FORMATS 1
formats

Modulated semantic pregnance and image reading. How readers determine information transmitted by an image

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Modulated semantic pregnance lays the base for an explanatory model of the processes of image reading and thus of any kind of text. This model defines the result of the process of reading an image as a semantic macro-structure. The construction of this macro-structure is ruled by the principle of the search for a propositional gestalt which for the reader supposes the minimum quantity of information which the given conditions allow. Thus, in the process of reading, the calculation of the quantity of information determines the sense of said information. This general principle is modulated, in each specific reading process, by diverse kinds of clauses and exceptions which are signalled to the reader by different kinds of marks allotted/inscribed in the image/text.

1. Images as representations of apparent acts

1.1. An image is a representation of an apparent act by which one individual signals to another a portion of the possible world (1) .

1.2. Any apparent act can unfold into two kinds of enunciative acts: an act of showing and an act of informing.

1.3. An apparent act on a portion of a world always supposes an enunciative act of showing. If someone directs our attention by some gesture towards some place, we can ask "what portion of the world are they showing us?".

1.4. A representation of a presupposed act is installed in all figurative images; by this act, a first individual shows a portion of a possible world so that a second individual can look at, identify and contemplate what is presented. In this case, the first individual takes on the enunciative role of shower, while the second takes on the enunciative role of spectator.

1.5. An apparent act on a portion of a world supposes an enunciative act of informing. If someone directs our attention, by some gesture, towards some place, after identifying the portion of world shown us, we can ask "what is the informative intention of showing us this portion of a world?".

1.6. A representation of a presupposed act is installed in all figurative images by which a first individual shows a portion of a possible world to a second individual so as to transmit some

semantic information. In this case, the first individual takes on the enunciative role of informer, while the second takes on the enunciative role of reader.

1.7. The fact that every image is installed as a representation of an apparent act determines its dialogic nature.

2. Images and mental representations

2.1. For a reader, an answer to the question: "What information is someone trying to transmit showing such and such a portion of the world by such and such an image?" will be considered as the basic hub of the meaning of said image.

-If we consider image 1 in text 1, for example, we will take into account that someone is showing a portion of possible world in which a series of objects are placed, but we will immediately ask, "What is the signaller who shows us such and such a portion of the world trying to inform us? Is he trying to inform us that the tap of a bathtub is dripping? Is he trying to inform us that a woman is taking a bath in the bathtub? Is he trying to inform us that the woman who is taking a bath has big breasts?" Etc. Any of the alternatives which may appear as an answer to the question asked, if it is selected as the definite answer, will become the basic hub of the meaning of image 1 in text 1.

Image 1. TEXT 1.

2.2. The answer that the reader of an image may reach for the question, "What is the signaller who shows us such and such a portion of the world trying to inform us?" must have a propositional format.

-For image 1 of text 1, semantic information such as "the tap of a bathtub is dripping", "a woman is taking a bath in a bathtub", or "the woman who is bathing has big breasts", has a format of propositional representation.

2.3. In the process of comprehension of an image, an individual can construct a mental model (2) , a mental representation with some degree of analogy to that portion of a world which the image shows; but a mental representation of this kind, that is, a mental representation of a non-propositional nature, cannot be identified with an adequate mental representation of the answer to the question, "What semantic information is someone transmitting by such and such an image?". Any analogic representation always supposes some level of inspecificity on the information to be aprehended from the world shown.

2.4. The greater the degree of analogy between the mental representation and the portion of the world for which said representation accounts, the greater the inspecificity of the semantic information to be aprehended. In a hypothetical mental representation which would reproduce the complete structure of characteristics given in a portion of the world, with no addition of supplementary indication, the inspecificity of semantic information which we intend to transmit in respect to said portion of the world would be maximum. As we reduce the degree of analogy, we would also reduce the degree of inspecificity; but if the principle of analogy persists, even though it be in its minimum expression, the effect of inspecificity on the semantic information which someone has intended to transmit by the image will also persist in its minimum expression (3) .

2.5. An individual will not have determined exhaustively what the semantic information is which someone intends to transmit by showing, by means of an image, a portion of the world, until said information is not represented mentally in a format which supposes the least degree possible in analogic relation to the portion of the world shown, that is until said information is not represented in a propositional format (4).

2.6. Aprehending the portion of the world which someone tries to show by means of an image implies optimising the possibilities of analogic formats of mental representations. Aprehending semantic information which someone tries to transmit by means of an image implies optimising the possibilities of arbitrary, propositional formats of mental representations (5) .

2.7. In the process of comprehension of an apparent act which an image supposes, an individual will generate two mental representations, one as spectator, and another as reader. The mental representation which the individual generates as spectator supposes a representation of the portion of the world which is shown by its image. This representation has the form of a mental model and possesses a referential value. The mental representation which the individual generates as reader supposes a representation of the information which is transmitted by means of the image. This representation has a macro-propositional form and possesses a semantic value.

3. Images as manifestations of propositional batteries

3.1. The propositional nature of semantic information which an image transmits is determined by the fact that not only is something presented by said image -reference-, but also that some information is given about that something -predication-.

3.2. A figurative image presents, in the portion of the world it shows, a series of objects. These objects are categorised in the process of perception/reading. By categorisation, a reference value is assigned to this set of objects represented and they are transformed into semantic entities.

-In the image in text 1, for example, we can establish a list of categorised objects: "woman", "bathtub", "tap", "soap", "walls", "woman's eyes", "drain", etc.

3.3. For each figure which appears in an image, alternative categorisations can be established.

-As to the image in text 1, if we determine that there is some liquid in the bathtub, this can be specified in semantic entities as "water", "alcohol", "milk", etc. On the other hand, for the woman categorised in the first place as "woman", alternative categorisations could appear, such as "inflatable doll", "transsexual", etc.

3.4. A figurative image manifests, for each of the semantic entities it may present, all those predicates which can be aprehended by an individual in the reading of said image. Each assignment of a predicate to a reference makes up a proposition.

-In the image in text 1, for the semantic entity "woman", for example, we could establish a long list of propositions expressed in sentences like "The woman has short hair", "the woman has her knees out of the water", "the woman is stretched out in a bathtub", "the woman has her eyes open", etc.

3.5. The combination of all propositions the reader can understand in a random succession by reading an image, will be called the image's propositional battery.

-For each of the semantic entities which can be identified and categorised in the image in text 1, a long list of propositions can be made. The combination made up of a random succession of all possible propositions referring to all the semantic entities which the reader can identify in the image in text 1, will define said image's propositional battery.

3.6. The whole of an image's propositional battery, whatever propositional format it may have, cannot be considered as the answer on the meaning of said image. This is so because this battery normally supposes a quantity of propositional information so high that it makes its reading and memorisation impracticable.

-If we ask ourselves about what semantic information someone is trying to transmit by means of the image in text 1, we would not answer with an enormously long list in which all the propositions the image can manifest follow one another at random. We do not recognise the experience of making a reading of images as a process of this kind. Such a reading would be interminable and memorising would be impossible.

