

The relationship between perception and language in art education*

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In this speech, I will focus on the relationship between perception, mainly the visual one, and language in art education. My objective is to put forward a propaedeutics to the aesthetic experience that helps understand how the relationship between perception and language pervades not only this specific kind of experience but, more generally, all the various occurrences and fields of a subject's experience. To this aim, it is important to keep two levels of information quite separate. On the one hand, we have the level of the theoretical and methodological contents that principally concern the teacher's competence; on the other, the level of examples that, being of easy and immediate didactic use, can provide the teacher with indications and ideas for educational project.

Since in this speech I will refer to quite complex and continually evolving notions, I thought it convenient to resort to the use of some slides that can help you better understand them. The slides will use quotations from various authors' writings, and some abstracts from encyclopaedias and scientific texts that exemplify, or that can be considered to be very akin to, the main theoretical and methodological assumptions of the Italian Operative School (from now on, *IOS*), to which I constantly refer (see slide nr. 1 at the end of the text).

We also have to bear in mind that, by dealing with the relationship between perception and language, we are tackling the study and analysis of mental operations, and thus entering an interdisciplinary domain where the basic notions can contribute to various scientific fields.

By speaking of perception, we need to take into account the fact that in the history of philosophy this word has often received antithetical interpretations, on the basis that everything one knows comes either from the outside world (empiricism), or from reason (rationalism). It is only in the

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nineteenth century that perception becomes a specific subject of psychology. From that moment on, the experimental method imposes itself, and experimental research is carried out on the basis of the different theoretical assumptions of the last century's various psychological schools: from associationism, to behaviourism, gestalttheorie, cognitivism, the more recent developments of the neurophysiology of vision, and the cybernetic approach to the study of mind typical of the *IOS*.

The tendency to overcome the dichotomy between mind and body, subject and object becomes more and more evident, so that one is led to realize that perception is the result of complex activities taking place at a neurophysiological and mental level: the whole body of knowledge about vision is then brought into question (slide nr. 2).

The first prejudice to discredit comes from the use of the word "image", which, despite having a proper and positive meaning in common language, is nonetheless misleading and deceiving if used to explain visual perception. Such a use, in fact, entails a naïve conception of vision: a conception that many school textbooks still support by proposing the stereotype of the image reflected upside down on the retina, on the assumption that what we see is something already constituted, given to our passive observation.

The *IOS* has significantly contributed to overcoming this inveterate conviction, by showing that the shape of things is the result of mnemonic-attentional activity. It is on this assumption, and particularly thanks to the research carried out since the sixties at the Cybernetics Centre of the University of Milan, that the operative procedures and methodological criteria that are at the basis of this didactic project could be developed.

A rather effective way of approaching visual perception has been that of choosing some words from the common language, such as the Italian verbs "vedere" (to see), "guardare" (to look) and "osservare" (to watch). Indeed, they prove to be particularly suitable if one decides to face the problem of vision starting from one's own personal knowledge. It is useful, therefore, to refer to the definitions given by dictionaries, such as those of the Italian dictionary Zingarelli:

- a) "vedere" (to see): to understand, to perceive something by using the eyes;
- b) "guardare" (to look): to turn one's eyes in a particular direction in order to see something;
- c) "osservare" (to watch): to look at something with attention, to give special attention to something in order to see.

The first definition, by referring to a "perceiving something by using the eyes", indeed exemplifies our own thesis, about which we will speak later when performing our analyses. The definition given of "guardare" (to look) is certainly more explanatory because it mentions the

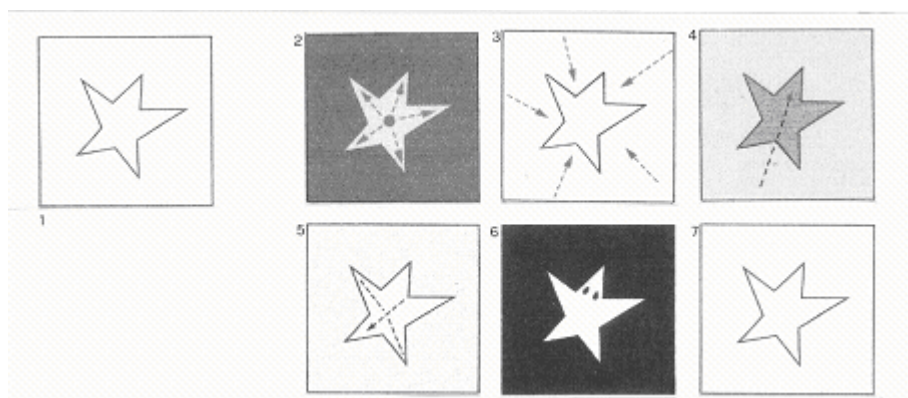
potential movement of the eye, which despite being of basic importance to vision, is usually neglected. Particularly suitable to our theoretical assumptions is the definition given of “osservare” (to watch) because it stresses the role played by attention. In fact, according to the *IOS* it is attention that is at the basis of cognitive processes.

On the *IOS*’ assumption that being aware of one’s own mental activity represents the basic condition of any learning process I propose some examples which allow us to analyze our mental operations. This poses at once the problem of showing how the shape of things is not so much an intrinsic characteristic of theirs, which we could only see as passive observers, but, on the contrary, results from the activity performed by the mind itself.

To become aware, through the analysis of attentional dynamisms, of the activity performed by the mind, we will resort to some figures that can be interpreted in various ways: “multi-value shapes”. They are not only suitable for our current aim but also for the exercises teachers will propose to their own pupils or students.

Multi-value shapes: the awareness of mental activity

A multi-value shape of great educational effectiveness, able to arouse the interest of even the youngest students, involving them in a careful consideration of mental activity, which otherwise would be impracticable, is fig. 1:



Figures 1 to 7

Looking at fig. 1., somebody can see a star, somebody else a broken glass, but also a leaf, a swallow, a ghost or a flag. The figure is always the same, but one easily realizes how, in perceiving the different images, attention focuses now on one element, then on another one, holding or

discarding various parts, changing the relationship between different parts, articulating, combining or breaking them up in many ways.

In seeing a star (fig. 2), one's attention first focuses on the centre of the internal frame, and then links the lines two by two following the radial disposition of the five points. The small portion of sky against which the star stands out will acquire however the consistency of a solid figure or the materiality of an object when, relating the parts to the each others in a different way, one sees the star turning itself into the hole of a broken glass with its sharp edges (fig. 3).

In order to see the leaf and the swallow, one has chiefly to operate on symmetry relations (fig. 4 and 5), while, in order to make the ghost appear, one has only to imagine two little eyes as they are usually designed in cartoons (fig 6). The use of relations becomes more complex in seeing the flag or the banner because the background gets to include the space that is outside the borders of the square (fig. 7).

It is well known how the use of a rich and suitable adjectivation is usually poor both in speaking and in writing. This can be explained, at least as far as observation is concerned, by the fact that, if one is not aware of the activity performed by mind, one will tend to see the shape of things as an intrinsic property of theirs: consequently, when linguistically referring to what one sees, one will use the poorest and most restrictive kind of expression.

To help equip oneself with a rich catalogue of adjectives it is therefore necessary, first of all, to free oneself from the restriction imposed by the presumed objectivity of shapes, and then to consciously take the stance that allows oneself to see things from different points of view: a stance that is mainly fostered by adopting analogies, allusive images and metaphors, and by letting oneself be carried away by one's own feelings and mood. This stimulating exercise can easily be performed with the aid of linear sketches. It is just by means of one of these linear sketches that we could propose the experiment of the "multi-value line" (fig. 8). To better understand the implications of this experiment, it is important not to mistake the undifferentiated physical substrate for the line constituted by one's mental activity: while the former is always the same and does not change, the latter is the result of the dynamism through which the attentional path is constantly kept present. The experiment consists in showing this figure to the pupils, students or anyone wishing to undergo the experiment, and in inviting them to find as many adjectives as they can express to describe it, with the instruction to control for each adjective where they focus their attention, and how they differently combine and relate each part to the others. The most significant adjectives that have been gathered are the following: bending, waving, winding, sinuous, soaring, and flabby. Everyone can compare one's own analyses of the attentional dynamisms implied by each adjective with those listed in slide nr. 3. At first sight, one could be surprised by the fact that the same line can be

antithetically perceived both as “soaring” and “flabby”. However, the apparent contradiction vanishes as soon as one realizes that it is based on the false belief that the line exists independently of one’s own activity, and that one need only invert the direction of the movement of his eyes to perceive it differently.

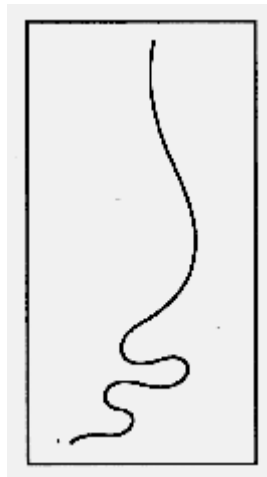


Figure 8

Yarbus’ experiments

Having mentioned the importance of eye movement, I think that it is worthwhile presenting the Yarbus’ experiments, a well-known Russian scholar who worked at the Academy of Science of Moscow in the sixties. He was the first who registered these movements, clearly showing that the way one looks at things changes according to one’s individual interests, expectations and culture. Yarbus’ findings can therefore be considered as a first confirmation of the *IOS*’ hypotheses.

