only exist in the same sense in which we have long lived in a world after painting: a world in which the meaning of painting has been modified by the advent of photography. But now the meaning of photography and painting alike are in the process of being thoroughly changed by the emergence of computer-pictures.

In the present essay, I will not be using the term "post-photography" as a shorthand for postmodernist photography (as Carani 1999 seems to do); instead it is meant to describe those means for creating pictures which have come into being after photography, and which are more or less connected to the computer. Artistic pictures will only interest me to the extent that they serve to emphasise some characteristic properties of photography and post-photography. It is possible to see the computer as a mere means of communication and/or reproduction, for instance as a way to convey pictures on the Internet, in which case we may agree with O'Toole (1999), that the meaning must have been there beforehand, and that the computer can only contribute to the deterioration of this meaning. But the computer may also be an instrument of creation: it is not only one of several possible means for mechanical reproduction, but it is also a means for digital production. And this is were we enter the domain of postphotography.

I. The society of pictorial information

Our society of information is a society of pictures. But it is probable that this combination

of two clichés becomes more illuminating if we invert it: the society of pictures is, for the first time in history, a society of information. The pictorial sign becomes an information good, as is already the linguistic sign: something that, once it has been created, can be repeated indefinitely; but also something that can be put together out of repeatable and finished elements, just like language, although in a form peculiar to pictures.

I.1. The picture as an information good

Thus, it finally becomes possible to say of the artistic picture what the Russian formalists and the Prague school have said, mainly with the literary work in mind: that it presents itself as a divergent act not only in relation to previous ways of making art, but also in relation to the standard media, language respectively the everyday picture.

On one side, we have the original scene: the picture as the holy thing, emitting a type of prohibitive power like that of the sacred Ark of the Bible or the nuclear remains, tied to the here and now, in an indissoluble indexicality, and without any possibility of being repeated identically from place to place and from time to time. On the other hand, we have the world to which modernity has condemned us, in which each copy makes reference to the type it realises, and of which there are identical tokens which return in other times and other places.

The vision obviously stems from the classic text of Walter Benjamin, who already in the decade of the thirties proclaimed the beginning of the era of mechanical reproduction of the work of art. No doubt the affirmation was premature; instead of losing its aura, which may at some moment may have seemed light like a puff of air, Modernist art has moulded itself into bronze; the world of art has become more than ever sufficient onto itself. The very manual character of traditional art now serves to turn the artistic picture into an even more pregnant rhetorical divergence to the standard medium.

In another way, Benjamin's prediction was not sufficiently radical. The mechanical repetition has become digital, which implies that its typicality no longer requires a pre-existing original, which can be perceived as such. And from having been only a means of reproduction, digitality has become the very form for the production of pictures.

I.2. Densification in the Western history of pictures

The semiotics of culture, as it was originally defined by the Tartu school, does not deal with the study of cultures, but with the models that the members of cultures make of their own culture. It makes models of models. The importance of this difference does not seem to have been obvious for many latter-day semioticians or even for the Tartu school itself. From this point of view we can take clichés like "the society of information", "the society of pictures", "the post-industrial society", "the postmodern condition", etc., and ask ourselves what these auto-models really mean: what are the fads and fashions which they indicate in this twisted form, and how do they themselves become productive in history?.

It is possible to see the history of the Occidental world as a progressive densification of the existing number of pictures, that is to say, as an increase in the number of pictures by inhabitant (Ramirez 1981). But to see the development in purely quantitative terms is not

very informative; it is the different processes that are behind this augmentation which are significant.

From Prehistory to the Renaissance the unique picture dominates. This does not mean that uniqueness is a value at this stage; this happens much later with the creation of the concept of art. To start with, the unique picture is a limitation: a type of sign with a single replica (copy). For a long time it was a privilege granted only a few to possess a picture, look at it and possibly allow others to make copies of it. In some countries and climates the fresco was replaced quickly by paintings on wood, copper or fabric which were more easily transportable. An open market for the sale of pictures arose, and the book and other prints spread the pictures widely. The procedures for the reproduction of pictures which were later developed (xylography, copper engraving, etc.) every time made it possible to produce a greater amount of copies while preserving the similarity to the original. Photography perfects what Ivins (1953:4, 113ff) has called "the exactly repeatable pictorial statement", that is to say, the production of countless replicas from each picture original. New omnipresent visual media which are immediately reproduced arose with the film and the television, more recently with the multimedia and other visual forms mediated by the computer.

Different processes seem to be behind this general densification of pictures. At least since photography was invented the picture types have all the time increased. In general, there are two ways to create a picture: by hand, that is to say, normally with some simple instrument that is held by hand, like for example, a pencil, a brush or a drawing-pen, or with the help of some more complex mechanical apparatus. The first way can be called a *chirographic* method and the second a *technographic* (cf. Gubern 1987b) or a *mechanographic* one (Sonesson 1992). Examples of pictures made technographically are photographs, video-films and the computerised graph. In general, it takes much less time to produce a technographical picture than a chirographical one of equivalent size and complexity. The technographic way to produce pictures is, in addition, accessible to a much greater number of people, since it does not require any skill that demands a long time of learning or any innate talent. The criterion applied is then not to produce artistic pictures, but an elementary transfer of information of the represented object.

The Occidental history of picture-production also has resulted in an increasing number of replicas (or copies), both in absolute numbers and in relation to each type of picture. Naturally, it has always been possible to produce copies, and since painting became a craft, the procedure has been of fundamental importance, as a learning procedure as well as a way to exercise the profession, in which case the patron books played a fundamental role for a long time. The mechanical procedures of reproduction make it possible to produce more and more copies which maintain the similarity with the original plate (which is equivalent to the original or in any case is a step closer to it). Ivins (1953) emphasises that the picture thus becomes a sign which is more and more similar to the linguistic one, in the sense that now each statement can be repeated and remain exactly identical; in other words, in the sense that several replicas can be made of the same type. It is at this stage that the art work, according to Benjamin (1974) becomes mechanically reproducible, that is, it becomes a type that can generate many replicas. In this process, it supposedly loses its "aura", which has come to be associated with its character of being unique, which is now highly valued.

However, also at more abstract levels the number of pictures has increased: that is to say,

the number of pictorial kinds. This is true in terms of principles of *construction* : to the stone engraving and the drawing have been added xylography and oil painting; later the photograph, the music video, the computerised picture, the multimedia, etc. It is also true in terms of *use*. With more ample access to education, and the emergence of mass media, advertising and the industry of entertainment, pictures acquire a social use instead of having a merely individual one, and their functions become more specialised, just like their resulting characteristics. At the same time more *channels* arise by means of which pictures can circulate in society. For a long time, most pictures were to be found in churches and palaces, to which most people did not have free access at any moment, nor, in particular, when they wished to. From the last century onwards, pictures are present on publicity signboards in the street, in newspapers, in magazines, in public museums and galleries of art, etc. However, television spreads them into the home, and with the advent of the Internet, they also can be constructed with the help of a home computer, with views to a later diffusion all over the world. This development is at least partly the result of the increasing number of types of pictures, pictorial copies and pictorial kinds.

Finally, we now have an increasing number of more clearly delimited acts of pictorial communication. In principle, stone inscriptions, frescoes and paintings in churches and museums always stay in determinate places, where anyone, at any moment, may look them up. The postcard, the publicity picture and the television picture are, on the contrary, and in an increasing degree, actively directed by a sender to relatively passive receivers during limited periods of time. The encounter between the picture and its receiver only can happen in determined places and at certain moments: even the picture copy dissolves into several events in time (although relatively few ones). This is valid also on the Internet, where it is the receiver who assigns the time to the act of communication by connecting himself to the picture database, the software archive, or the web pages (cf. Sonesson 1995b). In the transition from the mechanical reproduction of the picture to the digital one, all these processes are accelerated and extended. The aureole of art, already askew, falls resoundingly to the ground.

I.3. From mechanical reproduction to digital production

What Benjamin discusses is, fundamentally, how the picture, once it has been created, can be multiplied and spread in new copies. It is one thing when an oil painting is translated into a reproduction or is scanned into the computer in order to be shown on a web page; and it is a completely different thing when computer graphics and web pages are created for the purpose. The mechanisation of the construction forms does not necessarily coincide with that of the distribution forms, even though certain construction forms, such as the film and the computer, seem to be predestined to mechanical distribution.

A division of the pictorial signs founded on everyday language may result in three categories of picture categories (Sonesson 1992*): construction categories,* defined by what is relevant in the expression in relation to what is relevant in the content, which, among others, differentiates the photograph from the painting; *function categories,* that are divided according to the social effects anticipated, for example, the publicity picture which has as its goal to sell products, the satirical picture which ridicules somebody, the pornographic pictures, which is supposed to produce sexual stimulation; and the *categories of circulation* characterised by the channels through which the pictures circulate in a society, which makes the bill-board into something different from the

newspaper picture or the postcard into something different from poster.

This is of course a primary source of visual rhetoric: by means of the mixture of different construction categories, function categories, or circulation categories, a rupture of our expectations is produced (Sonesson 1993;1994;1996a). Among well-known blends of construction categories may be counted the Cubist collages, whose materials are heterogeneous. A mixture of function categories is present in the well-known Benetton publicity, in which a news picture has been curiously blended into a publicity picture. A more abundant source of the rupture of the norm is, nevertheless, the expectations which we entertain that there will be certain correlations between categories of construction, categories of function and categories of circulation. A great part of Modernism (as well as Postmodernism) has consisted in breaking, in ever new forms, with the prototype of the art work that was current in the XIX century: an oil painting (construction category) with aesthetic function (function category) that circulates through galleries, museums and exhibition halls (circulation category). In this sense Modernism has been a gigantic rhetorical project, as Postmodernism was later to be.