3.7. One or several propositions of the propositional battery, taken at random, cannot be considered as the answer to the basic hub of the image's meaning, although they may be easily read and memorised. This is so because the degree of unpredictability about the result of the reading of the image would be so high that it would make the production of images for transmitting semantic information unprofitable.

-If we ask ourselves what is the semantic information someone is trying to transmit by the image in text 1, we will not consider pertinent the random taking of any proposition or set of propositions which the image shows. Thus, for example, the set of propositions expressed in the linguistic enunciate "Two towels are hanging behind the woman's head and the woman's eyes are open" does not have to be considered as a basic hub of the meaning of the image just because of the simple fact that the image shows it, by the simple fact that this set of propositions can be true as to the portion of the world which is shown in the image.

3.8. Only in the case that an image be used as a data bank, can each act of reading then

legitimately consist of aprehending any of the propositions of the propositional battery. This proposition will answer, in each case, to a specific question which the reader puts to the image.

-A paradigmatic example of a kind of image used as a data base is that of maps. On a motorway map, for example, we can ask questions such as "What towns must we pass to get to such and such a city?", "Which is the shortest route from this town to that?", "How many kilometres are there between this and that point on the motorway?", etc. A map has a huge propositional battery and each proposition is relevant to a question the reader may put to the map.

4. Reading of images and construction of semantic macro-structures

4.1. The reading of an image or set of images presupposes a process by means of which a semantic macro-structure is produced. This semantic macro-structure must give the reader the over-all meaning which can be inferred from the propositional battery manifest in the image (6) .

-If we ask ourselves what is the semantic information someone is trying to transmit by the image in text 1, we could intuitively answer something like "it seems that we are being informed that a woman is bathing in a bathtub". In this case we would consider, therefore, that the propositional unit "a woman is taking a bath in a bathtub", or another like it or more or less equivalent to it, should be taken as the semantic macro-structure of image 1 of text 1. Somehow, it seems that we have the intuition that the semantic macro-structure "a woman is taking a bath in a bathtub", defines and integrates in the best possible way, the battery of propositions manifest in the image.

4.2. A mental model is the mental representation of the portion of the world which a text shows. A semantic macro-structure is the mental representation of the semantic information which in the text is transmitted onto the portion of the world which is shown in the text itself.

4.3. A semantic macro-structure supposes a specific categorisation for each of the figures presented by the image, among all the alternative categorisations which could be assigned to said figure.

-Thus, for example, for the central figure in image 1 of text 1, the macro-structure "woman bathing" implies its categorisation as "woman" and not as "doll", or "transsexual", say.

4.4. A semantic macro-structure supposes a definition and a specific organisation of the propositional battery manifested by an image. To this specific organisation we will allot the name propositional structure. A propositional structure is the result of the introduction of a factor of order into the propositional battery. Order is determined from a basic hub constituted by a semantic macro-structure, a macro-proposition which reports the over-all meaning of the image.

-The semantic macro-structure determines order in the propositional battery, so that the different propositions are organised by means of a principle of hierarchy. Thus, for image 1 in text 1, the macro-structure "a woman is taking a bath in a bathtub" determines a specific order for the different propositions in the propositional battery:

"A woman is taking a bath in a bathtub"

The woman has hair. The bathtub has a tap.

Her hair is short. A drop of water is falling from the tap.

4.5. The propositional structure is a hierarchical form. At the upper level we have the semantic macro-structure. In the progressively lower levels we find the semantic information which, recursively, widens the information in the macro-structure till all the propositional structure's own information is exhausted.

4.6. The degree of memorability and accessibility of the semantic information contained in the propositional structure will be greater the higher its position in said structure. The highest degree of memorability and accessibility corresponds to the information contained in the semantic macro-structure.

-Given that the propositional unit "a woman is taking a bath in a bathtub" is in the highest place of the propositional structure we have constituted from the image in text 1, while the proposition "her knees are bent" takes a lower place in said structure, the first proposition will be memorised longer than the second and will be more easily accessible for the individual.

4.7. Assigning different semantic macro-structures as defining hubs of the image's meaning supposes giving the propositional battery different orders which the image manifests, that is, it supposes organising diverse propositional structures.

4.8. The propositional structure of an image supposes a specific description of the portion of the world shown by means of said image.

4.9. Multiple semantic macro-structures and thus, different meanings, can be assigned to any image. Not any semantic macro-structure can be considered as the answer to the meaning of an image. Not any principle of order can be considered as the pertinent principle of order. The unpredictability of the result of the reading of an image would be so high thet it would be unprofitable to produce images for transmitting semantic information.

-For image 1 in text 1 we could propose different semantic macro-structures: "a woman is taking a bath in a bathtub", "there is a nude woman inside the bathroom", " a person stretched out is looking forward", "a bathtub and the body of the woman in it have rounded shapes", "a woman is taking a bath in a bathtub full of milk", "a young woman meditates with bent knees", "an inflatable plastic doll is in a bathtub". Each of these macro-structures would give a different answer to the question "what is the semantic information someone is trying to transmit by the image in text 1" and would determine different definitions and organisations of the propositional battery manifest in the image. All the macro-structures presented report on descriptions which may be true in relation to the portion of the world shown in the image and also they define and order, somehow, the propositional battery: however, we could agree that intuitively, the macro-structure "a woman is taking a bath in a bathtub" seems more adequate to the image in text 1 than any of the alternative macro-structures we have put forward. The question is: why?

5. Indeterminacy of image reading and the principle of the guarantee of communicability

5.1. That a proposition, a set of propositions, or a macro-proposition be true or may be true as to the portion of the world which is shown by means of an image, does not determine that this proposition, set of propositions or macro-proposition must necessarily be considered as the basic hub of the image's meaning, as the mental representation of the semantic information which is transmitted by means of the image.

5.2. The following cannot be considered as the basic hub of the meaning of an image: 1. The random set of all propositions of the propositional battery. 2. Any proposition of the propositional battery designated at random. 3. Any macro-proposition which, although introducing a specific order factor into the propositional battery, has been determined at random (7).

5.3. It is necessary to postulate the existence of some principle which converts the determination of an image's semantic macro-structure into a non-random process and which, therefore, will guarantee the fulfillment of the communicative function of said image. Only a principle of this kind will allow us to understand that producing images for transmitting semantic information can be profitable.

-If we intuitively determine that for image 1 in text 1 the macro-structure "a woman is taking a bath in a bathtub" is more pertinent than, for example, any of the other possible macro-structures presented earlier, there must be some principle, explainable in computational terms, by which our mind arrives at such a conclusion, some principle which allows the author of the image in text 1 to foresee what it is which we will read and which will allow us, as readers, to infer what it is that the author of the image in text 1 meant by showing us that portion of the world which appears in that image.

5.4. In processes of transference of semantic information by means of images, a principle of the guarantee of communicability must be introduced. This principle supposes a reduction of the degree of unpredictability and indeterminacy of reading, and poses a dialogical perspective. According to this perspective, both the informant and the reader are competent as to the principles which regulate the applying of basic operations of information processing. From this competence, the informant and the reader can mutually take one another into consideration.