In his experiments, Yarbus registered the eye movements employing a small device that was applied to the eyeball by a cupping glass. A very small mirror fixed to the cupping glass allowed to trace, by means of the reflection of a ray of light, the complete map of the eye movements, which are technically called saccades.

Certainly, the most interesting aspect of Yarbus’ experiments is to have highlighted the tight connection existing between eye movements and attention. In this way, he has definitely showed that the common belief that things appear to us instantaneously, without any activity of ours, and that to see what is in front of us we only need to open our eyes is misleading. We can easily become aware of this by looking at any kind of image. We need only stare at a little detail of an image to

realize that our clear vision is limited to a very restricted area, and that to get a global perception we always have to synthesize the explorative activity of the eye.

Yarbus made a particularly significant experiment for our research. He controlled the eye movements performed by a subject who observed Repin's picture *They did not expect him* (fig. 9).



Figure 9: "They did not expect him" by Repin

The graphs reproducing saccadic eye movements during a complete registration of three minutes show how attention focuses almost exclusively on people's faces and their behaviour (figures 10 a-b-c-d-e-f). If we compare these six registrations we notice that the eyes go back repeatedly to the same elements, which therefore indicates that a prolonged observation is not sufficient to enrich perception unless strong and stimulating motivations intervene. This is a limitation that particularly characterizes a kind of everyday observation that aims above all at recognizing things for their own utility and functions, and that we define "common observation" so as to distinguish it from the other kind of observation we intend to promote through the criteria of operative methodology: aesthetic observation.

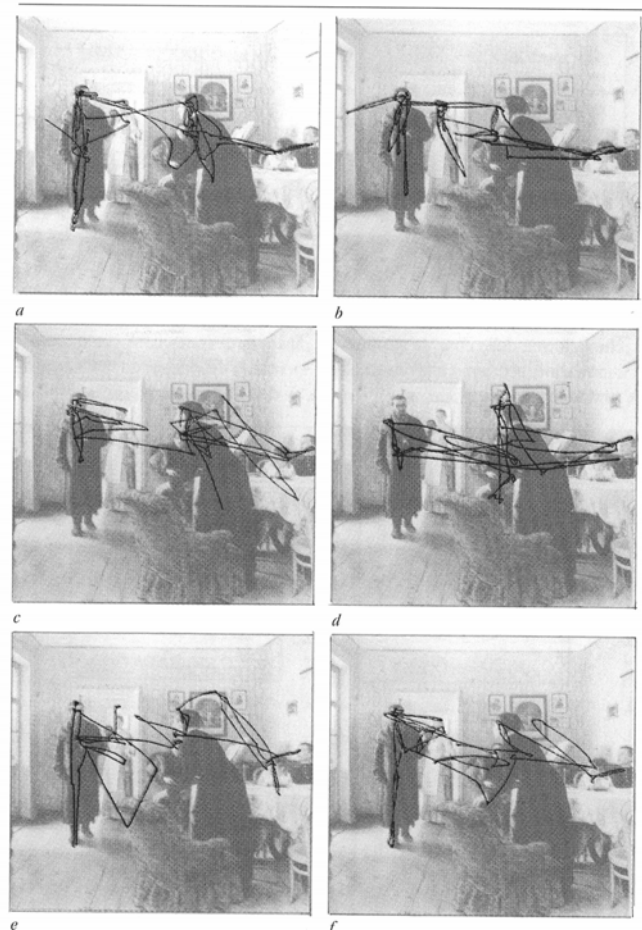


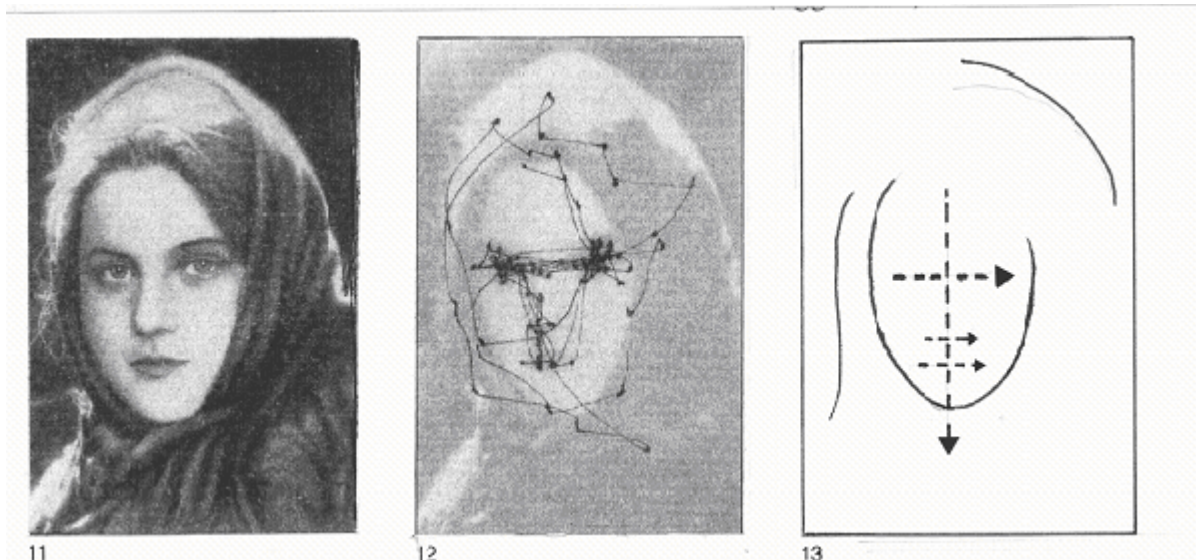
Figure 10 (a-b-c-d-e-f)

The effects of the limitation entailed by common observation can be seen above all when the content of a work of art is privileged over other aspects as a result of the contemplation of the work of art itself. It is a kind of approach we often meet in textbooks that deal with works of art by simply describing what they represent, or by discussing very superficial and sciolistic aspects.

Yarbus' experiment is particularly interesting because it shows that the observer, being interested only in the people represented in the picture, tends to ignore much of the scene, especially the large background area. Since, in aesthetic contemplation, the chromatic value of this area is the same as that of the other parts of the picture, leaving it out means that the observer unknowingly degrades the work of art to mere illustration, and is unable to see it as a work of art.

Nouns and constitutive structures

In another experiment, that confirms some of our hypothesis, Yarbus registered the movements of the eyes while the subject observes a girl's face (figures 11 and 12).



Figures 11 to 13

The relation between perception and language is now considered with regard to the constraints that nouns set on mental representations, and in particular on constitutive structures. We have first of all to specify what we intend by these expressions. Within the limited scope of our research on visual perception, by “mental representation” we generally mean the image we have in mind when we think about or speak about a thing. In their psychological works, some scholars speak of “image” or “mental schema”, but also of “visual concept” (slide nr. 4). When a mental representation is occasioned by a noun it assumes the very specific meaning of constitutive structure. The “constitutive structure” is a kind of visual categorization related to a process of generalization that takes place when one refers to classes and types, but not to a specific individual thing considered in its phenomenal occurrence.

By calling what one is observing a face, therefore, one elicits an essential schema that, being based on an invariant relationship between eyes, nose and mouth, is independent from any variation of light and shade, and from any change of point of view. This schema can be inferred by analyzing the movements of the eyes registered by Yarbus. Indeed, the saccadic eye movements clearly reveal how attention, repeatedly focusing on the eyes, builds a symmetrical relation between them and the position of the nose and the mouth. The schema can be represented in its dynamic essentiality by means of some vectors (fig. 13). Slide nr. 5 deals with the more complex interaction with perception.

Stereotypes and the isolation of separated elements

By means of some experiments that compared the works of some Italian middle school students, it was possible to control the use of graphic-pictorial stereotypes, and to understand how such use in particular, and perception in general (slide nr. 6), is highly determined by the constitutive structure elicited by the noun given to things.

In one of these experiments, we analyzed the stereotype of the flower, showing the well-known picture by Van Gogh *Still Life: Vase with Twelve Sunflowers* (fig. 14).



Figure 14

Fig. 15, which shows the mutual relationship existing between noun, constitutive structure and stereotype, helps us understand the stereotype of the flower.

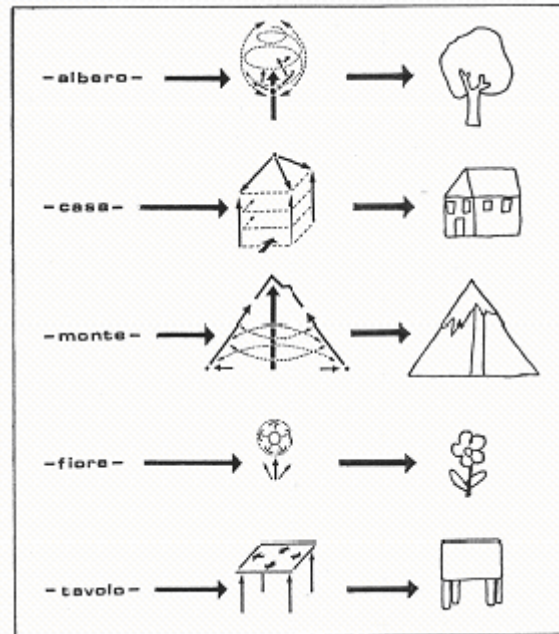


Figure 15

There are some significant correspondences: indeed, the stereotype of the flower is structurally similar to the schema of the constitutive structure both for the frontal position of the corolla and for the simplicity of the archetypical form.

