Dynamic and Structure

As distinguished researchers of structuralism make their contributions to better understanding its various aspects, I take it upon myself to address the subject of the conference from a perspective of change. To celebrate the impressive achievements that led to what organizers so aptly called "die Entstehung einer universalen Wissenschaftskultur der Moderne" requires that we submit our own hypotheses in furtherance of the discussion they initiated. If not in continuation of a particular direction of thought, from among the many identified in a part of the world I myself came from, my contribution is at least related to what the cultural theory initiated by structuralism intended to explain: changes in culture. I shall proceed along a rather transparent argumentative path:

1. Revisit the notion of structure in order to define a context of interpretation of the many ideas originating from the "schools" that made the thought of a comprehensive universal theory of culture possible.
2. Revisit the distinction between science and humanities, a distinction that marked not only possibilities, but also led to many (too many) dead ends. We know how scientific methods affect humanities, but much less how humanities affect science. From a cultural perspective, this is a subject we cannot afford to ignore or underestimate.
3. Provide a framework for a dynamic perspective of the many original (and not so original) structuralist themes that crystallized in the expectation of a comprehensive theory of culture. The critical dimension of the intellectual endeavor that various schools under consideration (the Moscow Linguistic Circle, the Prague School, American Structuralism, etc.) triggered should provide guidance.
4. Semiotics in particular, and more so the cognitive dimension of the study of language and culture are consequences of the structuralist approach. Therefore, a complementary perspective, in the form of a theory of mind, shall emerge.
5. Questions related to the foundation and functions of literacy, especially of its history and development that were not possible in the past interpreted at this conference can be formulated and, moreover, answers attempted.

1. A context of interpretation

While the initial understanding of structure, i.e., of building, or of ensuring the underlying stability of a building, never escaped the use of the word, its acknowledged interpretations fall within two distinct perspectives: a) a stable set of relations among constitutive elements; b) a holistic entity defined by its intrinsic properties (recalling Smuts' notion of the holistic world, 1929).

The first perspective is relatively static (close to the original architectural meaning); the second implies the overarching notion of system (including structure and the elements structured). Nevertheless, both have Platonic affiliations. They echo a never exhausted concern for an immanent form, or at least for some of the ways in which form might be embodied in particular

structures. Indeed, in many ways, structure emerges as what is beyond the physical, the formal, different from the genetic fabric, and free of historic development, free of function or purpose. As we know, probably first acknowledged in the terminology of seventeenth century biology, structure became a powerful concept in the humanities due to its linguistic and moreover anthropological foundations. The linguistic foundation results in the implicit assumption of an extraordinary role attributed to language. This role was later on emphasized by the psychoanalytical and philosophical appropriation and re-elaboration upon structure. Preoccupation with structure, as a given or projected underlying set of relations, and preoccupation with particular structures, identified or assumed as gnoseological devices in well-defined areas of investigation, are related, but not reducible to each other.

The attempt to define structure and furthermore to question the nature of structure – objective or subjective, or as an interplay of the two – was influenced by the subsequent preoccupation with systems. One view holds that structures are structures of systems, entities supposed to function precisely because they are structured (since structures themselves do not function).

An elementary structure is represented by the simplest relation among two elements. In this respect, all polarities are essentially elementary structures: Yin and Yang in pre-Confucian China, pre-Socratic polarities, the odd-and-even of the Pythagoreans, Heraclitus' day and night, hot and cold in Anaxagoras, Empedocles' love and strife. Their formal structure is not different from that ascertained in Lévi-Strauss's (1973) binary opposition that constitutes the nucleus of his structural anthropology, or from Saussure's structural theory of language (although Saussure did not use the word *structure*), or from Barthes' structural semiology (1975), itself a foundation for a universal theory of culture. Barthes even initiated his semiological perspective by giving meaning to the occurrence of the word *sign* in the vocabulary of theology, medicine, linguistics, (especially that of Ferdinand de Saussure, 1916), and other domains. Thus, assimilating structure and the basic tenets of structuralism, he remarked that *sign* unconditionally refers two related terms *(relata)* one to the other. But until this conclusion was reached (and thereby a very distinct structuralist sign theory founded), many other contributions were made to the understanding of particular or more general structures.

Previous to Dilthey (who introduced the term within humanities, i.e., *Geistwissenschaften*) structural considerations were either literal (structures of buildings, machines, tools) or sporadic. After the major contributions to the definition of structure in linguistics and anthropology were made, the term entered a phase of loose usage from which gnoseological return could no longer be expected. This is one reason why some researchers of structure (Foucault is the example *par excellence*) simply opted out of a structuralist school of thought or direction of concern. Other reasons can be found in the political appropriation of the term (in particular, in Marxian inspired philosophic, economic, and social jargon), as well as in the expectation of rigor to which structuralist ideological discourse refused to obey. All these and epistemological optimism make the need for clear definitions even more critical.

Structure as relation among *relata* – a subject that brings to mind the *signans* and *signatum* of the Stoics and the *signifiant* and *signifier* of Saussure – was pursued in the establishment of structural semantics by Greimas(1984). In his view, a relation to another element defines the meaning of each individual element. By extension, *to structure* is then seen as to perceive

differences, moreover, to organize. This brings the issue in the direct proximity of information theory, where indeed Greimas' thought meets that of Max Bense, whose semiotic orientation is rather influenced by Peirce than by Saussure.