6. Semantic pregnance as a principle of the guarantee of communicability

6.1. The guarantee of communicability established between individuals who transfer semantic information to one another by means of images is based on the principle of semantic pregnance. The principle of semantic pregnance defines that, to determine the meaning of an image or set of images, the greatest quantity of explicit semantic information will be processed in order to calculate, as a result, the semantic macro-structure with the least quantity of information that the given conditions allow (8).

-If we intuitively determine that the semantic macro-structure "a woman is taking a bath in a bathtub" is the most pertinent as to the image in text 1, this would have the following

explanation: said macro-structure, among all those possible, is that which defines and subsumes the greatest quantity of the image's propositions so as to construct a semantic order which implies, for us, the least quantity of information, the maximum pregnance.

6.2. To determine the propositional structure transmitted by an image or set of images, a reader will take into consideration the principle that said propositional structure must increase in the least possible quantity the quantity of information stored in his memory.

6.3. Every individual will look for a propositional structure which will contribute some relevant quantity of information in an image or set of images. However, every individual, to determine which is the propositional structure which he must assign as meaning to the text, will calculate the semantic macro-structure which will suppose, for him, the least quantity of information.

6.4. The application of the information processing operations manifest in an image is determined by fixing a kind of goal defined by maximising pregnance. The reading of images must be understood as a process of resolution of a specific class of problems.

6.5. In the same way as an image supposes a battery of perceptive stimuli which must be reduced in the process of perception to a perceptive gestalt with the maximum degree of pregnance possible (9), an image also supposes a battery of propositional stimuli which must be reduced in the reading process to a propositional gestalt with the maximum degree of pregnance possible.

6.6. The processing of semantic information for the construction of the meaning of a text is determined by calculations around factors referred to the quantity of information. Information in a quantitative sense determines information in a qualitative sense. The treatment of the quantity of information determines the sense of said information. Reading is a calculation. Reading images is a calculation.

6.7. The general principle for determining the semantic macro-structure that a reader can consider as determining the meaning of an image or set of images is a principle, according to which the reduction of the quantity of information must be maximised. In this sense, the construction of a meaning from an enormous battery of propositions is ruled by a general principle by which the reader tends to simplify complexity, to determine some kind of order in chaos, to reduce the degree of ambiguity, to make information more redundant, and, therefore, to convert uninteligibility into inteligibility and make his memory capacity more profitable.

7. Determining factors in the degree of pregnance of a semantic macro-structure

7.1. To determine the quantity of information of a semantic macro-structure, and, therefore, to determine, among all those possible, the semantic macro-structure which will be assigned to an image, two basic factors will be taken into account. The first factor refers to the number of propositions implied in the macro-structure. The second factor refers to the macro-structure's degree of improbability in regard to the reader's memory.

7.2. Regarding the first factor, we will take into account that the number of propositions supposed in a macro-structure are determined depending on two variables: the first variable

refers to the quantity of elementary propositions which make up the semantic macro-structure; the second variable refers to the quantity of alternative propositions which can be derived from the macro-structure.

7.3. The more the elementary propositions articulated in a semantic macro-structure, the greater the quantity of information supposed in said macro-structure.

-Regarding image 1 in text 1, a macro-structure such as "a woman is taking a bath in a bathtub" contains a lesser quantity of elementary propositions and, therefore, a lesser quantity of information than, for example, a macro-structure such as "a woman takes a bath in a tub which has a tap from which a drop of water is falling".

7.4. The greater the quantity of alternative propositions which can be characterised from a semantic macro-structure, the greater the magnitude of its ambiguity and, therefore, this will suppose a greater quantity of information.

-If the semantic macro-structure of image 1 in text 1 can be "a woman is taking a bath in a bathtub", we could believe that one way of reducing its quantity of information would consist of applying a rule of generalisation on its propositional content. If we apply this kind of rule in some degree on the macro-structure quoted above, we could obtain a macro-structure such as "a person washes". Thus, "a person" would be a generalisation of "a woman", and washes" would be a generalisation of "is taking a bath in a bathtub". However, this macro-structure has a greater degree of ambiguity and, therefore, a greater quantity of information, than the first macro-structure quoted. The macro-structure "a person washes" is more ambiguous than the macro-structure "a woman is taking a bath in a bathtub", because from the first we can derive a greater quantity of alternative propositions than from the second. Thus, "a person washes" is a macro-structure which could be specified as "a man is showering" or "a girl washes her face", etc.; however, these propositions cannot be derived from "a woman is taking a bath in a bathtub".

Any semantic macro-structure can be transformed into a maximum generalisation degree semantic macro-structure, a macro-structure such as "something/someone is", "something/ someone is something", "something/someone is doing something", etc. Thus, the maximum generalisation degree semantic macro-structure of the semantic macro-structure "a woman is taking a bath in a bathtub" would be "someone does something in some place".

7.5. In the propositional structure of an image, on an axis of specification/generalisation, we have, on one end, that of specification, the basis of the propositional structure manifest in the image; on the other end, that of generalisation, we find the maximum generalisation degree macro-structure such as "something/someone is", "something/someone is something", "something/someone is doing something", "someone does something in some time/place", etc. The two ends suppose points of maximum quantity of information; the basis of the propositional structure, due to the number of propositions which make it up; the maximum generalisation degree macro-structure, due to the quantity of alternative propositions which can be derived from it because of its ambiguity. On some point of the axis, between the two ends, the quantity of information is maximally reduced, and at this point we find the semantic macro-structure which will be aprehended and memorised as the basic component of the image's meaning.

7.6. The more improbable a semantic macro-structure as to the expectations of the reader about the world to which the image refers,the greater quantity of information supposed by said macro-structure. The reader's expectations about a world are directly derived from semantic information about said world which is stored in his memory.

-The macro-structure "a woman is taking a bath in a bathtub full of milk" supposes a greater quantity of information than the macro-structure "a woman is taking a bath in a bathtub full of water". The fact of a bathtub being full of milk is, referred to a reader's memory, referred to his semantic frame (10) "bathing in a bathtub", a more improbable alternative than the fact of a tub being full of water. Neither of the two alternatives is contradictory as to the figurative clues present in the image; however, the reader will process the alternative which, to him, supposes storing the least quantity of information, that is, that which is more probable in relation to his memory structures.

7.7. Regarding a specific image, the most pregnant semantic macro-structure will be the one which, being the least ambiguous possible, contains the least ammount of elementary propositions and accounts for the most probable states and events for the structure of memory which the reader possesses in relation to the world referred to in the image.