However, even the very history of mass media and sign systems serves to undo the anticipated connections between pictorial kinds. This is valid also on a more general level: xylography already implies that the pictorial sign stops being absolutely bound to manual distribution; but only the computerised picture consummates the rupture with a construction realised by hand.

I.4. The pictures of the hand and of the machine

The child discovers the elementary graphic act (cf. Gibson 1978; 1980; Lurçat 1974) when its interest changes from the movement of the hand to the tracks that these movements leave on paper or on another support, when the hand maintains a pencil and the pencil leans against the paper. To the toddler, the marks left on the paper are accidental traces of a motor activity rewarding in itself, i.e. they function indexically. It is only at 18 months approximately that the child will react when no strokes and dots result from the contact of the marker with the paper, and only at 3 years will he refuse to draw in the air (Cf. Gardner 1973 b:215 ff.; 1980:43 ff.; Gibson 1978:230). What was at first accidental *substance* now becomes the very *form* of the act, defined by the principle of relevance known as the making of a drawing.

Later the graphic act is split into two, following two completely different lines of development: a part of the acquisition is disciplined by and for the representation of that limited amount of lines and curves that we call letters; another part still enjoys a relative freedom, at least until the "stage of realism" so much decried by the pedagogues makes its appearance. With one of the oldest metaphors of the world of computation one often says that writing is digital (as is spoken language), whereas the picture is analogous. By that one does not generally mean that the picture is iconic, that is to say, similar to that which it represents, but that it is continuous, as reality itself — as is a traditional watch-face, unlike the indicator of numbers of the quartz clock.

The perception of surfaces is important for the possibilities of survival of all animals; it is only by means of determining their mutual relations that the animals are capable of orienting themselves in the world of experience. However, according to James Gibson

(1980), it is only to man that the marks made on surfaces attract attention. Such marks may be of different types, for example, colour spots, lines or projected shadows; and they can be produced in different ways: by the fingers, with a pencil, a brush, some engraving instrument, with a rule, a compass, or with a more complex instrument such as a printing-press, a camera or a projector. The marks on the surface can be disorderly and then may perhaps be dirt spots. If they are symmetrical or regular in some way, they make up some kind of ornament; but if the marks have a form that can be interpreted as referring to a possible perceptual scene, we have to do with a picture.

A picture, or a *pictorial image* – to be distinguished from a solid image like a sculpture, a mirror image, a camera image, a photographic camera image, a retinal image, an after image, a mental image, and so on (Gibson 1978 228; 1980:xvif) – is "a surface so treated that it makes available a limited optic array /- - -/ of persisting invariants of structure" at some point of observation. Such a conception of what a picture is is obviously strange to the historian of art, from many points of view. He would consider even a sculpture to be a picture. Here I would like to insist on the fact that a picture is something whose plane of expression is, materially, a surface which is (relatively) flat (as Man Ray's billiard table, but not that of Sherrie Levine). For semiotics as well as for the psychology of perception, the possibility of three-dimensional iconic signs (sculptures, dummies, scarecrows, etc.) does not present the same problem as the representation of a perceptual scene on a surface. Moreover, it is evident that many of the most famous pictures of the last century would be categorised as ornaments or even as spots of dirt in Gibson's model. Malevitch's white triangle on a white bottom would be a simple ornament; Yves Klein's blue canvases would be less than ornaments, they would simply be painted boards; and Pollock's works would be dirt spots. What in fact differentiates these paintings from ornaments and dirt is that in our contemporary artistic world, at the same time that they are marks which are regularly or chaotically scattered on a surface, they are considered to have what Gibson calls a "referential meaning" — although this meaning generally cannot be identified with an ordinary perceptual scene (cf. Sonesson 1989a, III.3.2.).

According to Gibson (1978:229), there are two types of pictures: if the record is of a stylus, brush, pen, pencil, crayon, marker or another hand-held tool, the result will be a *chirographic* picture; and if the traces are made with a camera with its accessory equipment, we will have a *photographic* picture (Gibson 1978:229 f; 1980:xiiff). The examples given previously seem to show a greater variation and a less clear difference: the pictures really made by hand are only those painted with the fingers; also the camera must be maintained by one or several hands. In spite of this, it is easy to understand the basis idea behind Gibson's division; even though the action of the hand is mediated by the pencil, the compasses or the engraving instrument, it is the hand that creates the marks line by line and point by point, whereas the intervention of the hand in the case of the camera is global, maintaining the camera and pushing the button at a given moment. Each curve of the line which is drawn, and also every moment of its continuation, depends on a micro-decision which governs the hand. But once the camera is focused and the button has been pushed, then "the pencil of nature", as Fox Talbot called the photographing process, draws the whole figure all at once. Thus it may be that the hand is the main protagonist in all those cases in which the camera is not..

An interesting correlate of Gibson's distinction is that, while all pictures contain indexical signs of the instruments making the tracing on the surface, only in the photographs these indices are at the same time icons of the things depicted. To grasp the nature of

chirography, it may be necessary to oppose it to something which is vaster and less specific than photography. "Hard icons" is a term coined by Tomas Maldonado (1974) to describe signs which, in addition to bearing resemblance to that which they depict, are related to them as traces to that which produced them. Examples would be X-ray pictures, hand impressions on cave walls, "acoustic pictures" made with the aid of ultrasound, silhouettes, configurations left on the ground by people who were out walking in Hiroshima at the moment of the explosion of the nuclear bomb, thermograms, pictures made with "invisible light" to discover persons hiding in the woods — and ordinary photographs. The real contiguity between the picture and its referent is here taken to guarantee the cognitive value of the picture. It is important to note that "hard icons" cannot simply be signs which are both indexical and iconic, for that is true also of chirographs: there must be *coincidence* between their respective indexical and iconic grounds.

Yet on this account, there seems to be cases which are intermediary between photography and chirography. During the 18th century a device for producing drawings from silhouettes was in use: it consisted of a chair having a source of light on one side and a screen on which the shadow of the person sitting in the chair was cast on the other. The contours were conveyed by contiguity to the screen, but were not by themselves retained there, because of the lack of photographic emulsion, but had to be filled in by hand. In the case of the curious device known as a physionotrace, a view-finder was moved along the contours of the object, producing a contiguity between these contours and the gaze; thanks to another contiguity, this time between the view-finder and a stylus, the corresponding figure was concurrently traced onto a paper. Similarly, in the *camera obscura* as used by the artists from the Renaissance onwards, there is a series of contiguities between the contours of the object and the pattern of light on the paper, and between the light pattern and the tracings filling in the contours created by the light.

In any case, a binary division of this kind can only be possible if the term photographic is taken in an wide sense, because while the film picture could be seen as an extension of photography, the video picture is something completely different, and yet it is not hand-made. We might therefore want to follow Roman Gubern (1987b: 46f) in introducing the term *technography* as the true opposite of *chirography* (as suggested above*)*, and in assigning to the former category all photographic, cinematographic and videographic pictures. It also seems relevant to count into this latter category what the same Gubern (1987a: 73ss), in another book, has called "the synthetic picture", which is to say a picture produced with the aid of the computer (cf. Sonesson 1989b, III.1.2).

Since we categorise the computer picture, as it seems natural, as technographical, we are confronted with a strange contradiction: for even though the technical character of the computer picture is much more advanced that that of the camera, it does not force global resolutions on us. The drawing is directed to a great extent by the hand, mediated by the mouse, although the latter is not as flexible an instrument for it as the pencil or the instrument of engraving (a similar effect of which may possibly be obtained by means of a digitalisation table). In spite of its highly technographic character, it seems that computer graphics recovers some of the advantages of chirographics.

If we count all the ways of providing surfaces with marks as graphical, then we can, with Espe (1983), divide these into three types: chirographic, photographic and typographic surfaces Also the typographic ones would be technographic, since, at least since the times

of Gutenberg, the movable type is a small machine which allows only the reproduction of standardised elements. Only with the photograph there appears a technographic procedure that allows the reproduction of details that vary freely; which was previously something reserved for chirography (cf. Sonesson 1989b, III.1.2.). In this sense it is possible to be in agreement with Barthes (1980:21) when he speaks of photography as a *mathesis singularis*. But this is only so to the extent that we limit ourselves to reproduce reality in a single block. It is only the computer picture which offers a technographic procedure which retains its sensitivity to chirographic details.

II. Photography and the theory of indexicality

Unlike most other picture categories, photography has already engendered a small body of literature concerned to lay bare the specificity of its sign function (cf. Sonesson 1989b; 1994c). According to Philippe Dubois (1983:20ff), the first semiotical theories of photography tended to look upon the photograph as a mirror of reality, or, in Peircean terms, as an *icon;* then came that most celebrated generation of iconoclasts who tried to demonstrate the conventionality of all signs, supposing even the photograph to present a "coded" version of reality, or, as Peirce (according to Dubois, at least) would have said, a *symbol*; and finally the photograph was seen for what it really is, in Dubois' view: an *index*, more specifically, a trace left behind by the referent itself. The explicit turn to an indexicalist position was taken together by Dubois, Henri Vanlier (1983) and Jean-Marie Schaeffer (1987; cf. Sonesson 1989b: 46ff). Although both Dubois and Schaeffer explicitly refer to Peirce when introducing the idea of indexicality, they fail to go into any details when describing this conception, nor do they consider to what extent it may still be taken to be valid. This is why we will now have to enter the theory of indexicality.