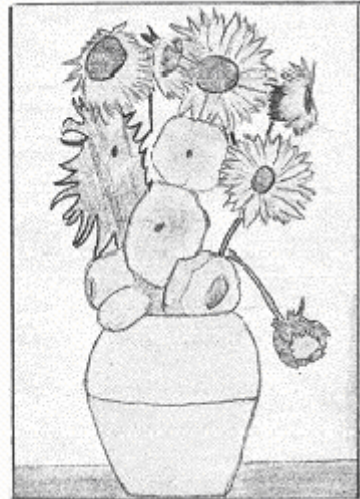
This starlike shape of the flower represents the conventional, invariant schema that we found in most of the tests (figures 16 to 24). It has to be noted that each flower is represented as an autonomous entity, occupying a place of its own and separated from the other flowers. This fact induces us to conceive of the perceptive behaviour characteristic of stereotypes in particular and observation in general, as essentially an operation of isolating separated elements. While some drawings reveal a certain receptive sensibility for the expressive aspects, in some others, actually the majority, the operation of isolating separated elements lets large background areas emerge just in those parts of the bunch where the whirl of petals shaken by the spasmodic rhythm permeating all the work becomes tighter.



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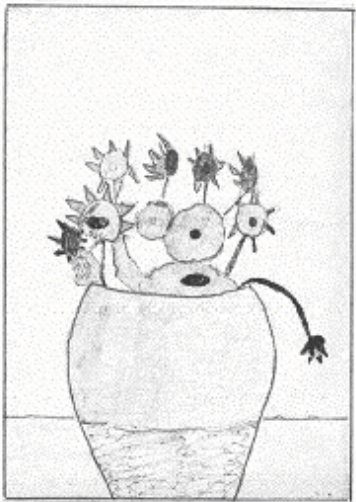
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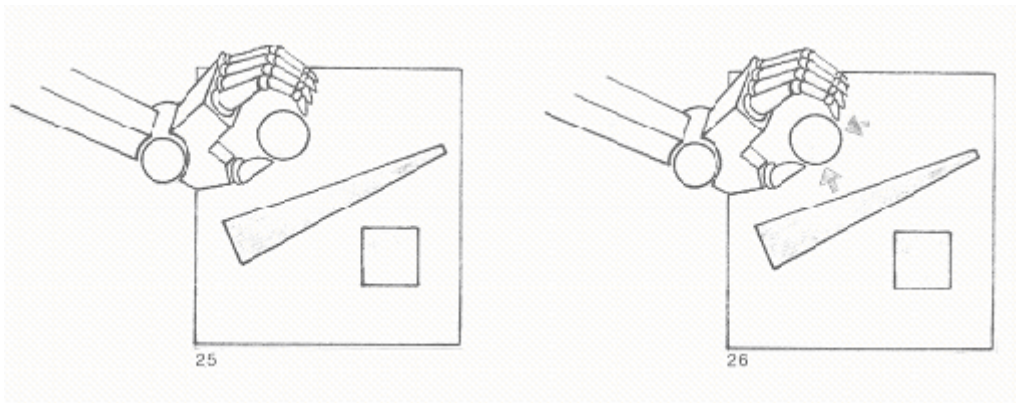
Figures 16 to 24

The operation of isolating separated elements is certainly the factor that mostly hinders aesthetic experience because it inhibits the ability to relate parts to each others: an ability that surely one does

not acquire through passive observation since relations can be seen only when the mental operations constituting them are performed.

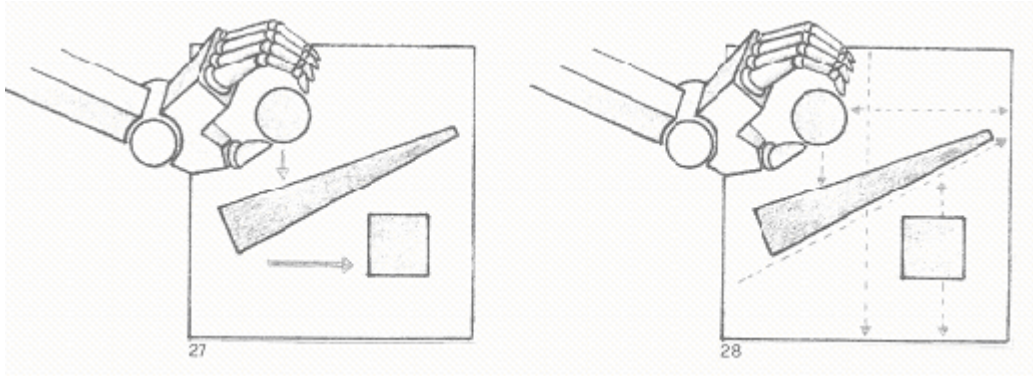
Putting, placing, and arranging

To analyze which mental operations make up relations all we need are a few objects (fig. 25).



Figures 25 and 26

In absolute silence, we will pick up one by one at least three objects, and will put them into a box or a frame. We will repeat this operation three times, each time making the same movements so as to place the same objects where they were before. Any observer who should be asked to describe the scene obviously will say that they saw the same operations repeated three times and that no difference could be perceived between the three occurrences. We can easily realize, however, that if we repeat the very same sequence of operations by describing it as “putting” (Italian: “porre”) the first time, “placing” (Italian: “disporre”) the second time and “arranging” (Italian: “comporre”) the third time, the scene will assume a different meaning and will be perceived differently at each time. When “putting” the objects, we tend to focus our attention on each single object at a time, ignoring the others: we are singling out isolated elements (fig. 26). When “placing” the objects, we relate them to each other following some kind of order or practical conventions (fig. 27). When “arranging” the objects, we take care of the relations not only between the objects themselves, but also between them and the area described by the frame or box, which becomes the background of the various configurations (fig. 28).



Figures 27 and 28

All this shows that to perceive relations we have to mentally constitute them before. What implications has this conclusion for aesthetic experience? When contemplating a picture, first of all, we should avoid assuming the attitude of isolating separated elements that is characteristic of daily observation. Assuming this attitude entails, for instance, seeing Morandi's still life (fig. 29) as representing objects just lying on a table. This is due to the fact that in daily observation our interest is usually and mainly in the objects: therefore we are led to focus our attention only on the manikin, the bottle and the cylinder, and to ignore almost all the other parts of the picture.



Figure 29

What we have to do, on the contrary, is to radically reverse our attitude: we should first focus our attention on the wide coloured areas in the background so as to be able, then, to mutually relate the coexisting background and what lies in the foreground (fig. 30), an operation the latter that we consider as the fundamental one for the aesthetic experience, and that represents the basis on which we will carry out experimentations on relations in compositions.

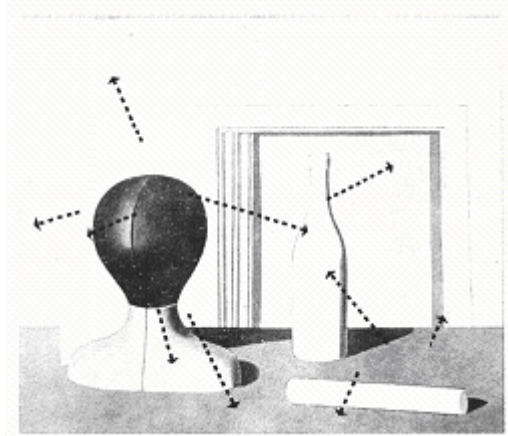


Figure 30

Operative criteria inducing different ways of relating things

Complex scenes with many figures are suitable for experimentations on relations in compositions. They allow us to experience various compositional alternatives and set up the criteria of analysis. A detail of Giotto's fresco *Lamentation* (fig. 31) can help us to exemplify the procedure.



Figure 31

As you can see, the pictorial composition is fundamentally based on a contiguity relationship between the figures. Therefore, the first step consists in identifying those couples of figures that are linked together by a common expressive movement. The compositional dynamic will be visualized

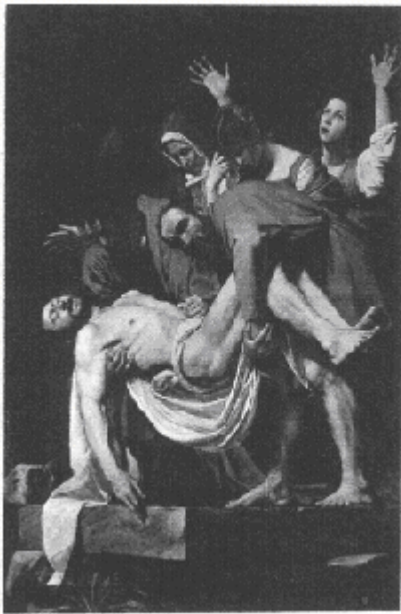
by vectors and other kinds of signs that will indicate the various forms and directions constituting such expressive movements. The second step consists in trying to form groups of three, four or more figures according to some kind of relation. In this way, we can verify how, depending on the way we look at the scene, it is possible to perceive many different configurations. These configurations, which let us follow the rhythmical movement of the contours and create relationships between light, shades and colours, can be centred upon either the concentration of the masses or the dynamism of the figures' gestures and behaviours. The eight possibilities sketched in figures 32 to 39 show how it is possible to proceed from the simplest compositional structure to the most complex one.