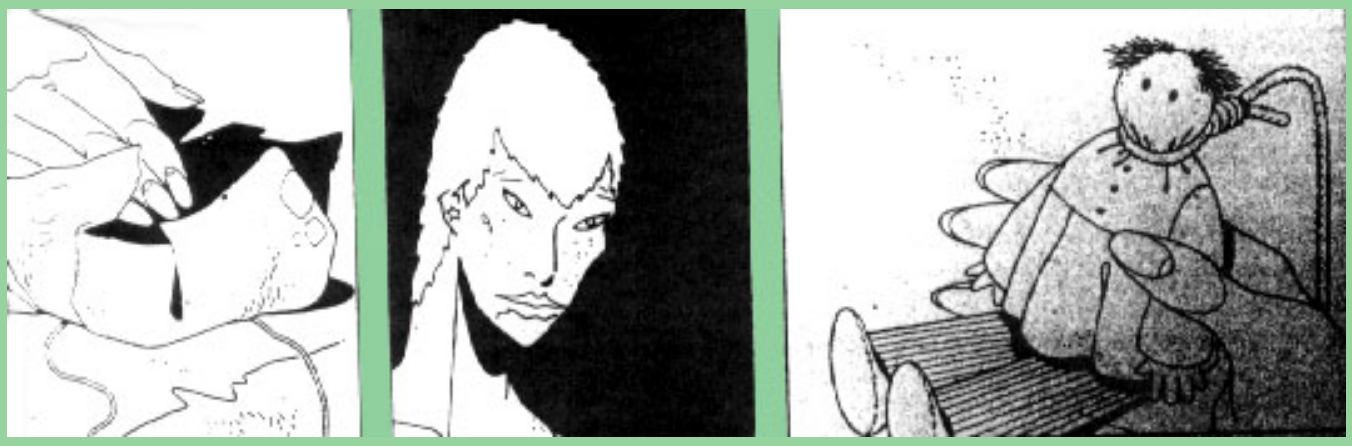
7.8. The pregnance of a semantic macro-structure implies the pregnance of the propositional structure which it organises.

7.9. When an image allows an individual to construct different semantic macro-structure which suppose equivalent ammounts of information, then that implies a substantial increase of the indetermination of the result of the reading of said image.

8. Reduction of the ambiguity of semantic macro-structures and application of the principle of relevant improbability

8.1. Reducing the magnitude of ambiguity of a semantic macro-structure supposes a maximum reduction of the quantity of alternative propositions which can be derived from it. To reduce the magnitude of ambiguity of a semantic macro-structure we introduce, into its construction, the principle of relevant improbability. This principle instructs the reader so that if, in the propositional battery manifest in an image, some proposition with a high degree of improbability appears, this proposition will be assigned a relevant presence in the final semantic macro-structure.

-For the sequence of images in text 2, we can determine a semantic macro-structure such as "a woman takes a rag doll with a rope around its neck out of a parcel". The information offered by image 6 about the kind of dress, the sahpe of the head, etc., have a high degree of probability as to the semantic frame "rag doll"; however, the fact that the doll appears to be hanged with a rope wound around its neck, is semantic information with a high degree of improbability as to the semantic frame, and, therefore, this information, following the principle of relevant improbability, will be included in the final macro-structure.



Images 1 to 6. TEXT 2.

8.2. The principle of relevant improbability reduces the ambiguity of the semantic macro-structure, because this principle determines that if there were some alternative, improbable for the propositions derivable from this macro-structure, then this alternative would appear manifest in the macro-structure. This principle averts carrying out indiscriminate characterisations or specifications with improbable alternatives, and thus extraordinarily reduces the quantity of alternative propositions which can be derived from a macro-structure.

-If in regard to an image we are given a macro-structure such as "a woman is taking a bath in a bathtub", we will suppose that the information we can derive from said macro-structure will be foreseeable as to the semantic frames it activates, and this because we know that if some improbable information as to said frames existed in the image, this information would appear in the macro-structure. The principle of relevant improbability tells the reader that if, for example, in the image in text 1 the woman were to appear with a panther's head, then said information would be included in the macro-structure of the image. If we did not take this principle into account, the propositions which could be derived from a macro-structure such as "a woman is taking a bath in a bathtub" would not be restricted to the most possible, but rather, it would be licit to derive any proposition we could imagine, even though this would suppose very improbable information; we could thus derive propositions such as "the tub is hat-shaped", "the woman has a panther's head", "the woman bathing in a tub is wearing a diving helmet", etc. Elimination of the principle of relevant improbability would extraordinarily increase the quantity of propositions derivable from the macro-structure "a woman is taking a bath in a bathtub" and, therefore, would extraordinarily increase the magnitude of its ambiguity and the quantity of information it supposes.

8.3. The irrelevant probability principle indicates that if a characteristic or component of a semantic entity appearing in a macro-structure has a high degree of probability within a semantic frame corresponding to said entity, then such information will not appear in the final macro-structure. The irrelevant probability principle allows reduction of the quantity of information when the number of elementary propositions which make up the semantic macro-structure are reduced, and this without ostensibly increasing the magnitude of ambiguity of said macro-structure.

-The final macro-structure of image 1 in text 1 will be "a woman is taking a bath in a bathtub", and not "a woman, with two arms and two eyes, is taking a bath in a bathtub". The elementary propositions "the woman has two arms" and "the woman has two eyes", are very probable in regard to the semantic frame "woman", and, therefore, can be derivable from the first macro-structure without needing to be included in it.

9. Introduction of implicit information and construction of semantic pregnance

9.1. In the reading of an image or set of images, we will introduce, for information processing, the least possible quantity of implicit propositional information which will allow the greatest possible reduction of explicit propositional information.

-To construct a semantic macro-structure such as "a hand takes a parcel" from images 1 and 2 in text 2, it is necessary to include implicit information. This semantic information includes propositions which give an account of intermediate states, not shown, in the development of the action. Including implicit propositions allows construction of semantic macro-structures whose quantity of information is less than that of macro-structures which could appear if said propositions were not used. If the reader were not to include implicit information, then he would basically have two possibilities of interpretation. According to the first possibility, the states explicitly described in each of the images are to be understood as independent states, not interconnected in any way, states referring to different entities and to different spaces and times. The description of two non-connected states supposes a greater quantity of information, of complexity, than the narration of an action which integrates them into a semantic gestalt. According to the second possibility of interpretation, states explicitly described would form a part of an action, but there would not be unshown intermediate states between said states. This second reading would report on an action which develops in sincopation and in totally discontinuous time. An action of this kind shatters the reader's expectations as to the temporal development of events in the worlds he knows, and, therefore, this supposes for the reader, a greater quantity of information than that which would be implied by including implicit semantic information which reports on the phases of development of an action not shown in the images.

In the reading of an image or a sequence of images to construct semantic macro-structures, implicit propositions should be inferred; however, these must suppose the least possible quantity of information. To read the sequence made up by images 1 and 2 in text 2, implicit information will be included which describes the successive states in which a hand goes in between boards, takes a parcel and goes out again, with the parcel. The implicit propositions which refer to the succession of actions narrated suppose the least possible quantity of information which allow the configuration of a unique action from the explicit states. The reader will not infer implicit semantic information more complex or improbable than that which is strictly necessary to reduce the quantity of explicit information. Thus, for example,

the reader in the sequence pointed out will not gratuitously include propositions which give an account of how, between the states described by images 1 and 2, the hand goes in and out between the boards several times while wagging the index finger up and down, etc.