II.1. Indexical and the iconical grounds

In one of his well-known definitions of the sign, or rather the sign-vehicle, Peirce (2:228) describes it as something which "stands for that object not in all respects, but in reference to a sort of idea, which I sometimes called the *ground* of the representation". According to one of his commentators, Greenlee (1975:64), the ground is that aspect of the *referent* which is referred to by the expression, for instance, the direction of the wind, which is the only property of the referential object "the wind" of which the weathercock informs us. On the other hand, Savan (1976:10) considers the ground to consist of the features picked out from the thing serving as *expression,* which, to extend Greenlee's example, would include those properties of the weathercock permitting it to react to the wind, not, for instance, its having the characteristic shape of a cock made out of iron and being placed on a church steeple. In one passage, however, Peirce himself identifies "ground" with "abstraction" exemplifying it with the blackness of two black things (1.293). That, of course, would be an iconical ground (such as the similarity of the weathercock to a real cock); an indexical ground, in a parallel fashion, would then be whatever it is that connects the properties of the weathercock as a physical thing to the direction in which the wind is blowing. The ground, it appears, is a part of the sign having the function to pick out the relevant elements of expression and content. Therefore, the ground is really a *principle of relevance,* or, as a Saussurean would say, the "form", connecting expression and content (cf. Sonesson 1989a:205ff).

Generally put, an *indexical ground,* or indexicality, would then involve two "things" that are apt to enter, in the capacity of being its expression and content (i.e. "representamen" and "object"), into a semiotic relation forming an indexical sign, due to a set of properties which are *intrinsic to the relationship between them,* such as it is independently of the sign relation. This kind of ground, which is a relation, is best conceived in opposition to an iconic ground, which really consists of two sets of properties which happen to be of the same kind, and the symbolic ground, which is a non-entity, since the motivation of the sign has no existence independently of the sign itself. This is the sense in which indexicality is Secondness, iconicity Firstness, and symbolicity Thirdness.

To be more precise, it would appear that, in Peirce's view, two items share an *iconic ground*, being thus apt to enter, in the capacity of being its expression and content, into a semiotic function forming an iconic sign, to the extent that there are some or other set of properties which these items possess independently of each other, which are identical or similar when considered from a particular point of view, or which may be perceived or, more broadly, experienced as being identical or similar, where similarity is taken to be an identity perceived on the background of fundamental difference (cf. Sonesson 1989a,III.1-3.).

Contrary to the indexical ground, which is a relation, the *iconic ground* thus consists of a set of two classes of properties ascribed to two different "things", which are taken to possess the properties in question independently, not only of the sign relation, but of each other. Indexicality as such involves two "things", and may therefore be conceived independently of the sign function. Since iconicity is Firstness, however, it only concerns one "thing". Indeed, as Peirce (3.1.; 3.362; 4.447) never tires of repeating, a pure icon cannot even exist: it is a disembodied quality which we may experience for a floating instant when contemplating a painting out of awareness. Perhaps, then, to use some of Peirce's own examples, the blackness of a blackbird, or the fact of Franklin being American, can be considered *iconicities;* when we compare two black things or Franklin and Rumford from the point of view of their being Americans, we establish a *iconic ground;* but only when one of the black things is taken to stand for the other, or when Rumford is made to represent Franklin, do they become *iconic signs* (or *hypo-icons,* as Peirce sometimes said). Just as indexicality is conceivable, but is not a sign, until it enters the sign relation, iconicity has some kind of being, but does not exist, until a comparison takes place. In this sense, if indexicality is a potential sign, iconicity is only a potential ground.

In sum, then, iconicity begins with the single object; indexicality starts out as a relation. The problem, therefore, consists in determining what kind of relation it is.

II.2. *Indexicality as contiguity and causality*

Such a view of indexicality as the one reconstructed above best fits in with the most general formulations given by Peirce, according to which it depends on there being a "real connection", an "existential relation", a "dynamical (including spatial) connection" and even, in one of its many conceivable senses, a "physical connection" between the items involved (Peirce 1.558; 1.196; 2:305; 3.361; 8.335). From this point, it seem natural to go on to argue that indexicality is involved with "spatiotemporal location" (Burks 1949:683ff), which underlies the "indices" of such logicians as Bar-Hillel and Montague,

the "egocentric particulars" of Russell and the "shifters" of Jespersen and Jakobson. In fact, however, as Savan (1976:25ff) observes, location in time and space will only result, to the extent that some system of co-ordinates has been conveyed by other types of signs – or, as I would add, to the extent that it can be presupposed by the ongoing practice of the ordinary world of our experience, the world taken for granted, our common Lifeworld.

More generally, many of the examples adduced by Peirce would justify us in going along with Jakobson (1979), when he claims that indexicality is based on "real contiguity", and is connected with the syntagmatic axis of language, and the rhetorical figures of metonymy. To Jakobson, however, metonymy actually involves, not only the relation of contiguity of traditional rhetoric, but also that of part to whole, known in rhetoric as synecdoche. This distinction may be re-established inside the category of indexicality (cf. Nöth 1975:20f), and could be described more generally in terms of *contiguity* and *factorality* (cf. Sonesson 1989a:40ff).

There is, however, another series of definitions which suggest that indexicality is, is some way, dependant on there being a relation of causality between the expression and content of the potential sign: that is, the index supposedly "denotes by virtue of being really affected by that object" (2.248). Apart from this, Peirce also makes a number of other claims about indices, many of which are repeated by Dubois (1983: 48f, 60ff) when trying to demonstrate that photographs are indices: that they refer to unique, singular objects (2.283); that they testify to the existence of its object (2.316); that they show up the object without asserting anything about it (3.361); and that they point, by "blind compulsion", to the object of reference (2.306).

Although the definition by *causality* is probably the most commonly quoted of all the definitions Peirce offers of indexicality, it has come in for serious criticism. Some commentators would reject the relation between causality and indexicality altogether, while others would see it as being merely coincidental. Burks (1949:649ff) takes Peirce to task for confusing the semiotic relation with mere causality, when treating, for instance, the weathercock, which is causally affected by the wind, as an instance of indexical signs: it is not clear, however, why causality should preclude indexicality, since the fact of the wind causing the weathercock to turn must be seen by the observer to be a contiguity in order for it to receive an interpretation.

More to the point, Goudge (1965:55) claims that not all examples of indexical signs given be Peirce are susceptible of receiving a causal explanation: the Pole Star, for instance, may be an index of the north celestial pole, but it is in no way caused by that astronomical location. Nor is a personal pronoun, or even a pointing finger, as I have argued elsewhere (Sonesson 1989a:39), actually caused by the person or thing for which it stands; and if they may be said to motivate it, then this is also true of all other signs. Moreover, if could be added that even some cases which are often taken to confirm the causal explanation are actually doubtful: the causal agent may not be that which is signified, or may not signify in the same respect in which it is the cause. Of all the innumerable causes that have to concur in order for a rap on the door to occur at a particular moment, the door and the material of which it is made, and a particular person and his moving hand may seem to be the most important. However, if, at this moment, no person in particular is expected, the sign will only carry some very general meaning such as "there is somebody (probably a human being) outside the door who wants me to open it and let him in". Neither the

particular person, nor his hand or the door, which are the causal agencies, are here parts of the meaning of the sign (Sonesson 1989a:39).

The idea that indices must point to their object by "blind compulsion" could be taken as a special case of causality, this time applied to the interpreter, and thus more properly described as motivation. Greenlee (1973:86) believes this to constitute a contradiction on the part of Peirce, since the interpreting mind is on the level of Thirdness, and thus lies outside the definition of indices, which derives from Secondness. It seems, however, that the contradiction, if there is one, should be located at another point, for already the "immediate object" must (perhaps contrary to the "dynamical object") be a mental unit. There is certainly an extremely Pickwickian sense in which all indices force us to attend to their objects, but in that sense the observation applies to all signs, and even to other kinds of meaning.

II.3. On some secondary properties of indices

It is true not only about causality, but also about several other secondary properties, which Peirce attributes to indices, and which are transferred by Dubois to photographs, that they do not seem to apply to all signs which we would like to qualify as indices. Here the importance of what may be called the structural argument comes to the fore: if we are going to exhaust the domain of signs admitting only three kinds of relationships, neither causality nor singularity can be defining characters of indexicality.

Indeed, it is also part of the claim made by Peirce (2.306) that all indices refer to a *singular instance,* not to some general category. Objections to this generalisation easily present themselves. From the size of an imprint left on the ground it may be possible for the interpreter to determine that the animal which has passed by is a horse, rather than a donkey, but normally there would be nothing in the expression of this index itself permitting him to determine the identity of the horse in question, although, if he knows that there is only one horse and one donkey inside the fence, he can draw a plausible conclusion as to which individual animal is involved. It might be argued, of course, that in any case, only one, particular, animal left the imprint; but the case is quite similar to the knock at the door, where, although a particular person must be doing the knocking, the knock itself merely means "there is someone on the door", unless we possess some additional information. The same argument may be applied to the photograph, in particular to the photogram, in which the referent would not normally be recognisable (cf. Sonesson 1989b:59ff).