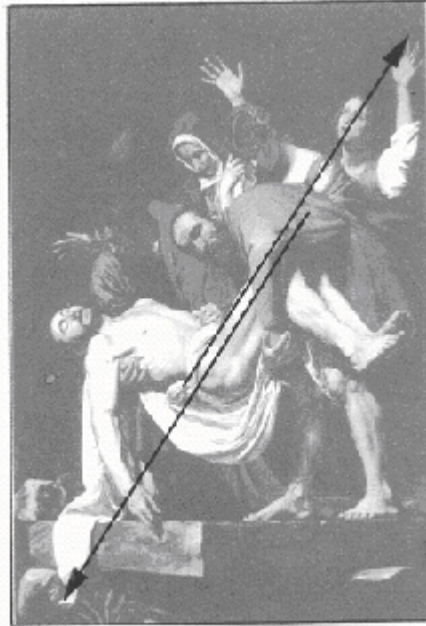
Figures 32 to 39

This kind of exercise is certainly helpful in promoting a person's ability to relate things to each other, and therefore it can be considered to be propaedeutical to the reading of works of art. However, it has to be taken into account that compositional rules change from period to period and

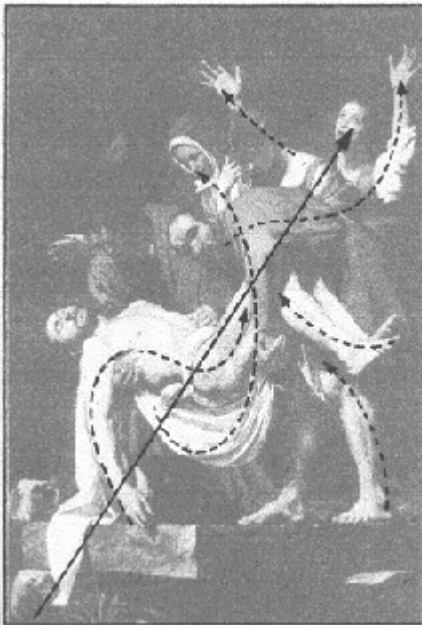
are characteristic of each single artistic school, trend and artist. Anyway, we should always be aware of the fact that aesthetic observation is mainly founded on the possibility of relating coexisting things to each other according to principles of symmetry, asymmetry, proportion, balance, and so on. These different modalities of relating things can easily be seen in the chromatic interplay and in the volumetric and plastic arrangements of Caravaggio's *The deposition of Christ* (fig. 40).



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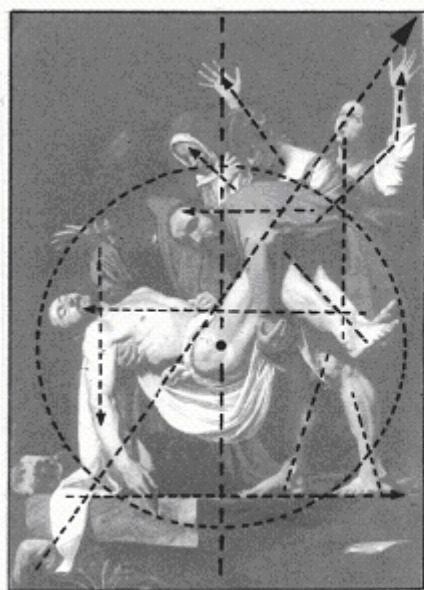
Figures 40 to 43

At a first glance, we perceive that the group of figures is disposed completely on the right. Such a disposition induces us to follow the diagonal in either one of the two opposite directions (fig. 41). If, starting from the border of the sheet lying on the tombstone of the grave, we move our eyes in an ascending way, we will be induced to experience a pressing rhythm that the violent lights schematically defining the various forms will make even more vibrant. The excited and disordered interplay of the bodies contributes to accentuate the dramatic atmosphere that reaches its climax in Mary of Cleofa's desperate gesture of raising her hands to heaven. Only her mournful look toward the infinite brings a mark of hope and a premonitory sign of Christ's resurrection (fig. 42).

If, on the contrary, we move our eyes in the opposite direction, we will be induced to experience a relenting rhythm that ends its impetus in the darkness of the grave, beyond the tombstone, where the deep and dim shade entraps and paralyzes the observer's attention in a state of suspension that is a metaphor of mystery and tragedy (fig. 43).

The coexistent antithesis of the tragic and the dramatic, which is a characteristic of Caravaggio's luminism, clearly appears in this picture: here the figures can be perceived both as spectral apparitions emerging from the dark background, and, contradictorily, as bodies swallowed up by the dim darkness that partly hides them effacing their contours in a way that their limbs and bodies can be identified only through the integrating working of mental representation.

Aesthetic perception, in any case, is a totalizing experience, involving all the aspects of what is perceived: above all, it implies the operation of framing, which leads the observer to explore the various parts of the picture keeping all of them present in his mind.



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Figures 44 and 45

Often, it is on the symmetry axis that compositions find the balance of their parts. If we consider the symmetry axis as the barycentre of Caravaggio's *Deposition*, we will perceive in all its power and magnificence the compositional unity formed by Christ's hanging body and Nicodemus' powerful body, who, bent, sustains the Christ (fig. 44). At the same time, the point of focalisation on the left foot, acting as the keystone of the composition, leads us to oppose the oppressive immobility of the tombstone to the vitality and energy pervading the whole work of art (fig. 45).

By this analysis of Caravaggio's picture I intended to show how every compositional structure has an independent aesthetic dignity of its own that coexists with all the others.

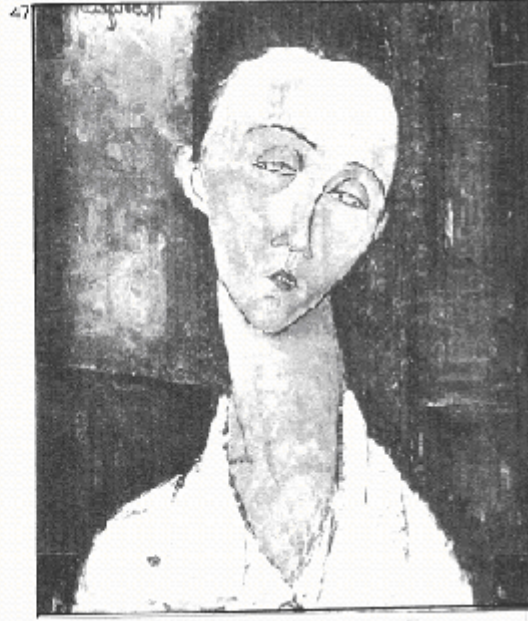
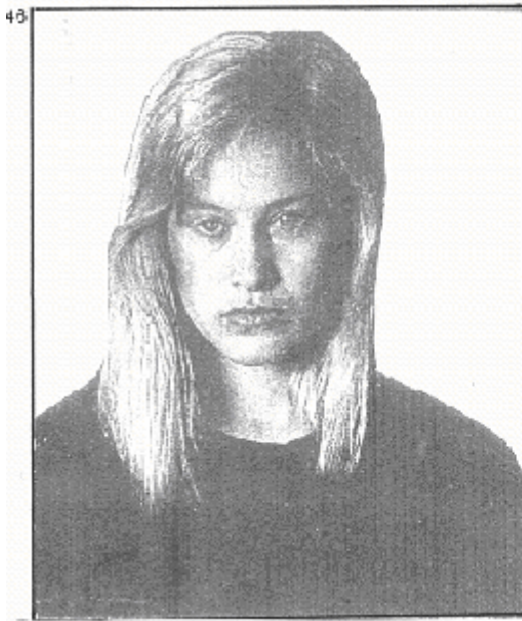
Transgression

It is useful to know that while common sense considers artists for their capacity to adhere as much as possible to reality, the history of art shows on the contrary that only who is somehow able to transgress tradition can be considered a true artist. What artists transgress are sometimes perspective rules and sometimes anatomical proportions; sometimes it may happen that they alter in a more or less moderate but nonetheless efficacious way the natural features of things. Transgression must anyway be justified by a real need of expression.

If we look at the past, we will realize that the most beautiful and unequalled mystic works of art have been created by Byzantine and Romanesque artists through their way of representing in their mosaics and frescos flat images deprived of any material consistence: a way that attains the highest awesomeness in the late Middle Ages when artists were able to remove any sign of perspective.

With an equal force, but in a quite opposite direction, Renaissance rationalism gave back bodies their volume and shades, thus proposing that perspective in which human beings could find their feelings and passions once again.

While in the past, transgression was represented by the alteration of the anatomical, chromatic and compositional features, in contemporary times it is represented by decontextualization, that is, the operation of isolating an object or event from the relations it has with its environment, where practical and utilitarian values usually tend to prevail. Moreover, contemporary artistic research tends to transgress the usual relationship between the artist as the subject and the work of art as the object: we can thus have conceptual art or multimedia techniques, where bodies as well as thought become determinant elements of artistic creation.