10. Rules for reducing the quantity of information in images and the construction of semantic pregnance

10.1. The rules which allow the reduction of the quantity of propositional information of an image or set of images are of three kinds: identification, integration, and connection.

10.2. Identification. Provided that identifying two or more semantic entities as one and the same entity supposes reducing the quantity of information, identification between these entities will be carried out.

-In each of the images in text 3, three figures appear; each of these figures refers to an individual. Although the features which allow the recognition of the three figures as referents to one and the same individual are not conclusive, especially if we consider the figure in image 1, the reader will tend to establish an identification between the three figures. This identification will provoke a reduction of the quantity of information as it allows the construction of a narrative macro-structure which integrates the three states described in each of the images of the sequence into a unit of action developed by one single individual.

Images 1 to 3. TEXT 3.

10.3. Integration. Provided that integrating two or more semantic entities into a superior entity supposes reducing the quantity of information, integration between said entities will be carried out. The rule of integration will be of two kinds: construction and generalisation. By means of

construction, diverse parts are integrated into a whole. By generalisation, diverse specific cases are integrated into a general class.

-In text 4, the reader will tend to establish the integration of the bust and face of the woman who appears in text 1 and the legs which appear in text 2 into a superior entity which will be specified as a woman's body. In the same text, the reader will tend to integrate the fragments of space shown for each image and the objects in them within a superior entity defined as "bathroom". In the same way, states referring to the relation between the woman and the dress, described in images 1 and 2 of the text, can be integrated into a superior semantic entity, and this entity will refer to an action such as "undressing". The integrating operations we have mentioned allow the construction of a semantic macro-structure with an quantity of information lower than that supposed by a propositional structure which did not take said operations into account.

Image 1 to 3. TEXT 4.

10.4. Connection. Provided that using a semantic entity as the answer to a question on another semantic entity supposes reducing the quantity of information, the propositional connection between the two semantic entities will be established.

-In text 2, the rag doll in image 6 can be the answer to the question "what is the woman who appears in image 5 looking at?". The rag doll can also be the answer to the question "what has the woman taken from the parcel which appears in images 2, 3, and 4?". Given that the fact of answering both questions by the proposed solution supposes a lesser quantity of information for the semantic macro-structure of the secuence than that which giving other kinds of answer or asking other kinds of questions would suppose, the reader will finally establish the

propositional connections which determine the questions/answers mentioned. These connections will define propositions such as "the woman is taking a rag doll out of the parcel" and "the woman is looking at the rag doll".

10.5. Rules for reduction of the quantity of information is the name given to rules whose application only reduces the quantity of information in some cases while, in others, it increases it. Rules of identification, integration, and connection will be considered as rules for reduction of the quantity of information because, as a general principle, they will only be applied in those cases in which they effectively reduce said quantity of information.

-In text 6, establishing an identification between the individuals who appear in image 2 and those who appear in image 3 supposes adding a greater quantity of information than would be implied by not applying such an identification operation, because the reader would have to introduce a great quantity of semantic information to explain how some individuals dressed as soldiers and shooting turn into the individuals in civvies who carry out a specific series of contorsions. In text 4, integrating into only one being the lower parts of the legs which appear in image 2 and the upper part of the tub which appears in image 3 would suppose substantially increasing the quantity of information transmitted in the text because of the fact of configuring an entity, with woman's legs and body of a bathtub with a woman's torso in it, which is extremely original in relation to the worlds known to the reader.

10.6. Each time that, in a reading process, new semantic information appears, the reader applies that rule for reduction of the quantity of information which generates greater pregnance into the result, that is, that which produces the least increase between the quantity of information before and after application of the rule.

-When reading images 1 and 2 in text 4, we could construct two semantic macro-structures. The first macro-structure would be: a woman is undressing"; the second macro-structure would be "a woman, with a fallen shoulder-strap and uncovered breasts, is looking at the legs of another woman who is stepping on a dress". For the first macro-structure we have used, basically, an integration operation; for the second macro-structure, we have used, basically, a connection operation. Given that the first semantic macro-structure contains a lesser quantity of information than the second, we will apply the reduction operation which will give us the first macro-structure as a result.

10.7. In the process of reading, the simultaneous application of sets of rules for the reduction of the quantity of semantic information may appear. In a specific phase of the reading process that set of rules which supposes the greatest possible reduction of the ammount of information will be applied.

-In text 2, to construct the meaning transmitted between images 5 and 6, a connection rule will be applied, -"the woman is looking, what is she looking at?", a rag doll-, but at the same time, a construction rule will be applied to integrate the head which appears in image 5 and the hand which appears in image 6 in one and the same woman's body.

10.8. Each time new semantic information appears in a reading process, the reader will tend to apply reduction operations. If the application of any of the rules or sets of rules supposes increasing the quantity of information in a greater degree than that supposed by its non-

application, then the new semantic information is conserved and is noted as the initial element in a semantic macro-structure which can possibly develop later.

10.9. If, in a reading process, several macro-structures develop in parallel, when new semantic information appears this will be related to that macro-structure in regard to which the addition of the least quantity of information is supposed.

10.10. Two semantic macro-structures developed in parallel can form a new, superior semantic macro-structure when the application of one of the rules of reduction which affects both of them supposes diminishing the quantity of information.