Goudge (1965: 60f) also argues against this generalisation, quoting the case in which a demonstrative pronoun ("that") refers to Newton's First Law, which as such, is not a singularity. Outside the linguistic domain, other interesting examples can be found. According to Peirce, the rolling gait of a man is an index of his being a sailor: but being a sailor is a social role, not a singularity. More importantly, however, the gait is part of a social habitus defining this role, which makes it into a part of a whole (a factorality). But if the relationship of a property to that of which it is a part is indexical, then it is reasonable to think that indexicality will also account for the relation between an item and the class of which it is a member. Such examples are apparently not among those mentioned by Peirce, but they are often cited by later semioticians: thus, for instance, if a pretzel is an index of a bakery (cf. Norrick 1983:230f), than that must be in virtue of its

being a member of the class of products sold in the bakery. A class is of course not a singular object, but it may be considered a collection of objects. Often, however, such a class is itself determined by abstract properties. A tailor's swatch, for instance, is a sign of a class of cloth having the same quality and pattern, but not the same shape or size. Some samples, for instance colour samples, may even be indices of abstract properties themselves (Sonesson 1989a:43ff, 137ff; 1989b: 60f).

In order to consider whether indices demonstrates the *existence* of their object, it might be necessary first to discuss the meaning of existence (cf. Goudge 1965:58ff). However, if existence is taken to imply the physical occurrence in the ordinary world of our experience, it does not seem to apply to all indices, not, for instance, to the cases considered above, in connection with singularity. A person having the rolling gait of a sailor may, in fact, not be a sailor; and the pretzel hung out above the bakery (admittedly an icon of an index) is still to be seen when the bakery is closed, and no bakery products are for sale. Plausible indices of a unicorn may be produced using a set of horse-shoes and a bull's horn, and do not testify to the existence of unicorns. A faked photograph of a unicorn, or whatever, may be assembled, using pieces of real photographs, processing them in a computer, or even creating them entirely by means of a computer program. Of course, the latter pictures are no photographs, and so no indices, but there is no way we can discover that from looking at them (cf. Sonesson 1989b:61f). For all practical purposes, then, indices cannot testify to the existence of their objects.

All indexical relations involve either *contiguity* or *factorality*. Those indexicalities which are not as yet signs, being based on items which are not situated on different levels of directness or thematisation, or not clearly differentiated, may be described as contexts (or "pairings", in Husserl's sense). Any experience of two elements being related by proximity, conceived as a primordial perceptual fact may be considered an *actual perceptual context* involving contiguity. A actual perceptual context involving factorality is any experience of something as being a part of a whole, or as being a whole having parts (cf. Sonesson 1989a,I.2.5).

When only one of the items is directly given, and the other precedes it in time, or follows it, we may speak of an *abductive context* (protention and retention, respectively). The term abduction is employed here in Peirce's sense, to signify a general rule or regularity which is taken for granted and which links one singular fact with another. As opposed to deduction and induction, abduction (or "hypothesis" as Peirce first called it) "is where we find some very curious circumstance, which would be explained by the supposition that is was a case of a certain general rule, and therefore adopt that supposition" (2.624). All experience taking place in time is of this kind, for instance our expectancy, when seeing the wood-cutter with the axe raised over his head, that on the following moment, he is going to hit the piece of wood (contiguity protention), and that on the moment just preceding he lifted the axe to its present position (contiguity retention). Indeed, Peirce's principle is known quite independently in perceptual psychology as the theory that perception consists in hypothesis-testing (cf. Sonesson 1989a, 30ff, 251ff).

Abductive contexts involving factorality would be, using in part some Peircean examples, the gait of the sailor, the symptom as part of the disease, part and whole in a picture, the partly destroyed Minoan fresco, a jig-saw puzzle, a piece of torn paper (the last three examples combine factorality and contiguity). We may use the term proto-index for an indexicality which is only momentarily a sign, as would be the "tableau vivant" of the

wood-cutter, the photographic pose (which is a limitation in time), that what is seen in the view-finder (with spatial limits), and indeed many of the examples given above, to the extent that the flow of indexicalities is momentarily halted.

III. The limits of indexicalism in the semiotics of photography

So far, we have been trying to determine the meaning of indexicality, not only from a discussion of "what Peirce really meant", but also by assimilating latter-day insights from the psychology of perception, and by making use of the structure argument, which requires the Peircean icon, index, and symbol together to exhaust the domain of possible signs. On our way, we have encounter some problems posed to photographic indexicalism by some supposedly secondary properties of indices; now, however, we are at last ready to discuss to what extent indexicality is the fundamentally determining property of photography.

III.1 Photographic indexicality as abrasion

When photographs are said to be indexical, it is contiguity, not factorality, which is meant, and a particular kind of contiguity at that: *abrasion,* i.e. the particular indexical relationship resulting from the fact that the object which is to become the referent has, on some prior moment of time, entered into contact with, and then detached itself from, what later is to become the expression plane of the sign, leaving on the surface of the latter some visible trace, however inconspicuous, of the event (cf. Sonesson 1989a,40; 1989b:46ff). In fact, as Vanlier (1983:15) notes, the photograph must be taken as a direct and certain imprint of the photons, i.e. of the light coming from the objects depicted, and only as an indirect and abstract one of the objects themselves. Unfortunately, Vanlier (1983:23, 25) himself rapidly seems to forget this distinction, talking about the scene as being the cause of the picture. In any case, he fails to note that, if the indexicality obtains between the photons and the plate, *it does not occur between the same relata as the semiotic function,* i.e. the objects depicted and the picture. Dubois (1983:66) at least is more consistent with his conception of the photograph as being an index when he takes the photogram to be its most characteristic instance; yet, if this is the kind of photograph he is intent on explaining, he will fail to characterise what most people would consider prototypical photography.

Certain limitations are imposed on the photographic trace by the support on which it is inscribed. Some of these are mentioned by Vanlier: the quadrangular shape of the photograph, its digital nature, the information it leaves out, its inability to record the temporal aspects of the process giving rise to the trace, etc. This may be restated by saying that the photograph is not only an indexicality of the objects, or even the photons, but also of the properties of the film, of the lenses, of the photographic device generally, of the space covered by the photons, and so on. This observation is quite parallel to the one made in the study of animal traces, according to which the same animal will leave different traces on different ground. For instance, Ennion & Tinnbergen (1967.16) will tell us that while the adder "'swims' on land like an eel in water" on most kinds of ground, leaving one kind of pattern behind, its way of advancing on flat sand produces a series of ridges at an oblique angle to the direction of the trail, quite different from the earlier pattern. This means that the same object, and the same proper part or noema of the object, will produce different imprints on different grounds – and indeed, the "acoustic picture" and the thermogram of the hand have little in common with a regular picture of

the same hand. That is, the footprint left on the ground is not really a direct result of the foot going by, but of the interaction of the foot with the ground.

The trouble with a purely indexicalist account of photography is that it cannot explain *what the photograph is a picture of*. There is no intrinsic reasons for considering the cause producing a trace (and even so, we have seen than many more causes than the motif may be held responsible for the trace) to be a more important type of cause than the others. Indeed, we can only explain the importance of the motif, when we realise that a trace, in the most central sense of the term, contains not only indexical but also iconical aspects, and if we begin by admitting that a photograph is a kind of pictorial sign, and that all such signs are first and foremost grounded in the illusion of similarity. As we noted when discussing "hard icons", the point is that the iconical and the indexical relations must obtain between the same relata (which they only do indirectly in the case of photography), but this relationship can only be recognised by starting out from the iconical ground.

Contrary to Vanlier and Dubois, Schaeffer (1987:101ff) thinks that the photograph may be an indexical icon in some cases, and, in other cases, an iconical index. He thus gives the impression of being less rigid than Vanlier and Dubois in his indexicalism, which may explain that both Carani (199) and Caivano (199) take a favourable view of his theory. It could be argued, however, that the photograph, contrary, for example, to a hoof-print, is always primarily an icon (Sonesson 1989b:68ff). While both the photograph and the hoof-print stand for a referent which has vanished from the scene, the signifier of the former sign continues to occupy the place that was that of the referent, and it stills remains temporally dated, whereas the photographic signifier, like that of the verbal sign, is omni-temporal and omni-spatial, tokens of its type being apt to be instantiated at any time and place (although only *after* the referential event and the time needed for development). In sum, in the case of a footstep, a hoof-print, etc., both the expression and the content are located at a particular time and place; in verbal language, none of them are; and in the case of photography, it is only the content (or, strictly speaking, the referent) which is bound up with spatio-temporality. Thus, the hoof-prints, present where before the horse was present, tells us something like "horse here before"; but the photograph of a horse, which most likely does not occupy the scene where the horse was before, only tells us "horse", and *then* we may start reconstructing the time and the place .

At this point, it may seem that we could say that, whereas the hoof-print is first and foremost an index, the photograph must originally be seen as an icon, before its indexical properties can be discovered. In fact, however, things may be still more complicated. Schaeffer is of course right in pointing out, against Peirce, that not all indices involve some iconic aspect, but it so happens that the hoof-prints, just like all other imprints and traces, in the narrow sense of these terms, also convey a partial similarity with the objects for which they stand. We have to recognise the hoof-print as such, that is, differentiate if from the traces of a man's feet, or of a donkey's, a well as from fake hoof-prints, and from accidental formations worked by the wind in the sand. Only then can we interpret the hoof-prints indexically. It remains true, however, that the essential meanings of the hoof-prints are embodied in indexicality: they tell us the whereabouts of the animal.