Figures 46 and 47

Slide nr. 1

«In 1945, a new journal of criticism of science was first published in Milan; its original name was *Analisi* and it was later changed to *Analysis*. The main promoters were the physiologist Giuseppe Facchini, the geneticist Adriano Buzzati-Traverso and the methodologist Silvio Ceccato (...) Other articles by Ceccato appeared in the journal *Sigma* founded in 1947 by Giuseppe Vaccarino and Vittorio Somenzi. In 1949, a new international journal *Methodos* took the place of *Analysis* and of *Sigma* (...) The development and diversification of the most original ideas of Ceccato and Vaccarino date back to the period of *Methodos*. These ideas were presented in a lengthy series of volumes (...) *Methodos* was born as the organ of the *Centro italiano di metodologia ed analisi del linguaggio* (...) The volume which would represent the manifesto of the *Italian Operative School*, *Il linguaggio con la tabella di Ceccatieff*, appeared in Paris in 1951 (...) Ceccato spoke of a new technique, to be placed side by side with the observative and transformative techniques of science and technology, aimed at making the scientist, the philosopher and the common man, including children, aware of the non-transformative operations which they make when talking of “right” and “left”, “beginning” and “end”, “part” and “whole”, “means” and “aims”, “cause” and “effect”, “freedom” and “necessity”, “law” and “case”. In the course of the debate between Ceccato and Vaccarino, this kind of operation was called “supplying work” (Italian: *lavoro apportativo*), in the sense that they are mental and verbal operations which, once completed, leave the object to which they are applied unaltered. In my opinion, the term “supplying” (Italian “*apportativo*”) could also be used with reference to perception, for instance in the choice of one of two ambiguous figures (...) But the problems of perception and observation appeared far more complicated to Ceccato and Vaccarino, who contrived several models for them, and created several neologisms for the mental operations pertaining to them. Obviously, the operative analysis had also to be applied to the terms “physical” and “mental”, thus avoiding making the traditional mistake of believing that there are things or processes that are physical or mental in themselves. According to Ceccato, every nominated thing, whether it is designated by a single word or a text, has to be considered as a result of some mental operations: in such a way, it is thus possible to proceed with the identification, analysis, and description of these mental operations. This way of performing the analyses allows one to have thought as the counterpart of speech, and, on the other, to not consider words any longer as pure labels of things existing in themselves, independently of the speaker, or of contradictory and, as such, elusive “concepts”, “ideas”, or “essences”. The semantic relationship can now be seen, in expression, as the relationship between the operations *constituting* the designated thing and the operations producing the gestures, sounds and signs that are used as the designating word, and in comprehension, as the relationship between the operations of perception of such gestures, sounds and signs, and the operations *constituting* the designated thing» (Vittorio Somenzi, “La Scuola Operativa Italiana”, *Metodologia*, 1, 1987, pp. 7-14).

Educational and pedagogical publications of “La Scuola Operativa Italiana”:

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- P. L. Amietta, S. Magnani, *Dal gesto al pensiero*, Franco Angeli, Milano, 1998
- S. Ceccato, *Il Punto*, Vol. I-II, IPSOA, Milano, 1980
- S. Ceccato, *La fabbrica del bello*, Rizzoli, Milano, 1987
- S. Ceccato, B. Zonta, *Linguaggio consapevolezza pensiero*, Feltrinelli, Milano, 1980
- G. Gentili, F. Giacomelli, A. Raccagni, *Mixart*, Zanichelli, Bologna, 1988
- G. Marchetti, *La macchina estetica*, Franco Angeli, Milano, 1997
- P. Parini, *I percorsi dello sguardo*, Artemisia, Jesi, 1996
- P. Parini, *Los recorridos de la mirada*, Paidòs Iberica, Barcellona, 2002
- P. Parini, M. Calvesi, *L'immagine*, La Nuova Italia Editrice, Firenze, 1970
- P. Parini, M. Calvesi, *Il linguaggio visivo*, La Nuova Italia Editrice, Firenze, 1980
- G. Zotto, *Il suono intelligente*, Zanibon, Padova, 1982

Slide nr. 2

«Che cos'è la luce e che cos'è la visione? (...) Nel caso della visione, il problema di individuare i processi che fanno da intermediario tra il mondo e la nostra conoscenza di esso è stato dibattuto più che per gli altri sensi. Questo era prevedibile, perché, come mostreremo, il mondo che vediamo è in gran parte un nostro costruito. “La luce non esiste, ma noi possiamo vederla. La luce è una sensazione, e dunque non ha esistenza fisica”. Che paradosso! La stessa luce del giorno è una nostra creazione. Ciò che colpisce la retina è un flusso di radiazione elettromagnetica, che è assorbita a “pacchetti”. Chiamati quanti o fotoni. La retina trasmette al cervello impulsi nervosi che indicano gli schemi dell'intensità della radiazione riflessa, la quale cambia nel tempo e nello spazio. Ciò che l'osservatore percepisce, persone, alberi, case ecc., è scelto fra questi schemi da programmi appresi fin dalla nascita sulla base della loro importanza. Coloro che sono nati ciechi e che in seguito hanno riacquisito la vista grazie a un intervento si accorgono di poter “vedere” la luce, ma non le cose. Vedono una massa confusa di colori, ovvero come ha riferito uno di loro: “Vedo qualcosa, ma non so cosa”. Più tardi possono imparare a vedere le forme» (John Young, *Philosophy and the Brain*, OUP, Oxford, 1987, trad. it. *I filosofi e il cervello*, Bollati Boringhieri, Torino, 1988, pp. 136-137).

«Nel caso del suono, come in quello degli altri sensi, il segreto sta nella codificazione, nella riduzione cioè di uno stimolo complesso e informe a una serie di valori misurabili e quindi a una serie di segnali nervosi da inviare in ultima analisi al cervello. Tale codificazione è in realtà un'innovazione e una creazione (...) Non si sottraggono a questa considerazione neppure gli stimoli sensoriali, che nascono da eventi fisici e sono soggetti a tali leggi. Ma in natura l'odore di violette non esiste, come non esiste un accordo in Do o il giallo paglierino. Ciascuno di questi è un segmento di realtà ritagliato da uno dei nostri sensi e da essi elevato al rango di sensazione (...) Il mondo di per sé non è popolato né di sensazioni né di stimoli. Sono infatti gli organi di senso delle varie specie animali che individuano dei potenziali stimoli e li trasformano in sensazioni (...) La scena visiva di per sé non è in sostanza in grado di comunicare al nostro cervello nessun tipo di informazione, non più di quanto lo sia ad esempio masticare del cibo. Perché sia possibile ottenere informazione dagli organi di senso è necessario che questi si facciano trovare preparati. È necessario cioè che sappiano già qualcosa, e precisamente conoscano almeno a grandi linee il repertorio delle cose che potrebbero percepire. I nostri sensi insomma non osservano passivamente il mondo, ma lo interrogano (...) Per arrivare a tale risultato è richiesto l'apporto di una precedente conoscenza, un sapere antico, un diverso tipo di informazione acquisita tanto tempo fa e accumulata nei millenni nelle nostre cellule e nei nostri geni sotto forma di patrimonio genetico. Per imparare bisogna conoscere. Chi non sa niente non impara o, più correttamente, in assenza di ogni informazione non si acquisisce nuova informazione. D'altra parte uno dei fondamenti concettuali della Teoria dell'informazione è che il presupposto per l'acquisizione dell'informazione stessa non è l'ignoranza ma l'incertezza» (Eduardo Boncinelli, *Il cervello, la mente e l'anima*, Mondadori, Milano, 1999, pp.117-121).

«Senza linguaggio e al di fuori del linguaggio non ci sono oggetti, perché gli oggetti sono costituiti unicamente come coordinazioni consensuali di azioni nella ricorsività di coordinazioni consensuali che è l'agire linguistico. Per i sistemi viventi che non operano nel linguaggio non ci sono oggetti: gli oggetti non fanno parte dei loro domini cognitivi (...) L'autocoscienza nasce con il linguaggio. Per un sistema vivente che funziona operativamente come un sistema chiuso non ci sono un interno e un esterno, in quanto non ha alcun modo per fare questa distinzione. Eppure nel linguaggio una simile distinzione può esistere, e nasce come un tipo particolare di coordinazione comportamentale consensuale in cui vengono costruiti gli stessi partecipanti, in maniera ricorsiva, come distinzioni di sistemi di distinzioni (...) L'ambiente esiste solo per un osservatore, e dunque è un fenomeno riguardante l'agire linguistico (...) Noi come esseri umani operiamo nel linguaggio solo interagendo nel dominio in cui esistiamo come sistemi viventi; non possiamo compiere distinzioni che comportino interazioni al di fuori di questo dominio. Di conseguenza, sebbene il linguaggio come dominio ricorsivo di distinzioni consensuali sia aperto a una ricorsività infinita, si tratta operativamente di un dominio chiuso, nel senso che non è possibile uscirne utilizzando il linguaggio e nel senso che le descrizioni non possono essere caratterizzazioni di entità indipendenti (...) Dal momento che tutto ciò che è detto è detto da un osservatore ad un altro osservatore e che gli oggetti (entità, cose) nascono nel linguaggio, non possiamo operare con gli oggetti (entità o cose) come se esistessero al di fuori delle distinzioni che li costituiscono. Inoltre gli oggetti, come entità linguistiche, diventano elementi esplicativi nella spiegazione delle coerenze operative delle circostanze di vita in cui ha luogo l'agire linguistico (...) Noi parliamo come se le cose esistessero in assenza dell'osservatore, come se il dominio delle coerenze operative che costruiamo in una distinzione funzioni come funziona a prescindere dalle nostre distinzioni (...) Di fatto, senza osservatori niente esiste, perché l'esistenza è definita nell'operazione di distinzione compiuta dall'osservatore. Per ragioni epistemologiche, noi esigiamo un substrato che possa fornire in maniera indipendente una giustificazione ultima o una validazione delle distinzioni da noi operate. Tuttavia, per ragioni ontologiche, un simile substrato resta al di là delle nostre possibilità come osservatori. Tutto quello che possiamo ontologicamente dire circa il substrato è che esso permette tutte le coerenze operative che noi realizziamo nelle circostanze in cui viviamo, esistendo nel linguaggio (...) Di conseguenza, è nel dominio in cui esistiamo come unità composite che distinguiamo le molecole, gli atomi o le particelle elementari come entità, e realizziamo linguisticamente le operazioni di distinzione che le definiscono e le coerenze operative dei loro domini di esistenza (...) L'osservatore viene prima, non l'oggetto. L'osservatore è dato

nella prassi del vivere nel linguaggio, e noi ci troviamo già immersi in esso quando cominciamo a rifletterci sopra» (Humberto Maturana, *The Biological Foundations of Self Consciousness and the Physical Domain of Existence*, 1990, trad. it. *Autocoscienza e realtà*, Raffaello Cortina, Milano, 1993, pp. 91-122).