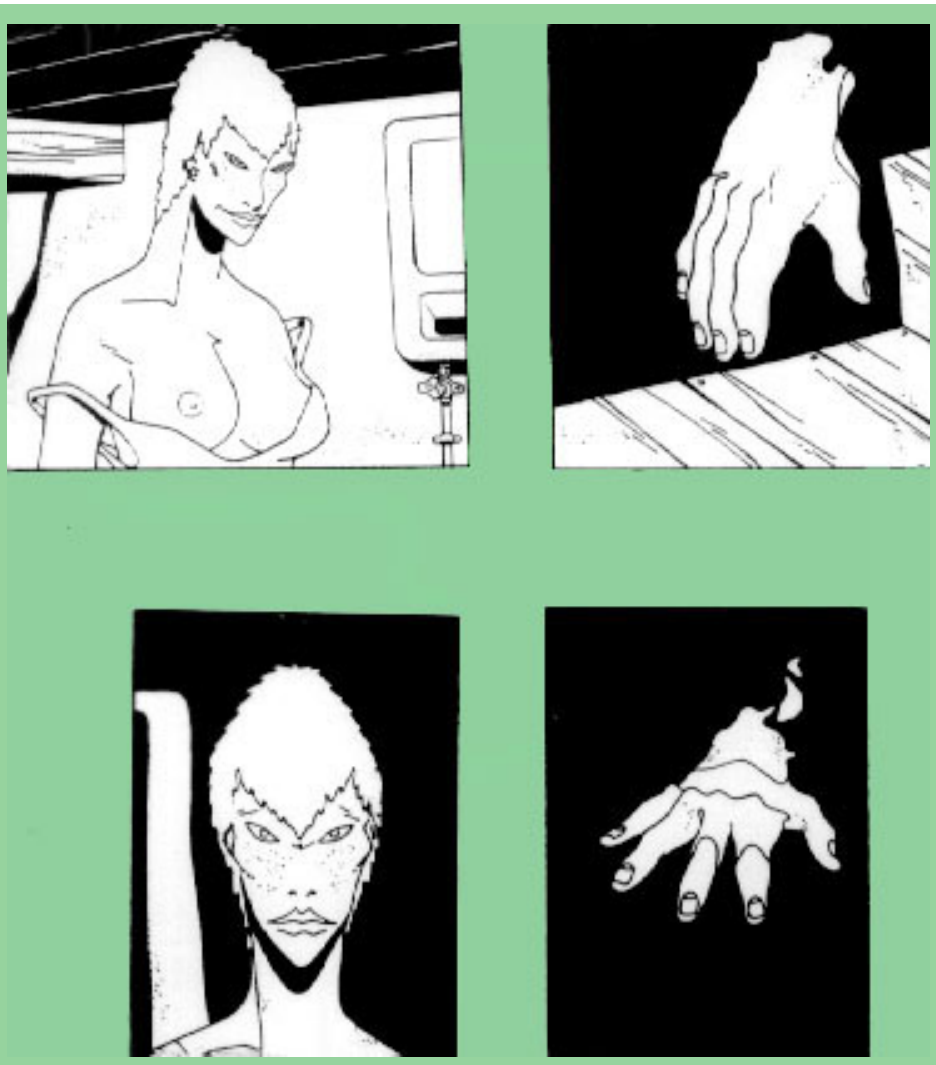
11. The construction of semantic pregnance in image sequences and the mutual relevance principle

11.1. In a set of images presented as a text, the propositional structure of each of the images is calculated so as to give the set of the text a semantic macro-structure which will suppose the least quantity of information possible in the given circumstances.

11.2. The fact that the propositional structure of an image is determined on the basis of an all-over calculation on the semantic information of the text in which the image is integrated, allows the possibility of the semantic macro-structure taking on different values, according to the different texts in which the image can be included.

-To image 1 in text 4 we can assign a semantic macro-structure such as "a woman allows her dress-straps to slip". The reason is that the state which describes this semantic macro-structure can be articulated with the state described in the macro-structure "the clothes are on the floor at the woman's feet". This second macro-structure can be assigned to image 2 in the same text because it can be articulated with the macro-structure we have already defined for image 1. The macro-structures pointed out are assigned to each of the images because the states which they describe can be integrated into an action which subsumes them and for which we can account by means of a semantic macro-structure such as "a woman undressing".

To image 1 in text 5 we can assign the macro-structure "a woman, with a fallen shoulder-strap and uncovered breasts, is looking". This is because the state which the macro-structure describes can be articulated, by means of a question/answer connection, with the state which, in image 2 in text 5, describes the macro-structure "a hand, not joined to any body, floats above the floor". Thus, by means of the connection established by the question "what is the woman looking at?", the sequences of images 1 and 2 in text 5 can acquire a semantic macro-structure such as "a woman, with a fallen shoulder-strap and uncovered breasts, is looking at a hand, not joined to any body, which floats above the floor". To the same image, that which appears as 1 in text 4 and as 1 in text 5, we assign, for each sequence, different semantic macro-structures. This can be explained by the fact that the basic hub of an image's meaning, for a reader, is determined by maximising the semantic pregnance of the whole of the text in which the image is included.



Images 1 to 4. TEXT 5.

The construction of the meaning of an image by means of editing, be it film, comic, etc., is explained by the application of the semantic pregnance principle.

11.3. In a set of images presented as a text, to assign a semantic macro-structure to each image the reader must develop a problem-solving process by means of which he will calculate, for the different images, those macro-structures which will allow the establishing a semantic coupling. The objective of the semantic coupling will be to construct a propositional gestalt with the highest possible degree of pregnance.

11.4. In a text made up of a set of images, those macro-structures which are mutually relevant will be calculated for the different images. Several macro-structures are mutually relevant when they make the constitution of a new semantic macro-structure possible, which for the reader will suppose a lesser quantity of information than that supposed by the non-articulated macro-structures of the images which make up the text.

11.5. Among all the semantic macro-structure which can be assigned to the images in a sequence, those whose degree of mutual relevance is greater will be determined, that is, those which allow the greatest reduction of the quantity of information transmittable by the text.

-In text 4, in images 1 and 2, among all the semantic macro-structures which could be assigned to them, we allot them respectively the macro-structures "a woman allows her

shoulder-straps to fall", "the clothing is on the floor at the woman's feet". These macro-structures are allotted to images 1 and 2 because they are mutually relevant macro-structures, that is, they allow the construction of a new, superior level macro-structure "a woman undressing", which reduces to a minimum the quantity of information transmittable by the text.

11.6. A proposition is relevant to another proposition not because while it allows us to infer some new proposition this is useful to increase the quantity of information which the individual stores in his memory; a proposition is relevant to another proposition because, while it allows us to infer a new proposition which subsumes or articulates those preceeding, it allows the construction of simpler, more pregnant, propositional structures, and, therefore, this allows the reduction of the quantity of information which the individual will store in his memory (11).

11.7. Relevance is not a first order explanation principle, but rather is derived from the principle of pregnance.

11.8. The principle of semantic pregnance and, therefore, the principle of mutual relevance, determines that semantic information transmitted by a sequence of images is configured as a gestalt, as a system in which all units of information are structurally dependent.

12. Determining semantic pregnance and memory diversity

12.1. Given that applying the principle of semantic pregnance can vary according to the reader's memory, readers with different memory/culture can calculate different semantic macro-structures to assign a meaning to the same image.

12.2. If we have an image and a semantic macro-structure which is the result of a process of reading said image, the characteristics of a reader's memory or culture can be calculated. This calculation will be carried out taking into account that for said reader that macro-structure supposes the least possible quantity of information between macro-structures he could have produced.

-We could imagine the following four semantic macro-structures as a result of the reading of image 1 in text 1 by four different hypothetical readers: 1- "a woman is taking a bath in a bathtub"; 2- "a nude white woman is in an artifact full of liquid"; 3- "pieces of the body of a living creature are scattered on a surface and surrounded by objects of different shapes and sizes"; 4- "a pearate is adeling", where pearate refers to a kind of woman, and to adelate to a kind of action proper to pearates.

For each of the four macro-structures we can infer individuals with different memories and, therefore, cultures. If for each of these hypothetical individuals we can infer some characteristic of the structure of their knowledge of the world, this is due to our presupposing that said macro-structures are, for each of the individuals who have produced them, the most semantically pregnant results at which they have been able to arrive in their reading of the image in text 1, and that therefore they are not the product of any random order of information transmitted by the image.