In the case of a photograph, on the other hand, we do not need to conceive of it indexically to be able to grasp its meaning. It will continue to convey signification to us, whether we are certain that it is a photograph or not. Indexicality, in photographs, really is

a question of second thoughts and peculiar circumstances. Thus, the relation between the pictorial surface and the referent no doubt functions as a sign relation when a spy tries to discover secret military constructions in an aerial photograph or when a photograph is used to decide who, among a number of runners, won the competition; but the same photographs may be taken as pictures in their own right, without thematising the indexical relation. Though photographic indexicality is an indexicality of light, it is most of the time no more central to the interpretation of photographs than the indexicality of drawings. It therefore appears that indexicality cannot be the primary sign relation of photographs, although it is an open potentiality present in their constitution, which is exploited in certain cases. First and foremost, the photograph is an iconical sign.

What I have been discussing here is whatever, of indexicality or iconicity, is the *dominant,* in the sense of the Prague school, of the photographic sign: that feature of the photographic structure which does not only gain the upper hand in the structure of the sign, but also organises all other features for its purpose. This is not to deny that, at different levels of organisation, the photograph contains indexical, iconic and symbolic sub-signs. I am thus in perfect agreement with Caivano (1999), when he argues that different properties of the photograph may be indexical, iconic or symbolic (as Carani, 1999 also seems to suggest); indeed, in my earlier work, I have affirmed that features such as indexicality and iconicity are properties, not of signs, but of parts or portions of signs (cf. Sonesson 1995c; 1998b; 1999a). On the whole, I also find Caivano's examples convincing, but it do not think they fit in with the terms, as these are interpreted by Peirce and, in particular, by the indexicalists within the semiotics of photography. While Caivano's use of the Peircean terms may thus be criticised, he does point to some interesting differences between visual properties conveyed in pictures.

According to Caivano, colours are indexical, because they "share physical properties with the objects", but this is the Peircean definition of iconicity, not of indexicality. In fact, there is no more contiguity or causality between these properties than between the others which are found in the picture and the depicted world alike. Cesia, i.e. the distribution of light, and shape, on the other hand, are said to be iconical, because topological transformations account for the way the real-world objects are represented in the pictures: thus, for instance, a glass which is a transparent object may be represented in a photograph which is itself opaque. Similarly, visual textures are said to be indexical and tactile texture iconical, because the former but not the latter are identical in the picture and in the real world. Movement, finally, is said to be represented symbolically, in Peirce's sense, which, here again, is taken to signify "conventionally".

There is a conceptual zone where indexicality and iconicity appear to blend into each other. Indexicality as factorality involves properties which are part of the same whole: one part may suggest another part or it may point to the whole itself. This is was has been called *exemplification* (by Goodman 1968), which clearly seems to be indexical. We may thus imagine a whole consisting of colour properties, of which both one instance of red present in the real world and another instance of red present in the picture are members – and iconicity seems to have be reduced to indexicality.

On the face of it, this line of reasoning seems to be valid. But this is not the kind of indexicality with which the indexicalists in the semiotics of photography are concerned. And, in any case, if we follow this line of reasoning, one may well wonder in what sense we would still have some kind of iconicity which may be opposed to this iconicity

reduced to indexicality. Perhaps Caivano is concerned with iconicity which is real as opposed to iconicity which is only an impression derived form more abstract relationships. Differently put, what is at stake is iconicity as identity and as similarity, where the latter, as I noted above (in the discussion of grounds, II.1), is defined by a similitude on the background of a fundamental alterity.

The "symbolicity" which Caivano finds in the way photographs signify movements also seems to me to be problematic. The signs of movements described by Caivano are clearly the result of moving objects affecting the photographic emulsion through the photons they emit while in the process of movement; that is, they have been indexically produced. This means, of course, that these effects are indices not only of the presence of the objects, but also of their movements, of the fixity of the camera, of the shutter speed, the inexpertness of the photographer, and so on. This observations also applies to the kind of "chronotopic anamorphosis" discussed by Machado (1999), at least to the extent that the effect is involuntary, as is might have been in the case of Lartigue. Indeed, in one way or another, as Gubern (1999) clearly implies, everything in the photograph is actually indexical: it may even by indexical of the choices made by the photographer.

III.2. *Global and local systems of mapping*

In Dubois' history of photographic semiotics, Barthes appears as a proponent of the iconic conception, because of having opposed the conventional, historically relative, and learned character of drawing to the "quasi-tautological" nature which photographic expression shows in relation to its content. His claim to be a vindicator of the symbol view probably rests on his listing of photographic "connotations". And he is considered a pioneer for the index theory for the reason that he has described each photograph as implying that "this has taken place" ("cela a été"). In fact, also Peirce may be considered an authority for all conceptions: he sometimes tells us the photograph is an index, sometimes an icon, and elsewhere he observes that all real icons are somewhat conventional.

Actually, Barthes' (1964) defence for the iconicity view may not be as naive as has lately been claimed. It could be interpreted as the theory that drawing, but not photography, requires there to be a set of rules for mapping perceptual experience onto marks made with a pen on paper; and these rules imply a particular segmentation of the world as it is given to perception, picking up some (kinds of?) features for reproduction, while rejecting others, and perhaps emphasising some properties at the same time as others are underplayed; and all this takes place under given historical circumstances, which are responsible for varying the emphases and the exclusions. Against this, it might be argued that Renaissance perspective, and a lot of other principles of rendering, are built into the camera: but the point is precisely that they are incorporated into the apparatus, and thus not present to consciousness in the actual process of picture production.

The idea becomes more reasonable when expressed as a difference between the *types of mapping rules* involved in photography and hand-made pictures, respectively. If we look upon the relationship between the pictorial content and its referent in the outside world as a kind of indexicality, more in particular as a *factorality* (a relation of part to whole), we may interpret Barthes to claim that photography is able to pick up particular proper parts ("son sujet", "son cadre") and perceptual angles of vision ("son angle") of the whole motive, but cannot chose to render just a few of its attributes. In some all too obvious ways this is false: for essential reasons, photography only transmits visual properties, and

it only conveys such features as are present on the sides of the object fronting the camera. Also, depending on the distance between the camera and the motive, only features contained in a particular range of sizes may be included.

As long as no trick photography is involved, however, it seems to be true that, without recurring to later modification of the exposed material, *photography is merely able to pick up features, or restrict its selection of features, on the global level,* whereas in drawing, local decisions can be made for each single feature (cf. Sonesson 1989b:36ff; Dubois 1983:96f). This also applies to all other rules of photographic transposition listed by Ramírez (1981: 158ff) and Gubern (1974:50ff): abolition of the third dimension, the delimitation of space through the frame, the exclusion of movement, mono-focal and static vision, granular, discontinuous structure of the expression plane, abolition or distortion of colour, limitation to scenes having a certain range of luminosity, and abolition of non-visual stimuli. These properties may also be redistributed into the categories of colour, cesia, shape, texture, and movement, listed by Caivano (1999).

This throws some light on the curious cases of the physionotrace and the like. In all these cases, there is similarity and contiguity between the expression and the referent, and although the contiguity is mediated, the same is true, as we have seen, about photography. However, in the camera obscura and in the silhouette-making device, the step from the light pattern to the tracing is not mechanically determined but the decision to have the second correspond to the first is a free act of will. Similarly, in the physionotrace, the decision to follow the contours of the object with the view-finder is a free act, even if all the rest follows mechanically. In the camera, on the other hand, the whole decision system is supposedly mechanically implemented, and that is what constitutes the decisive guarantee of authenticity..

At this point, computer-generated pictures again seems to pose a problem. In some rather indirect way, contiguity may be said to play a role in the creation of certain computer images: the computer mouse, and even more clearly the digitalisation board, are clearly hand-held devices leaving a record on a surface, although this surface is not directly the monitor, and even less the print-out. Even though the very notion of a surface seems doubtful in this case, it is certainly true that by moving the mouse, we bring about a record of some kind of abrasion, which may even be accidentally produced by a toddler or a cat more interested in the movement for movement's sake. The abrasion is not caused by physical pressure (apart from the first phase in which the hand grasps the mouse and presses it to the desktop) or by light, but by electronic impulses.

However, pictures produced, not by means of a mouse or some other hand-held device, but created entirely or in part by mathematical algorithms do not seem to involve indexicality in any essential way. On the other hand, 3D-scanners do not only rely entirely on indexicality, but also supposes a coincidence of the indexical ground and the sign function, in a way which is reminiscent of photography, and perhaps even more of the physionotrace.

As for the indexical relation of factorality between referent and content in computer images, it seems to be identical to that of truly chirographic, rather than photographic, pictures: continuity is suggested by what we know of the connections obtaining in our socio-cultural Lifeworld, not by the acquaintance with some individual object of real-life experience (as is the case of the "indexicality" which Caivano 1999 finds in

post-photography). Yet the photographic connotations conveyed by some computer images tend to suggest that some real-world objects have been present around, as well as in front of, the camera.

III.3. The web of causality and intentionality

In one way, Schaeffer is a more radical indexicalist than his fellow propagandists: he believes that by declaring the photography indexical, and identifying indexicality with causality, he can completely do away with the intentions of the photographers.. To show this he quotes the extreme case of a camera having been rigged up in front of the finishing-line, in such a way that it is automatically triggered off when the horses cross the line. The photograph is somehow produced without any intervening human agent. To my mind, Schaeffer's argument does not show what he claims it to do. In fact, by rigging up the camera in this particular place, by directing the objective in a particular direction, and by installing some mechanism which triggers off the camera when the horses cross the finishing-line, someone has certainly given expression to a set of intentions – even if we might want to call them *remote intentions*. This also applies to the case of a camera mounted on some vehicle sent up by a rocket to Mars, in order to take photographs of the surface. Here even the direction in which the pictures are taken at a particular moment may not be determined by any human agent at the time, but still there must have been someone who had an intention when constructing the device and sending it to Mars. On the other hand, it is true that, for most purposes, we may ignore the intentions of the photographers, just as we may ignore the causes of the some objects having been imprinted on the photographic emulsion, except in cases such as the photograph of the finishing-line, and the spy photograph.