«Passando infine al ruolo epistemologico della coscienza, Schrodinger isolava nel principio di realtà il nucleo della difficoltà. L'oggettività è una semplificazione che introduce una separazione artificiale tra ciò che è percepito e colui che percepisce, e permette l'emergere della scienza solo a costo dell'affossamento della coscienza: non ritroviamo l'io nella nostra immagine del mondo perché esso è quell'immagine, ed essendo il tutto non può esservi contenuto come parte. L'impressione che la fisica moderna abbia incrinato la barriera fra soggetto e oggetto è dunque fuorviante. In realtà non c'è nulla da incrinare, perché la barriera non esiste, e *soggetto e oggetto coincidono* (...) Poiché ogni linguaggio non solo è determinato da una visione del mondo ma a sua volta la determina e tende a nasconderla, il linguaggio ordinario basato sulla struttura soggetto-predicato-complemento è non solo l'effetto della visione frammentaria, ma anche la causa del suo perdurare. Il passaggio ad una visione unitaria richiede dunque una revisione linguistica in cui soggetti e complementi (indicanti oggetti) vengano esplicitamente sostituiti da verbi (indicanti azioni)» (Piergiorgio Odifreddi, "La fisica...mente", *Sapere*, agosto 1998, pp. 70-71).

«Il vecchio pensiero si riferisce a un mondo di cose separate e oggettivamente esistenti. La sua struttura, così come la struttura del linguaggio che lo esprime, contiene una funzione di frammentazione, di separazione, di divisione. Un mondo che si pensa in questo modo è un mondo diviso. Un mondo in cui ogni essere umano è separato da sé, dagli altri esseri umani, da tutte le altre forme di vita e dal resto della natura. Questo pensiero ha inoltre un carattere di fissità, di apparente oggettività, che ce lo fa apparire come una descrizione fedele delle cose "così come sono". Si tratta di una nefasta illusione. La realtà è fluida, indivisa. Ed è importante che il pensiero rifletta questo carattere della realtà (...)una delle cause fondamentali delle diffuse e interminabili divisioni fra esseri umani (in termini di razza, nazione, famiglia, professione, eccetera), che impediscono attualmente all'umanità di lavorare insieme per il bene comune (e in verità anche solo per la sopravvivenza), è un tipo di pensiero che tratta le cose come intrinsecamente separate (...) La struttura soggetto-verbo-oggetto delle lingue moderne implica che ogni azione abbia origine in un soggetto separato e si riversi su un oggetto separato o riflessivamente sul soggetto stesso. Questa struttura onnipresente genera in ogni aspetto della vita una tendenza a dividere la totalità dell'esistenza in entità separate, considerate come essenzialmente fisse e statiche (...) Corrispondentemente l'ambiente naturale in cui viviamo è stato concepito come un aggregato di parti separatamente esistenti, sfruttabili da diversi gruppi di persone. E ogni singolo essere umano si è frammentato in un gran numero di compartimenti separati e in conflitto fra loro, determinati da desideri, scopi, ambizioni, affiliazioni, caratteristiche psicologiche, eccetera: a tal punto che si dà per scontato che un certo grado di nevrosi sia inevitabile, mentre i molti che valicano i limiti "normali" di frammentazione sono classificati come schizoidi, paranoici, psicotici, eccetera. L'idea che tutti questi frammenti esistano separatamente è evidentemente un'illusione e questa illusione non può far altro che produrre interminabili conflitti e confusione. In verità il tentativo di vivere come se i frammenti fossero realmente separati è la radice essenziale di una serie crescente di problemi estremamente urgenti ai quali ci troviamo di fronte oggi (...) Essenzialmente il processo di divisione è un modo di *pensare le cose* comodo e utile soprattutto nella sfera delle attività pratiche, tecniche e funzionali (per esempio, serve a dividere un appezzamento di terreno in vari campi dove coltivare raccolti diversi). Tuttavia quando l'essere umano applica questo modo di pensare più in generale al concetto che ha di se stesso e del mondo in cui vive (cioè alla sua visione del complesso sé-mondo), perde di vista il fatto che queste divisioni sono puramente un artificio (...) Quello che sottolineeremo, prima riguardo alla ricerca scientifica e poi in un contesto più generale, è il fatto che la frammentazione viene continuamente riprodotta dall'abitudine di pensiero quasi universale che tende a prendere il nostro pensiero per una descrizione del mondo così com'è. Questa abitudine, in altre parole, considera il nostro pensiero come in corrispondenza diretta con la realtà oggettiva. Poiché il nostro pensiero è pervaso da differenziazioni e distinzioni, tendiamo a considerare queste divisioni come reati e a percepire e vivere il mondo come effettivamente suddiviso in frammenti» (David Bohm, *Wholeness and the Implicate Order*, Routledge, London, 1980, trad. it. *Universo mente materia*, Ed. RED, Como, 1996, pp.19-35).

Slide nr. 3

Depending on the adjective we chose to describe the line, attention tends to focus on one point rather than on another one, thus following different directions and paths. We can represent the attentional operations by using a small intersecting line to show the point where attention stops or pauses, and a broken line to show its direction. In this way, it is possible to segment the line in smaller parts and analyze how they combine and relate to each other.

The analyses that follow concerns six Italian adjectives by which a line can be qualified: “curveggiante” (bending), “ondulata” (waving), “serpeggiante” (winding), “sinuosa” (sinuous), “slanciata” (soaring) and “floscia” (flabby) (fig. 48).

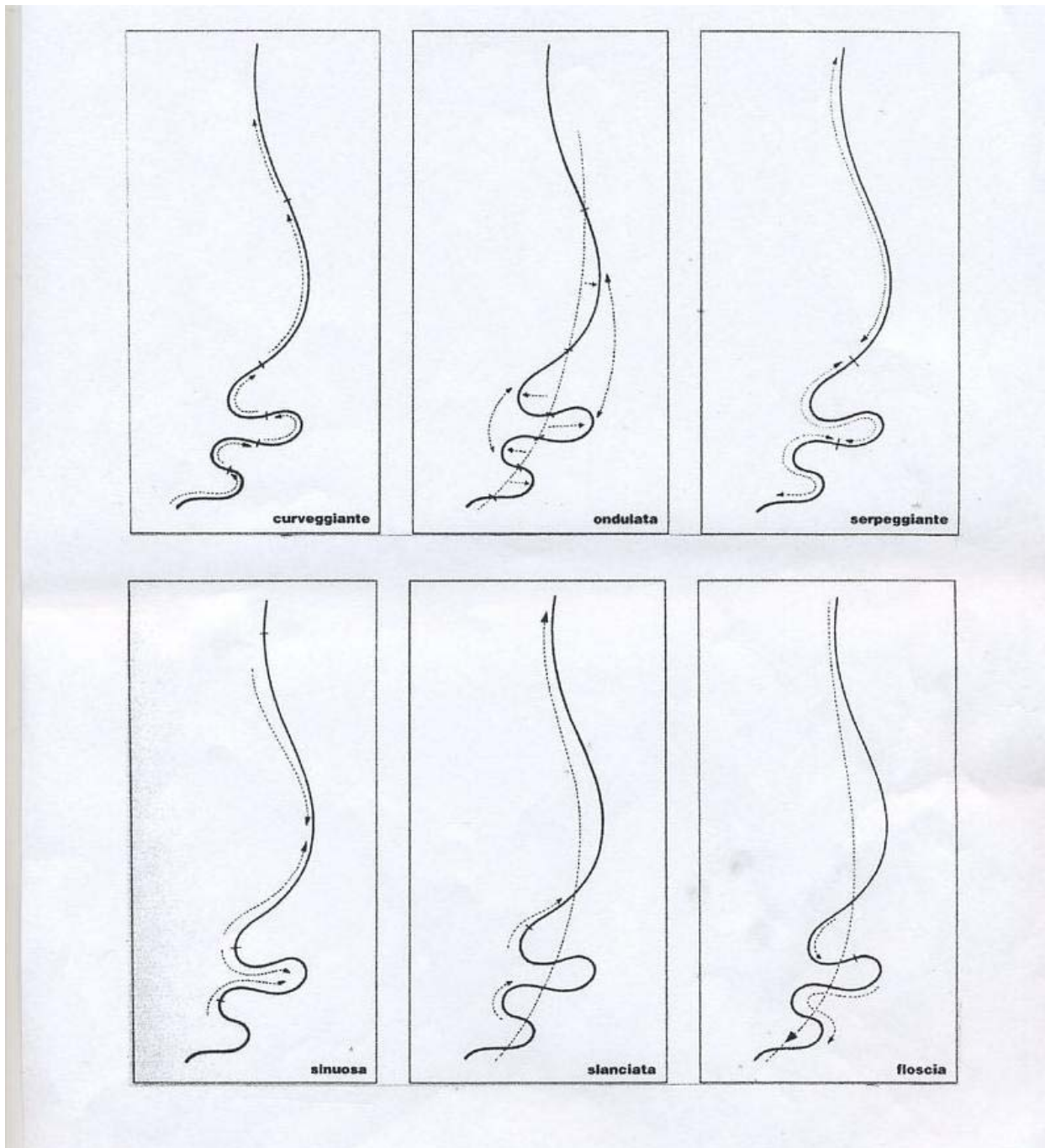


Figure 48

Curveggiante (bending). It is certainly the commonest way of qualifying a line of this kind. Attention halts in the points where the line changes direction, thus forming a series of curves that follow each other.