We will surely consider that the reader who produced the first macro-structure belongs to the

culture most closely identified with what is stored in our own memory. We can infer that the individual who has carried out the second macro-structure is one for whom the variable "being white" does not have a high probability value as to the semantic frame "woman", for whom the semantic frame "bathing in a bathtub" does not exist, etc. As to the individual of the third macro-structure, we can suppose that it is an individual quite far from our culture, even from the culture of any human being, for whom the categories of "woman" or "person" do not exist, and for whom not even the category "liquid" exists, at least for whom the semantic frame "liquid" does not include that liquids can be penetratated by solid bodies, etc. As to the fourth macro-structure, we have a hypothetic individual who stores in his memory two semantic frames which we do not possess. Thus, for this reader, a pearate would be a specific kind of woman who possesses, in a specific way, the characteristics of the personage who appears in the image in text 1. In the same way, to adelate would suppose a script (12), a standardised sequence of actions, proper to pearates; in said script we would include the fact of being in a tub with some specific objective. This hypothetic reader could have learned the semantic frames pearate and to adelate from a relation to his real world, a real world far from our own, or at least through reading texts referring to possible worlds with a fantastic nature, texts unknown to us.

12.3. For a reader, the less the quantity of information of the semantic macro-structure he has constructed for an image, the greater degree of comprehension of said reader as to the basic hub of the meaning of the image.

-Each of the hypothetical macro-structures we have looked at presupposes a different degree of comprehension for each reader. Thus, for example, the third macro-structure implies a reader whose level of comprehension is ostensibly lower than that of the reader who produced the first macro-structure, with whom we can identify. However, the reader of the fourth macro-structure surprises us with a level of comprehension which seems higher than ours and discovers knowledge of a world which we do not possess and which seems to allow him a more precise comprehension of the image's meaning.

12.4. To project the configuration of an image so as to transmit a specific semantic macro-structure, the author of said image hypothesises a receiver with a specific memory structure, a model reader (13).

13. Image reading and modulation of semantic pregnance

13.1. For the construction of the macro-structure which will account for the semantic information transported by an image or set of images, the reader will apply information reduction operations to the manifest propositional battery. This application will be carried out recursively. However, in this process the reader will take into account some exceptions and clauses signalled by means of different kinds of marks. These marks may appear alloted to images or may make up a part of their configuration. Clauses and exceptions applied to the semantic pregnance principle define a modulated semantic pregnance.

13.2. By means of an image, and to determine its interpretation, we put two basic components at the readers disposal: a propositional battery on which the reader must apply information reducing operations, and marks which instruct on exceptions and conditioners which must be considered when applying those operations.

13.3. To explain the processing of the image's semantic information, it is not necessary to postulate the existence of a great many codes and specific rules of different kinds; we have enough with an account of some general semantic information reducing operations, operations which are common to different kinds of cognitive processes, and of a set of exceptions and conditioners which can correct, in some cases, the automatic application of those operations.

13.4. Clauses and exceptions which can be taught on the application of information quantity reducing operations are of a cultural nature and are historically transformed to generate different kinds of language games (14) .

14. Types of modulation of semantic pregnance in image reading

14.1. Marks related to images as signs of exceptions and clauses in the application of general operations for reducing semantic information are of three kinds: marks indicating semantic entity, marks indicating texts and fragments of texts, and marks indicating genre.

14.2. Marks indicating semantic entity are marks which signal a semantic entity and instruct the reader to avoid the integration of said entity together with other entities, into a superior semantic entity.

14.3 Marks indicating semantic entity pose the following problem for the reader: calculate from such and such an image which is the semantic macro-structure with the smallest possible quantity of information, taking into account that to carry out such a calculation, said semantic entity cannot be integrated into another, superior one.

-In image 4 in text 6, a set of personages appear who could be integrated into a semantic category as "demonstrators" or "participants in a demonstration repressed by the army". However, in said image, one of the individuals who appear is signalled in different ways: he appears in the centre of the compositional space defined by the limits of the frame, he is the closest in reference to the observer's point of view, and, by means of a baloon, his voice is represented and acoustically focussed. The marks indicated which signal out the personage instruct the reader to include in the final macro-structure a semantic entity which refers individually to said personage.

Images 1 to 4. TEXT 6.

14.4. Marks indicating text are marks which serve to signal the limits of a text, a text which may be constituted by an image, a set of images or any articulation of significant structures constructed from any kind of language. Marks which define the limits of a text instruct the reader to avoid processing semantic information in such a way as to relate propositions or batteries of propositions belonging to different texts when applying reduction operations. Marks indicating text fragments instruct the reader to take into consideration the division of

the text into fragments (division indicated by means of said marks) when constructing macro-structures of a lower level than that of the over-all semantic macro-structure.

14.5. Marks indicating text pose the following problem for the reader: calculate which is the semantic macro-structure with the smallest quantity of information, considering that to carry out the calculation only propositions which appear between such and such limits and such and such sublimits may be related.

14.6. Marks indicating genre are marks which signal the genre to which a text is to be allotted. Each genre determines that the semantic macro-structure which will appear as a result of the reading must possess a specific kind of organisation. Marks indicating genre, therefore, instruct the reader to avoid, in the process of reading, application of operations of information reduction without the introduction of some conditions about the final result of the process.

14.7. Marks indicating genre pose the following problem for the reader: from such and such an image or set of images, calculate which is the propositional structure with the smallest quantity of information, taking into account, to carry out the calculation, that the final semantic macro-structure must possess such and such kind of organisation.

-By means of a reading process, we can calculate, for image 1 in text 7, a semantic macro-structure such as "a man waits for a train to arrive on a rail not connected to any railway". The state which this semantic macro-structure describes possesses, regarding the reader's memory, a high degree of improbability and, therefore, a relatively high quantity of information. In known worlds, the existence of an individual who awaits a train in such circumstances is not probable. A macro-structure such as "a man carrying a suit-case finds an isolated rail and stops to look at it" accounts for a series of events which could surely turn out to be more probable in relation to knowledge the reader possesses about worlds, the individuals who people them, and the rationality of their actions.