As far as intentionality is concerned, a strong opposition is often made between drawings and photographs, traditionally and, more recently, both in semiotic theory and in pragmatics. When discussing the other's contribution to our knowledge about ourselves, Bakhtin (1990:34ff) claims that a painted portrait, but not a photograph, gives us the point of view of another person on ourselves. It will be noted that, to Bakhtin, a picture, just like a literary work of art, consists in a object (a referent) and a point of view taken on it (his "intonation" or "accentuation"). This is similar to the way I once described picture depiction, as consisting of a picture and a commentary on it, only that the picture itself is now further analysed into two parts (cf. Sonesson 1994d). But Bakhtin clearly denies that a photograph can be analysed in this way: it is purely material, it is nobody's point of view. This concords with the conception defended by Barthes, who claims the relationship between signifier and signified in the photograph is "tautological", as well as with the indexicalist view of photographs, as defended, for example, by Schaeffer. But we have seen that the photograph actually supposes some rules for transforming perceptual appearances into pictorial surfaces, which are of course partly built into the camera, but also in part determined by the position taken by the photographer, the adjustments he makes, and so on. The real difference consists in the *global* character of the photographic mapping rules, as opposed to the many *local* decisions on which a chirographic (hand-made) pictures depends. This is like saying that each detail of the chirographic pictures has its point of view, whereas only the photograph in its entirety embodies a point of view.

In a similar vein, Grice (1989: 218) opposes the case in which he shows somebody a photograph of the latter's wife in an adulterous relation to another man, and the case in

which he shows him the same situation in a drawing. It is only in the latter case that Grice would like to say that he means something, for the photograph would produce the same effect, he thinks, if the husband found it in the room by accident. Grice's argument obviously depends on his idea that an intention to communicate something must be recognised for meaning to exist; but for our purposes we may transform this into the theses that a drawing, but not a photograph, would justify us in attributing an intention to the one producing it, while the photograph would only justify us in assigning a cause to the photograph showing the relevant scene. We must of course ignore the possibility of the picture looking like a photograph really being a document created by a graphics program. Still, it seems to me that the difference is not as clear-cut as Grice would have it. Even if the husband found a drawing, instead of a photograph, of his wife in an adulterous situation laying around, he would most likely be worried: for there must probably have been some "cause", in the widest sense of the term, for the draughtsman choosing to illustrate the scene in question, one of which could have been his having observed it.

Grice's example is special, because it concerns the interpretation of the situation conveyed by the sign, the referent, to the exclusion of the sign itself. So it may be worth-while to ask ourselves how we would separate the parts of intention and causality in a sign which is considered for itself, such as a work of art. In the case of an amateur photograph, the fact that many of the objects represented are cut off by the margins of the picture would normally be considered something unintentional, in fact, something caused by the limited expertise of the photographer. But in Cartier-Bresson's works, this aspect is essential for defining his peculiar style of photography "in flagrante delicto". One reason for this is that we have already interpreted Cartier-Bresson's photographs as works of art. Another reason may be the consistency with which these features are repeated from one work to another by the same photographer (but, again, that may also be true of some amateurs). Yet another reason, however, may be that Cartier-Bresson has declared his intentions by others means.

Pragmatists like Grice claim that speaker's intention is part of that which must be grasped by anyone wanting to understand a given utterance. Rephrased in semiotic terms, that amounts to the postulate that intention (or whatever is the carrier of intention) is part of the *expression* plane of the sign. That is, according to this conception, to understand that an expression E means C, it is not sufficient to recognise that E, according to a system of interpretation, stands for C, but it is necessary to grasp that there is somebody S, who has the intention I, to signify C (or C_1, etc.) when using E, and so on. Against this conception, I have argued that intention must instead be understood as part of the content of some semiotical system, such as verbal language; more precisely it is part of what Hjelmslev calls the connotation of the sign, i.e., meaning which follows from the speaker having chosen one expression instead of another possible one for a certain content, or one variety rather than another of the expression (cf. Sonesson 1999b; Sonesson 1989a:179ff). It is simply part of our conventions or habits to attribute intention to visual shapes which resemble letters, as well as to sounds which resemble phonemes. On the contrary, certain others signs, such a gestures (with some exceptions) are normally taken to be non-intentional signs.

To understand that an expression E means C, we only have to recognise that E, according to a system of interpretation, stands for (denotes) C; if, in addition, we recognise that E/C

is part of (connotes) verbal language, which is a semiotic system the instances of which we, in the ordinary course of events, take to be produced by (more or less) conscious and goal-directed agents, we will think that the reason for E having been produced at this particular time, is that an agent A wants to convey to us C, as well as his intention to convey C to us, and so on.

From what has been said about photographs and drawings above, it should be clear that this view, as it has been presented so far, is too simple. It is certainly not true that semiotic systems can be distinguished into those the realisations of which are interpreted as intentional, and those that are not: rather, we should say that different schemes of interpretation allow for intentions to be attributed at more or less low levels of configurational structure; and that they may require the intentionality to be assigned at more or less remote stages of choice. In verbal language, we would normally not take obligatory grammatical concord to be something which is intended by the speaker. So there is a point in the structure of language where intentionality ceases to be attributed as a matter of course. Levinson (1983: 11) asks in what sense the one who says "Je suis malheureuse" could be said to intend to communicate that she is female. This intentionality could of course be attributed to the speaker, to the extent that she has "taken charge of" the rules of the French languages; it would be a remote intentionality. Such an attribution would make more sense if there were a possible choice between dialects. It would also make more sense, in the case of a man using the phrase, in order to construct for himself a female personality. .

When we recognise something as being a photograph or a drawing, this means that we have been able to assign it to a particular scheme of interpretation which may often be enough to determine the part of causality and intentionality involved, how deeply enmeshed they are in the structure of the signs, as well as their degree of remoteness. Sometimes, of course, additional information (which is to say further schemes of interpretation) may be necessary to determine the particular intricacy of structure, and the remoteness of history, at which we are allowed to attribute intention and causality. But it is precisely such schemes of interpretation which seems to become invalid with the advent of the computer picture.

IV. Beyond photography – and beyond the picture sign

As a picture, the computer picture already has something paradoxical to it: for where is the surface of the picture? We said, with Gibson, that the picture is a surface provided with marks. When it has been printed out, also the computer picture is such a surface, that is to say, a sheet of paper, just as a drawing or certain paintings, and the marks are carbon or ink spots produced by the print head, while the picture shown on the screen of the computer is a shadow projection, similar to the video picture, and not so different from the slide or the projection of the magical lantern. But where is the picture and which is its surface when it is not on the screen and has not been printed out? Or in other words (and we will return to this), where is the original of which both the print-out and the picture on the screen are copies?

IV.1. In search of a surface

The problem which emerges from the confrontation between the computer picture and the definition of the picture due to Gibson is encountered by Gubern (1987a: 83s) in another

way. Before the era of the computer, he affirms, the picture demanded a smooth and hard surface on which the message was permanently inscribed by hand or by chemical means. This was true of the painting, the engraving, the photograph and the film, but it does no more apply to the video picture and the computer picture. The film and the slide already imply a disassociation between picture and the surface on which it is stored, but in these cases, the picture that is projected onto the screen is similar (isomorphous) to that which is graphically inscribed on the surface; they are different only in size. Both in the case of the video picture and the computer picture, however, this optical isomorphism between the surface and the projected picture is lacking.

The slide is actually an evasive surface (and so is also, in a way, the mirror, discussed by Eco 1984: 202ff; 1988: 11ff, and the surface of the water, from which Gubern takes his point of departure). On the one hand, there is the celluloid surface, treated with chemical processes, which contains sediments of different pigments. On the other hand, there is the white screen, on which shadows are projected. The screen as such is as little isomorphous with what it shows as the video picture (as is Eco's mirror), just as "erasable" — and yet it is the place of our picture perception. The surface that is concrete and (relatively) permanent, that is, the slide which is inserted into the projector, is not the surface where the picture appears for the perception. In fact, already from the slide onwards a process begins that is completed in the television picture and the computer; which results in a closer similarity of the process of meaning of the picture to the classical model of communication according to which a message is sent at a determinate time and place in order to be received at a determinate place and time. This model is not easy to apply to the fresco painting which during centuries awaits its spectators in the same place, or the canvas which for ever is suspended on the wall of the museum or the living room. Like the linguistic message, the video and the computer picture are manifested at a particular, rapidly passing, moment, in a certain place (cf. Sonesson 1992 and 1995b).

As always, the sign only exists when it is perceived. But in the case of the computer picture, neither does the picture remain waiting for us somewhere else in a perceivable format. Like the genie of bottle, it must be conjured up whenever we want to perceive it.