Ondulata (waving). To see a waving line, one has to alternatively relate the convexities of the line to its concavities.

Serpeggiante (winding). In the winding movement, attention segments the line in S-shaped parts that follow each other.

Sinuosa (sinuous). In seeing a line as sinuous, attention proceeds from one side only, focusing mainly on its protuberances and hollows, and discarding the former while retaining the latter.

Slanciata (soaring). In seeing a soaring line, attention skims over the lower part of the line and moves to the upper one with a rush that leads it to leave the line.

Floscia (flabby). To see a line as flabby, attention has to make a descending movement, which makes one have the impression of a line heavily bending down on itself.

These analyses offer great opportunities of didactic use because they allow us to expand the research to terms denoting states of mind, feelings, and artistic genres, such as the dramatic, lyric, poetic, tragic, and comic, which pertain more specifically to the aesthetic field.

Slide nr. 4

«È difficile dire che cos'è una rappresentazione mentale, ma fortunatamente tutti sappiamo più o meno di che cosa si tratta. Quello di *rappresentazione* è probabilmente il concetto cardine di ogni teoria della mente e anche il *punctum crucis* della difficoltà di ridurre quest'ultima, anche solo concettualmente, a un prodotto dell'attività cerebrale. Tanto sfuggente è il concetto e tanto mal definito e definibile che per un periodo la psicologia decise a fame a meno (...) la nostra mente non procede esclusivamente dal basso verso l'alto, *bottom up*, cioè dagli elementi percettivi agli schemi mentali, ma anche dall'alto verso il basso, *top down*, poiché rappresentazioni e schemi mentali esercitano un ruolo significativo nell'organizzazione stessa dei percetti. E ciò vale a tutti i livelli, dalla visione alla classificazione, dalla memorizzazione all'immaginazione. Alcuni di questi schemi mentali sembrano ricadere a loro volta in classi di schemi di base che sono in numero finito e sono anzi in certa misura preconfezionati. Un'osservazione che può avere delle conseguenze di rilievo. In primo luogo, questi schemi potrebbero essere alla base dell'organizzazione di una sintassi e forse di un lessico per il successivo sviluppo del linguaggio e soprattutto per il suo apprendimento durante la prima infanzia. In secondo luogo sembra dimostrare che anche nella comprensione e nell'interpretazione l'individuo mette in atto la solita strategia della scelta di alcuni elementi all'interno di un repertorio preordinato e finito» (Eduardo Boncinelli, *Il cervello, la mente e l'anima*, Mondadori, Milano, 1999, pp. 225-231).

«Tutti, ovviamente, sappiamo che le immagini che “vediamo” sono in realtà fabbricate dal cervello o dalla mente; ma sapendolo con l'intelletto è molto diverso dal rendersi conto che è davvero così. Questo aspetto della faccenda si impose con forza alla mia attenzione una trentina di anni fa a New York, in occasione di una dimostrazione pubblica data da Adalbert Ames jr. di certi esperimenti su come conferiamo profondità alle nostre immagini visive» (Gregory Bateson, *Mind and Nature. A Necessary Unit*, 1979, trad. it., *Mente e natura*, Adelphi, Milano, 1984, p. 50).

«La percezione consiste nell'adattare il materiale di stimolo a stampi di forma relativamente semplice, che io chiamo concetti visivi o categorie visive. La semplicità di tali concetti visivi è relativa, in quanto uno schema complesso di stimoli, esaminato mediante una visione affinata, può determinare una forma alquanto complessa, forma che sarà la più semplice possibile nelle circostanze date. Quel che importa è che un oggetto, che si stia guardando, può dirsi veramente percepito soltanto nella misura in cui corrisponde ad una qualche configurazione organizzata» (Rudolph Arnheim, *Visual Thinking*, Regents of the University of California, Berkeley-Los Angeles, 1969, trad. it. *Il pensiero visivo*, Einaudi, Torino, 1974, p. 35).

«Non solo leggere, ma anche ascoltare, sentire e guardare sono attività che presuppongono abilità e che si manifestano nel tempo. Tutte dipendono da strutture preesistenti che qui chiamiamo *schemi*, le quali dirigono l'attività percettiva e ne sono a loro volta modificate. Percepire non esige ricordare, nel senso ordinario del termine, ma è un'attività in cui il presente dipende tanto dal passato immediato quanto da quello più remoto. Naturalmente, anche il ricordare vero e proprio (il richiamare alla mente passate esperienze) è un'attività di questo tipo, così come lo sono l'immaginare, il parlare, il pensare e ogni altra forma di attività cognitiva. Spero di dimostrare che tutte queste attività vadano meglio intese quali applicazioni delle stesse fondamentali strutture cognitive» (Ulric Neisser, *Cognition and Reality. Principles and Implications of Cognitive Psychology*, W. H. Freeman & Co., San Francisco, 1976, trad. it. *Conoscenza e realtà*, il Mulino, Bologna, 1981, pp. 37-38).

«We call this pattern of firing neurons an active representation. A latent representation of a face must also be stored in the brain, probably as a special pattern of synaptic connections between neurons. For example, you probably have a representation of the Statue of Liberty in your brain, a representation that usually is inactive. If you do think about the Statue, the representation becomes active, with the relevant neurons firing away. An object, incidentally, may be represented in more than one way – as a visual image, as a set of words and their related sounds, or even as a touch or a smell. These different representations are likely to interact with one another (...) William James thought that consciousness involved both attention and short-term memory. Most psychologists today would agree with this view. Jackendoff writes that consciousness is “enriched” by attention, implying that while attention may not be essential for certain limited types of consciousness, it is necessary for full consciousness» (Francis Crick e Christof Koch, “The Problem of Consciousness”, *Scientific American*, 267, 1992, p. 112). (Italian translation, “Il problema della coscienza”, *Le Scienze, Quaderni, nr. 91*, p.69: «Noi indichiamo questo schema di scariche neuronali con l'espressione “rappresentazione attiva”. Nel cervello deve essere immagazzinata anche una rappresentazione latente del volto, probabilmente sotto forma di un particolare insieme di connessioni sinaptiche tra neuroni. Così, ognuno di noi ha probabilmente una rappresentazione della Statua della Libertà nel cervello, rappresentazione di solito inattiva. Se si pensa alla statua, la rappresentazione diventa attiva, e si ha la scarica dei relativi neuroni. Un oggetto, in ogni caso, può essere rappresentato in più modi: come immagine visiva, come insieme di parole e relativi suoni, o persino come sensazione tattile od olfattiva. Le diverse rappresentazioni sembrerebbero interagire una con l'altra (...) Le rappresentazioni che corrispondono a una coscienza vivida sembrerebbero avere particolari proprietà. James pensava che la coscienza coinvolgesse sia l'attenzione sia la memoria a breve termine. Molti psicologi oggi concorderebbero con

lui. Jackeadoff scrive che la coscienza è “arricchita” dall’attenzione, implicando che mentre l’attenzione può non essere essenziale per certi tipi limitati di coscienza, è necessaria per la coscienza nel suo insieme»).

«Uno dei modi in cui le immagini visive possono essere costruite è quello suggerito dai filosofi dell’empirismo, secondo i quali la percezione viene costruita da sensazioni elementari mediante un processo di associazione. La teoria empirista è stata ripresa nell’Ottocento da Helmholtz e ai giorni nostri da Gregory. Questi autori hanno precisato che la percezione visiva (costruzione dell’immagine) avviene per confronto dinamico fra l’informazione sensoriale fornita dall’occhio e le immagini precedentemente percepite e conservate in memoria. Secondo questa teoria, quindi, per “vedere” è necessario avere imparato a vedere. Quando si guarda un oggetto, viene formulata un’ipotesi sulla sua natura in base all’informazione in memoria, e questa ipotesi viene sottoposta a verifica confrontandola con l’entrata sensoriale. Quando l’ipotesi è verificata, la percezione conduce al riconoscimento dell’oggetto» (Lamberto Maffei e Adriana Fiorentini, *Arte e cervello*, Zanichelli, Bologna, 1995, p. 4).