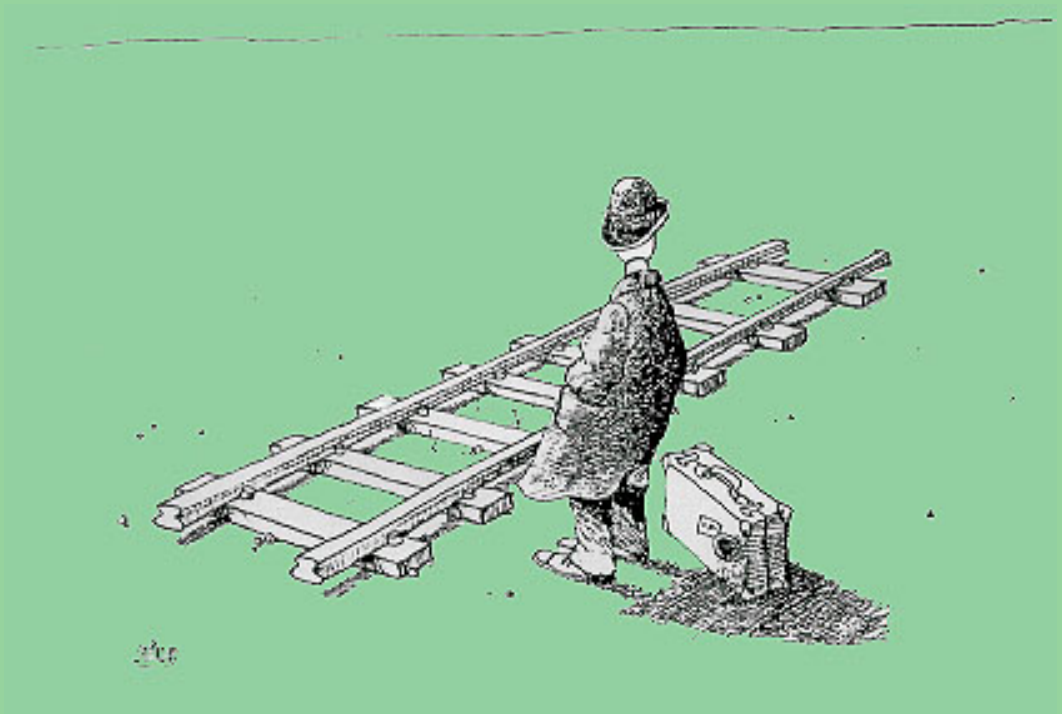


Image 1. TEXT 7.

The calculation of the first macro-structure presented for the image in text 7 is produced from the reading instructions identified by recognising the genre. In this case, elements such as the caricaturistic style of the graphic representation and the reference to the author, the humourist Quino, by means of the signature, clearly signal to the reader that the genre is comical. We can hypothesise that the comical genre poses the following problem for the reader: reduce the propositional battery of the text to a semantic macro-structure which will suppose the least quantity possible of information, considering that said semantic macro-structure must account for an individual who possesses the characteristics of appearing foolish, awkward, absurd, or mad.

The semantic macro-structure "a man waits for a train to arrive on a rail not connected to any railway" is, among those caculable from the image in text 7, the most pregnant macro-structure possible which installs as the topic of discourse, the figure of a foolish mad individual.

14.8. Both the factors which configure an image -representation style and technique, compositional and chromatic structure, plan scale, optical focus, etc.- and the elements allotted to the image -reference to the author, joint title and linguistic enunciates, kind of text in which it is included, etc.- are mechanisms to regulate the automatic tendencial process of reducing the quantity of information. These mechanisms modulate the processing of information from the image by means of indications of the semantic entity, text indications, and genre indications.

15. Reading situations and variations of the factors of calculation on the quantity of information

15.1. The principle of semantic pregnance determines the macro-structure which a reader will assign to an image; however, the fact that factors about the calculation of quantity of information can vary implies that we can assign different semantic macro-structures to one and the same image.

15.2. Each of the propositions and macro-propositions which can be true as to the portion of the world shown by an image can be constituted as the semantic macro-structure of said image, as factors such as the reader's memory structures, texts in which the image is included, kinds of marks which modulate the process of reducing the quantity of information, etc.

-For a specific kind of reader, the semantic macro-structure of the image in text 1, taken in isolation and as it is presented here, could be "a woman is taking a bath in a bathtub"; however, we can hypothesise different kinds of readers for the image in text 1, different sequences of images in which the image in text 1 is integrated, etc., which will determine that, for said image, macro-structures can be assigned such as "there is a nude woman inside a bathroom", "a drop of water is falling from the tap", "a young woman meditates with bent knees", "a pearated is adelating", "an inflatable plastic doll is in a bathtub", etc.

15.3. An image implies a universe of potential semantic macro-structures. Each macro-structure can become real in a specific reading situation. A reading situation supposes assigning specific values to the calculation factors for the quantity of information; but for each reading situation the principle of modulated semantic pregnance can offer an explanation of

the result of each information processing manifest in the image.

ENDNOTES

1 Sperber, D. & Wilson, D. (1986) note the apparent-inferential act as a basis of communication.

2 The theory of mental models as analogic constructions which develop in processes of comprehension and reasoning is set out, basically, in Johnson-Laird, P.N. (1983). A reference to this theme can also be found in Johnson-Laird, P.N. (1988). In VV.AA. (1993), different cognitive problems are taken up with reference to the theory of mental models. The concept of situation model (Dijk, T.A. van; Kintsch, W. (1983) is equivalent to that of mental model; however, while the mental model has an analogic nature, the situation model is configured in a propositional format.

3 Peirce, Ch.S. (1987:277) distinguishes between signs which transmit information, for example, a decisign, and signs from which information can be extractted, for example, an icon. The icon is a sign from which information can be extracted, but what is the information which an individual can consider pertinent among all the information which an icon/ representation puts at his disposal? Thus, the icon, as a kind of sign based on analogy, puts forth the problem of inspecificity.

4 Both Pylyshyn, Z.W. (1976,1973) and Fodor, J.A. (1975) sustain that images, as mental representations, can only be generated and take on sense by description, descriptions being representations of a propositional nature.

5 Pylyshyn, Z.W. (1988:305) distinguishes between "imagine (see X)" and "imagine (think X)"; this differentiation could be related to the distinction between the use of the possibilities of analogical formats and the use of the possibilities of propositional formats in the comprehension of an image.

6 On the concept of the semantic macro-structure as theoric basis for explaining reading processes: Kintsch, W. & Dijk, T.A.v. (1983,1978); Dijk, T.A.v. (1977) and (1978).

7 From the aesthetics of reception, Iser, W. (1979) and Ingarden, R. (1979) pose the problem of how a reader arrives at a specificity on details which remain undetermined in literary texts; however, the opposite problem can also be posed, the problem of how the reader arrives at a specificity on the all-over sense which the author intends to transmit by means of that description, from details of a description manifest in an image.

8 In this work we use the concept of information in two senses, a qualitative sense -which information?- and a quantitative sense -how much information?-. In this latter sense, information is contemplated as a measurable magnitude, as Shannon, C.E. and Weaver, W. (1949) posed, from the mathematical theory of information.

9 Moles, A. (1972) develops the relation between the idea of information, in its quantitative sense, and the idea of gestalt/form as product of perception processes.

10 For an explanation of the idea of semantic frame as memory structure: Minsky, M. (1986, 1975).

11 According to the relevance theory (Sperber, D. and Wilson, D. (1986), a proposition stored in the memory is converted in a context of a new enounced proposition when both allow generating new information by means of inferential processes. The semantic pregnance principle supposes, in a sense, an inversion of the relevance principle. The theory of relevance implies that the individual, while infering new propositions, seeks to increase the quantity of information; the theory of semantic pregnance indicates that what the individual seeks is to reduce the quantity of information by constructing propositional gestalts.

12 For an explanation of the script as memory structure: Schank, R. and Abelson, R. (1977).

13 Eco, U. (1979) poses and develops the concept of the model reader.

14 Wittgenstein, L. (1958a, 1958b) poses and develops a theory on language games as a kind of historically produced communicative act.

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