In spite of Gubern's identification between the video picture and the computer picture, the question arises whether the first does not have a relatively more concrete character. Whenever we put a video film into the video cassette recorder the same film is shown, in (more or less) the same way. But the computer picture can be shown on the screen as well as by means of the printer. One may also produce a "document" in the computer, which then is copied to another "document" and with insignificant changes becomes another picture original. The first document may have been the base for one long series of print-outs, but it is then perhaps thrown away, when the modified original is printed out in a new series. The limit between the copy and the original is strangely indeterminate. The surface of the computer picture is more evasive than all the others. Which is the picture itself? Which is the original? Perhaps we would like to identify the original with that which we see on the screen; however, it is possible to connect several monitors to a computer, and so see manifold versions of the same picture at different places. In fact, these monitors may be located several places in the world of our experience, which are world-wide a part, which is what happens all the time on the World Wide Web.

The answer to the question where the picture is can only be given within the framework of a particular social practice. The reality of the slide is in the projection of the picture,

because a social practice exists for which the celluloid picture is only a means and the projection on the screen is an objective. If the utopia of the paperless office had been realised, the picture without a surface could also have existed. The picture on the screen would have been the closest one could come to the real picture which was also possible to perceive. In the world defined by the present social practice, the true computer picture is the print-out. Or rather, it is the immaterial type that is defined by the class of all the print-outs.

IV.2. Temporally free and temporally bound types

It is a fundamental thought of the cultural semiotics of the Tartu school that the accumulation of information as well as of merchandise precede their interchange and is a more elementary and more fundamental characteristic of a culture (cf. Sonesson 1997b). According to Lotman, material objects and information are similar to each other, and differ from other phenomena, in two ways: they are possible to accumulate, whereas for example, sleep and breathing cannot be accumulated, and they are not absorbed completely into the organism, unlike food, but they remain separate objects after the reception. Here Lotman seems to treat the sign as pure information, perhaps because he thinks mainly about verbal texts, where the material base is extremely changeable. On the contrary, a picture is as much a material object as information, as much an artefact as an object of perception. This is why we can accumulate pictures in a double sense: as material things, in the safe-deposit box of a bank, or like experiences in the mind. In both senses they maintain a certain distance with respect to the body. Nevertheless, in our time of digital reproduction of pictures this is no longer self-evident.

Some of the characteristics that Lotman attributes to information brings to memory those which are mentioned by Masuda (1980), one of the first propagandists of the information society: information is not consumable, no matter how much it is used, but it can be transferred to a new place without disappearing from the point of origin; it is not accumulated if it is not used as is the case of material goods but, on the contrary, by being used increasingly and being integrated with other information. Against Masuda as much as against Lotman it is possible to object that information must be incarnated in some type of material substance, quite apart from the fact that all access to the information depends on some material apparatuses called computers, hard discs and compact disc player. In the world of ideas the content of a book exists indefinitely; but in reality, it evaporates with the last paper copy which moulders away or the last person that dies or forgets the content. Also computerised information is dependant on the wear of the units of storage such as compact discs and hard discs.

In this sense all information goods are temporarily limited — even though some limitations can be of relatively long duration. Roland Posner (1989) distinguishes two types of artefacts: the transitory ones (as the sound of a woman's high heeled shoes against the pavement) and enduring ones (as the prints that the woman's shoes may leave in clay, in particular if the latter is later dried). The transitory artefacts, in this sense, also have a material aspect, just as the lasting ones; they only have the particularity of developing in the time, which is why they cannot be accumulated without first being converted. If we except the case of the animated sequences, the computer picture must be considered as a lasting artefact; although it is very easy to go from one variant to another. At the same time, the computerised picture does not have the tangibility that we expect to find in an enduring artefact..

Normally, it is Posner's transitory artefacts whose development in time causes them to seem somehow "less" material (which is of course nonsense but must be taken seriously in the Lifeworld). It is easy to understand that thinkers of the Enlightenment like Diderot and Lessing could conceive of language (which they tended to imagine in its spoken form) a "more subtle material" than the picture that endures in time (at least until air is let into the prehistoric caverns or car exhaust is allowed to devastate the frescoes of a later time). But although it is not normally a temporal artefact, the computer picture seems to be "subtle" enough. Harold Innes (1950) differentiated all cultures according as they emphasised more enduring storage media which were difficult to transport, such as stone tablets, or media which were less enduring, but easier to transport like the papyrus – in other words, according to the relative emphasis the cultures put on the aspect of accumulation and transport, in the sense of Lotman. In a similar way, Metz (1990) has claimed that a photograph, but not a film, could become a fetishist object, in the Freudian sense, precisely because the former has more of a material character (cf.. also Sonesson 1995a). In this sense, the computer picture is completely exempt of any risk of fetishism; it favours the aspects of both accumulation and transport.

The difference between type and exemplar is described by Peirce by means of the terms "type" and "token" (or "replica"). In the previous phrase, for example, the word "and" appears once, considered as a type, but twice considered as a token. The letter "t" is also one type only, at the same time that only in the first sentence of the paragraph there appears eight tokens of it. This reasoning is easily extended to other systems of meaning; a reproduction of Leonardo's Mona Lisa is of the same type as another reproduction, but they constitute two exemplars or tokens of those which exist. Considered as a totality, this article is a single type, but it will appear in as many tokens as this revue is printed.

Yet it is not evident that the relation between type and token always is of the same kind. It seems reasonable to say that a painting first must be made in one exemplar before existing as a type; the first exemplar serves to establish the type, from which then further exemplars can be derived. In the same way, the first exemplar of an articles must be written by the author, before a type is established, that plays the role of a directive guideline for the different exemplars that are later created. In the case of phonemes, words, musical notes and so on, the procedure is different: there is not a first "l" which only then creates the type which is then repeated. Certainly, it can be possible to determine when a phoneme, or in any case a word, was used for the first time, but normally this is not relevant for the native speaker. And to the extent that it becomes relevant, the typicality has changed its character.

We could speak of *temporarily bound* and *temporarily free* relations between type and token; in the first case, but not in the second, the type is established in time by means of the creation of a first exemplar (cf. Fig. 1-2, and Sonesson 1998a). It should be observed that this is another distinction than the one Goodman makes between *autographic* and *allographical* arts. Among the temporarily bound typicalities previously mentioned, the verbal text is allographic, whereas the visual work of art is traditionally autographic; in other words, the art work, but not the work of literature, is defined as to its identity as well as its value within our inherited social practice by means of its temporary association to the first exemplar created by a certain individual. This is why we do not have to queue up in front of the Stockholm National Library to read the only exemplar of "Röda Rummet" written by Strindberg, while a similar conduct is expected of us in the case of a work of visual art (cf. Marner 1997). The whole social hierarchy of values is relevant

here: the radicality of the first ready-made that Duchamp exhibited did not consist in treating a temporally free typicality as if it were a temporarily bound one. In fact, the-bottle dryer and the urinal also depend on typicalities which are temporarily bound. They are founded on a kind of prototype. The difference is to be found in the different values attributed to the first exemplar that creates the type in the production of the object of use and the work of art.
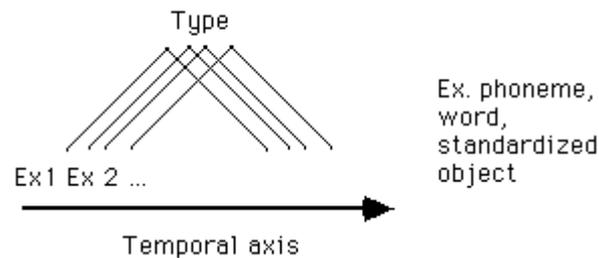

Fig. 1. Temporally free typicality

It would of course be wrong to compare the computer picture with verbal language in this sense: there is a sense in which the latter remains, like all pictures, a temporally bound typicality. In fact, the computer itself puts the date and hour on the picture at its moment of creation; but while we know when the picture was created, it is more difficult to know where it is. The evasive character of the first exemplar makes it particularly absurd to retain the autographic point of view in the case of the computer picture.
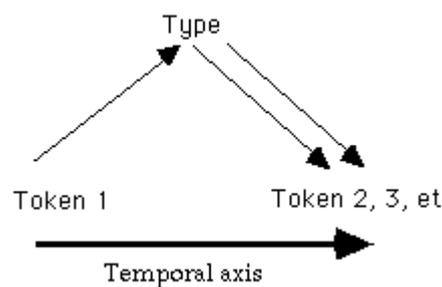

Fig. 2. Temporally bound typicality

When, in 1936, Walter Benjamin described our time as the age of mechanical reproduction, his diagnosis was not radical enough. By engendering ever new tokens, mechanical reproduction effectively reduces all tokens to their type, destroying the uniqueness of the characters of human history, and their infinitely ineffable creations, the nimbus of individual creation in its hic et nunc. Doing away with the "aura" of the work of art, it apparently only leaves the bare bones of categoricalness. Yet mechanical reproduction presupposes there to be an individual object to reproduce in the first place: a chirographic or photographic original, a first token which creates the type from which further tokens are derived. In verbal language, on the other hand, the type seemingly pre-exist to all its tokens, and this is also true, at least in some cases, of computer images: those which are combinations of standardised picture-elements, as well as those which are produced from mathematical algorithms (cf. also Gubern 1999).

IV.3. The ghost of the thing

The computer picture contains possibilities well beyond those of pixel and vector

graphics produced in ordinary graphics programs. The computers can produce pictures that without a doubt appears to be photographs — although the objects which they represent have never existed in the world of the senses (cf. Moles 1971: 54; 1981: 29, 226 ff.). The products of this so-called "picture synthesis" were a curiosity when Moles wrote about them, but they may now be made with any personal computer equipped with some kind of rendering software. Yet for us the results of those programs undoubtedly connote "photography" — and because of this they convey some kind of guarantee of reality, an appearance of reality.