«Abbiamo congetturato che ogni immagine abbia due aspetti: uno scheletro che ne raffigura in maniera rudimentale solo la forma base, ed eventuali parti accessorie, che sono i dettagli che vengono collocati sullo scheletro dopo che questo è stato generato. “Scheletro” in questa nostra accezione non significa la struttura interna, come l’ossatura d’un animale o l’intelaiatura di un edificio, ma piuttosto una rappresentazione approssimativa di un oggetto, e quindi d’ora in poi useremo il termine “schema” come suo sinonimo. Non potevamo fare a meno di postulare l’esistenza di immagini scheletriche, se volevamo avere delle parti-base, sulle quali agganciare i particolari dell’immagine. La nostra ipotesi era che di un oggetto (o di una forma qualunque) si registri sempre in memoria un’immagine schematica mentre il numero delle parti accessorie che la corredano varia da un caso all’altro. L’idea che non sempre immagazziniamo nella memoria a lungo termine tutti i possibili elementi di un oggetto spiegherebbe come mai tante volte siamo in grado di visualizzare mentalmente un oggetto (una rana, poniamo), senza però riuscire a “vedere” tutti i dettagli (per esempio se la rana ha o non ha una coda rudimentale). I contenuti di questi file accessori sono determinati da ciò che si riesce a notare quando si vede un oggetto o una cosa» (Stephen M. Kosslyn, *Ghosts in the Mind machine. Creating and Using Images in the Brain*, W. W. Norton & Co., New York, 1983, trad. it. *Le immagini nella mente*, Giunti Barbera, Firenze, 1989, pp. 155-156).

Slide nr. 5

When perceiving a face, the relationships between its elements play a fundamental role. Indeed, they induce that mental schema that, because of its essentiality and invariance, can be called the *constitutive structure* (Italian: “struttura costitutiva”). We can consider it as the central and most fundamental part of the figuration process (fig. 49).

Indeed, the constitutive structure is the generative core of that image we produce mentally when we think or speak about something, that is, its mental representation. When representing a “face” or a “head”, we can notice how the process of figuration, which starts from a vaguely shaped volumetric construction, tends to be accomplished following the articulations of the constitutive structure. Moreover, the constitutive structure helps on the one hand integrating further elements mentally represented, and on the other outlining well marked out schematic forms - such as the nose, the eyes, and the mouth - similar to children’s stereotyped graphic expressions.

It is the invariance of the constitutive structure that allows the consolidation of that linguistic commitment according to which one usually associates a mental representation with a noun. A mutual inducement ensues thus between language and mental representations: one can easily verify it by considering how it is possible to associate in a biunique way the mental scheme of each single part of the face – the nose, the eyes, and the mouth – with a noun.

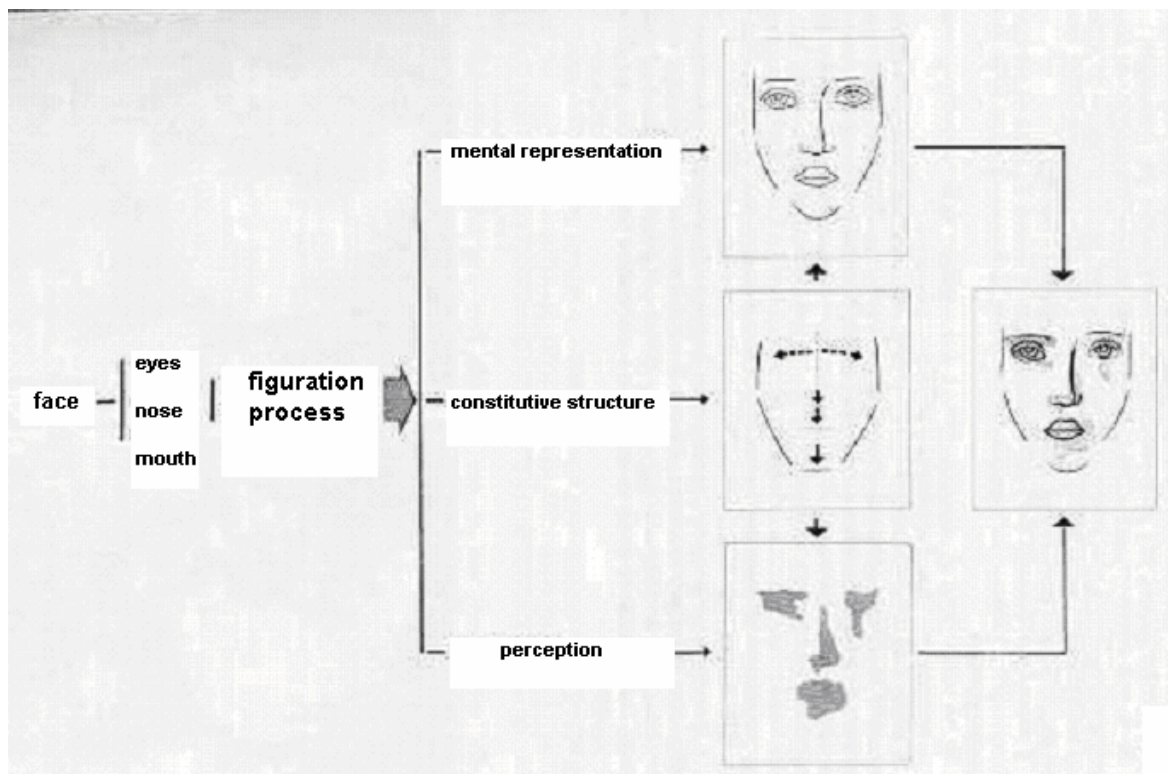


Figure 49

Slide nr. 6

Nouns of things bring about the operations constituting things themselves. Therefore, they represent a fundamental element for the genesis of stereotypes because it is mainly through words that children are led to observe and represent the objects of their environment. In this sense, the *tests of observation* are very revealing. In one of such tests, children were asked to reproduce in the most faithful way the old town centre of Bologna (fig. 50).



Figure 50

The result is clear (fig. 51): we found the same triangular or trapezoidal shaped-roofs that characterize the drawings made by pure imagination; moreover, each house and building seems to be isolated and separated from its context. The operation of isolating separated elements also dominates observation, which confirms that mental representation constrains visual perception.

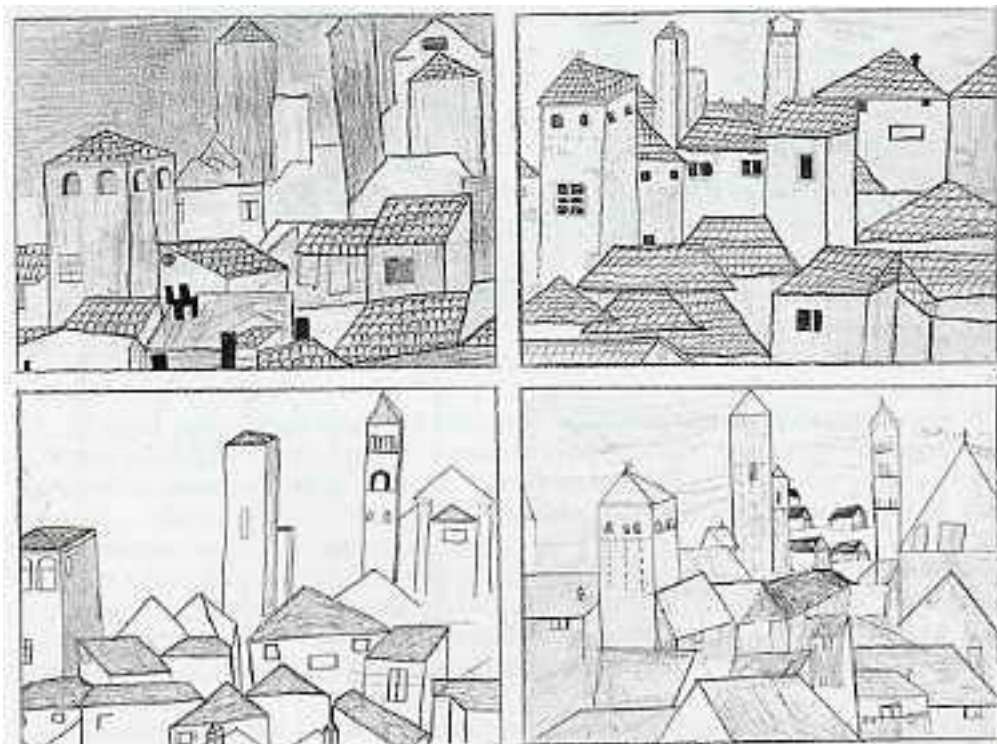


Figure 51

A further confirmation of these results was obtained with the following test. Children were shown a face drawn with a chiaroscuro technique, where every contour line was intentionally avoided (fig. 52). The task consisted in reproducing it in the most faithful way.



Figure 52

Also in this case, the stereotyped shapes of the eyes, the nose and the mouth prevail and are prominent in their linear definition and in one case the pupils are even marked in a resolute way (fig. 53). In all the drawings the oval contour of the face stands out well against the mass of hair: most probably it answers the need to represent bounded and identifiable forms. The plastic and volumetric role of the shades is almost completely ignored, while the chiaroscuro is entrapped by the linear contours.



Figure 53