Many paintings, both from the early days of photography (frequently painted with a photograph as an intermediary), and the hyperrealistic work of later times, have the appearance of photographic exactitude, but to a more diligent glance they are easily discovered to be paintings. These are paintings which connote photographicalness, but this false connotation is embedded into another one, which more truthfully connotes painting, similar to the way in which an imitation by a British speaker of the way an American speaks connotes Americanness but beyond this conveys the more truthful connotation of Britishness.

The same thing cannot be said about the synthetic picture. No matter how false its connotation of photographicalness is (and thus of the trueness to life), it is nevertheless completely without qualifications. Nothing, perhaps apart from some strange aspect of the objects depicted, seems to separate these pictures from true photography. However, it remains possible, as Moles (1971: 54; 1981: 29) points out, to construct the referent from its picture, thus making the picture true to life *post festum*.

Just as in the case of iconicity, it is the experience — this time of contiguity — which is fundamental, whereas the real contiguity, exactly as true similarity, may well be in doubt. The proximity is a part of the message and only secondly perhaps also one of its conditions of possibility. In the socially derived praxis of photogaphicalness, the photograph is a truth witness, and this function is transferred to the synthetic picture, whose plane of expression is indistinguishable from that of the photograph. And thus it may well continue to be until one day the synthetic picture becomes as common as the photograph; then we will be forced to abandon this more and more improbably presupposition of the existence of a previous relation of proximity between the motive and the picture. Or else we will have to discover more subtle qualities which allow us to separate the two picture categories.

When Barthes (1961; 1964) describes the photograph as a message without code, unlike drawing, he excludes the manipulations to which the picture may be subjected *a posteriori*. But in the case of the synthetic picture, there does not exist any such difference between an original moment of creation and the later process of manipulation; reality comes into being as the last step in the manipulation.

Nevertheless, there still remains the possibility of starting out from a photograph or even a painting, combing it with others, and modifying the shades and the extensions of the colours, eliminating undesired objects and drawing new ones in the process of copying. No real cuts or patches as in the old technique of collage will result; it will not be necessary to take new photographs of the cut-outs, as Max Ernst did, to erase the junctions. The manipulation can be completely imperceptible. When the recognition is anticipated, the very manipulation is transformed into the theme.

IV.4. In the territory of the sign

The possibilities of free variation of the computer picture seem to contradict its technographic character. The difficulty of locating the surface on which the marks are made which transform the surface into a picture makes the computer picture into something of a paradox. But there is also a type of picture produced by means of the computer that seems to be on the brink of losing its very sign character.

The hologram is already a problematic type of picture. Although it is often mentioned by semioticians, it has, as far as I know, never been analysed in relation to more classic forms of pictures. Unlike sculptures, dummies, wax figures, scarecrows, toys, etc. which are some kind of identity signs (cf. Sonesson 1989a, II.2.2.III.6 and 1992, III.1.M 1998c), the hologram is without a doubt a picture; it provides a surface where a real scene of perception is "seen in" or "perceptually imagined" (cf.. Sonesson 1989a, II.3.5.). The surface and the scene are at the same time present to perception, at the same time conscious, but experienced as excluding one another. On the contrary, the sculpture is an object by its own right that represents another object of which it lacks some characteristics. It is a solid object, whereas the hologram is made entirely out of light.

Consequently, the hologram is a picture. The difference is only that the illusion of the reality is much stronger, and that to some extent different perspectives on the same object are available according as the spectator moves around the picture, just as they are in true perceptual experience in the Lifeworld (Husserl's etc. principle; cf. Sonesson 1996; 1997a; 1999a). Nevertheless, the illusion of the reality is never total; the picture character — and with it the sign character — is always given in the perception at the same time as the depiction. This does not mean that a more refined holographic technique cannot make it possible in the future to cover up the picture character.

At present, it is possible to go much further with the aid of computers, at least in certain aspects. The synthesised picture can be presented in such a way that it makes up the totality of the (apparent) surrounding world perceived by a person. At the same time, this person has the possibility of moving around or of manipulating objects in the environment, and these movements lead immediately to changes in the pictures that are shown to him. This is possible because a number of perspectives on the synthesised object is available to the computer. In this way one is now able to visit the house one wants to build before it is constructed, to walk through the corridors and to enter rooms that do not yet exist, to try out the endurance of a staircase, the disposition of doors and windows, etc. In spite of its unequivocal picture character in the sense mentioned before, this so-called "virtual reality" shares many characteristics with the Lifeworld that forms the foundation for all signs. Husserl has observed that the perceptual worlds rests on the sensation that it is "always possible to go ahead"; to see objects from different angles, to come closer to the object in order to discover new characteristics, to investigate it in other circumstances. Virtual reality, just as the manifest world, has these characteristics.

IV.5. The perfect multimedia: the invention of Bioy Casares

The Argentine writer Bioy Casares (1940), mostly known for having written a series of detective novel with Borges, tells us, in his book "Morel's invention", the story of the perfect multimedia, well before the term was invented. A man arrives at a deserted island and discovers little by little that the island is not as abandoned as he had believed; people

appear in a palace and in landscapes close to where he hides. The man conceals himself and observes. He particularly observes a woman with whom he soon falls in love; with great anguish he decides to leave his hiding place and to declare his love to her — not without having meditated on her possible reactions. But she does not react at all to his approach. It is as if he did not exist for her; and in fact he really does not exist for her.

Everything which he has observed, it turns out, is a kind of recording which originates in some apparatuses hidden in the cellar of the palace and which is repeated time and time again. It is a recording which is a three-dimensional projection and which contains all the sensorial modalities (as far as it is possible to tell). This is Morel's invention. It is so similar to reality, to the world which we take for granted, that nothing in its form can tell us that it is only a picture, only a sign. Nevertheless it lacks one property that the perfect multimedia should have: interactivity (because the man cannot relate to the woman), also in the elementary sense of social responsiveness (contrary to what our hero thinks, the woman does not have any possibility of ignoring him significantly). Consequently, it is on the social plane that this "virtual reality" finally fails to fulfil Husserl's criterion of the possibility of always going ahead.

Many space wars later, Bioy Casares' invention seems less fantastic. One might imagine some kind of animated, computer-generated holograms, complete with odours and other sense modalities. What still seems difficult to conceive is the illusion of solidity, without the immersion which is a requisite for the production of virtual reality.

In the end, the first person narrator decides to enter the story, and thus to let himself be recorded, although this signifies death in the real world; it is as if he had entered virtual reality to remain there. Nevertheless, what Husserl said about the ordinary picture remains true even in this case; if the picture is confused with reality, as may happen if it is observed with an immobile eye through a peep-hole, it is no longer seen as a picture, that is to say not as a sign. To the extent that virtual reality is experienced as real it stops being virtual. It is all light, full of sound and sometimes also fury, signifying nothing.

V. Conclusion: Through a glass, clearly

Like all synthetic pictures, virtual reality precedes its (possible) referent. But it may (possibly) have a referent; it is not one itself. So far, the experience of the sign character of the sign endures; it is something directly given that is not thematic and that points indirectly to something directly given which is not a theme (cf.. Sonesson 1989a, I.2.5, I. 4.2; 1992). But the limit between the sign and reality becomes somewhat blurred. In the end, only appearances remain. *Dixit* Baudrillard, himself part of the appearances.

The time has come in which we may all, like Wu-tao-tzu, paint a picture on the prison wall and enter it. But it remains to be seen whether another prison is awaiting us on the other side of the landscape.

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Summary :

In order to discover the effects wrought on photography by the discovery of the computer picture, we first try to differentiate the part played by pictures in history, in terms of different uses, purposes and principles of construction. Pictures made by hand (chirography) and by means of some additional device (mechanography) are distinguished, as are the process of production and reproduction. In the second part, we look at the theory of indexicality, as conceived by Perice but adapted to the psychology of perception, as a preparation form a later review of some present-day theories of photography, which follows in the third part. Here we suggest that iconicity stills prevails in the photograph, although a multifaceted indexicality is always also present. We try to redefine the difference between chirography and photography in terms of the relative locality or globality of mapping rules. Finally, in the fourth part, we consider the specific character of computer pictures, from pixel and vector graphics, over algorithmic rendering, to virtual reality.

Résumé

Afin de décrire les effets que la découverte de l'image d'ordinateur a eus sur la photographie, nous essayons d'abord de différencier les rôles joués par les images dans l'histoire, en termes de différentes utilisations, de buts divers et des principes variables de construction. Ceci nous amène à distinguer l'image faite à la main (la chirographie) de celle qui est produite au moyen d'un dispositif supplémentaire quelconque (la mécanographie), ainsi que le processus de production et de reproduction de ce mêmes images. Dans la deuxième partie, nous considérons la théorie de l'indexicalité, tirée de Peirce mais adaptée à la psychologie de perception, en guise de préparation à une critique de quelques conceptions actuelles de la photographie, que l'on retrouve dans la troisième partie. Tirant les conséquences de notre critique, nous soutenons que c'est malgré tout l'iconicité qui prédomine dans la photographie, alors qu'une indexicalité multiforme reste également présente. Face à ce résultat, nous essayons de redéfinir la différence entre la chirographie et la photographie en termes d'une localité ou d'une globalité relative des règles de correspondance entre expression et contenu. Pour conclure, dans la quatrième partie, nous considérons le caractère spécifique des images d'ordinateur, en commencent par les graphiques construits de pixels et de vecteurs, et en passant par le rendu algorithmique, pour arriver enfin à la réalité virtuelle.