Lévi-Strauss issued what he called the requirements of a model for embodying a structure. "First, the structure exhibits the characteristics of a system," (change of one element affects change of all others). "Second (…) there should be a possibility of ordering a series of transformations resulting in a group of models of the same type," (a property of homology). Third, we can predict the behavior of the model when elements are modified. Fourth: "the model should be constituted so as to make immediately intelligible all the observed facts." Somehow, at the opposite end of the spectrum is Saussure's implicit understanding of language as structure, with the two primary relations – difference and opposition – as the nucleus. His thesis, "There are no signs, there are only differences among signs," resonates in Hjelsmlev's theory concerned not with sounds, letters, or meanings in themselves, but focused on their reciprocal relation. But even deeper, here is illustrated the difference between a nominalist understanding of structure – as a means or result of analysis – and the realist understanding – not only is language to be structurally analyzed (as Hjelsmlev ascertains), but language is structure. Chomsky's contribution is in distinguishing surface structures, which traditionally preoccupied grammarians, and deep structures, basic entities from which the variety of surface structures are realized. Language as a potential set of realizations is controlled by its deep structure. The hope that the structure of the mind might be revealed in what is common to languages of different surface structures is expressed in anthropological, psychoanalytic (Jacques Lacan), and philosophic (Derrida, Althusser) structure research. Other distinctions, such as the conscious and unconscious, or the open and closed structure, also captured the attention of cognitive researchers. Claiming to examine the "mind in its natural state," Lévi-Strauss (1974) examined primitive cultures as the result of successive transformations against the background of perceived mental patterns. Through the notion of structure and its implicit system correlations, semiotics and cognitive sciences come closer together than the critics of psychologism ever anticipated.

The ontology of structure and its epistemological and logical understandings are not independent of each other. This is why, in reviewing the historic evolution of the notion, one cannot ignore all other aspects as these actually constitute the meta-level of structure.

As a premise for the elaboration of a structural semiotics (semiology) or of a system of semiotics, the notion of structure is appropriated, by various authors, with all it carries in one or another of its adopted definitions. In the shift from concern with form (or even Gestalt) and comparative methods to preoccupation and infatuation with structure, semiotics undergoes a re-evaluation of its major concept, that of *sign*. By no accident, aesthetic research is at that time in the forefront, almost in pace with linguistics, frequently surrendering the artistic to the logocratic model. Mukarovsky (1973), coming from the area of interest in artistic artifacts and value, implicitly assumed that Gestalt or form and meaning constitute a whole best captured by the notion of artistic structure. What counts is the immediate reality of the work, its concrete existence as matter structured according to aesthetic intentions. The aesthetic effect is to be explained from the aesthetic structure of the work itself, not by artistic, psychological, or sociological causes. The thought extends the approach of Russian formalists, intent upon discovering structural laws governing the relation between literary accomplishments and other

historic events. They all interpose between the work of art and the individual the aesthetic structure that acts as a mediating entity between the collective conscience and the individual experience of art. The work is a complex web of signs that carries the complicated structure of interpretations. Due to this semiotic implication, the decisive step is made from the prior understanding "everything in a work of art is form" to "everything is meaning," as meaning results from the realization of the semiotically constituted aesthetic structure. In the area of aesthetic concern, a distinction needs to be made between structure applied or revealed in literary criticism – evidently in the spirit of the linguistic foundation – and the same applied to non-language-based expression, in particular music and the visual.

After quickly establishing the structural context, Barthes pursued his semiological journey into the territory opened to inquiry by Saussure. The relation (difference and opposition) applies to the literary signifier and signified, but also to the referent. Barthes extended the understanding of literary structure as foundation of semiology in order to capture higher level structures where the ideological comes to expression and can be revealed. He went beyond the work to the making, which is seen as structure-generating, a semiological endeavor nonetheless. When continuing his fascination with structure in the visual arts, Barthes effectively and brilliantly reduced them to the word, as fashion, for instance, or photography are for him and his followers not the actual clothing or photographs, but the discourse about them; or better yet, the process leading to the discourse. Umberto Eco, reflecting on Piaget's (1970) more modern notion of structure – unity of wholeness, transformation, and self-regulation – comes up with a semiotics within which structure is identified, at least in terminology, as a dynamic system (of culture, in his case). In the so-called absent structure, what was considered determined and perfected opens to the many realizations of the work through its interpretation. Here it becomes obvious that the complementary concept of function needs to be accounted for if the desired epistemological reward of a structural perspective (even if applied to absent structures) will ever come to fruition. Structures are, after all, defined through their function in a system, text, or communication endeavor. The reciprocal relation function-structure, becomes critical for the understanding of dynamic phenomena.

Finally, in extension of Peirce (1931), and reflecting his shift between nominalism and realism, an entire semiotic development – very contradictory – celebrates the functional triadic relations among the elements constituting the sign (object, representamen, interpretant). In fact, this definition is as much structural as any other, only the structure here is more complex than in the dyadic (dualistic) tradition. Consequently, structure dominates all Peircean inspired typologies (followed mainly by Deledalle and Marty, as well as by Bense and the school around *Semiosis*).

The dynamic view, focused on the functions, so close to semiotic implications, of design, architecture, and political action, and even more on the semiotic considerations of computing (programming, artificial intelligence, man-machine interaction), impregnated the work of many American and Canadian scholars. Beyond the structuralist thought and the heavy baggage it carries from a long history of obsessions with structure, attempts are currently made to deal with the self-organizing nature of sign processes (a notion inspired by artificial life research). Other notable attempts regard Husserl's definition of the sign (a revival of Plato's theory of ideas) focused on the extra-mental existence of eidetic essences. It is clear in both cases that, beyond their very dissimilar nature, the purpose is to transcend the thought of structure and to proceed

towards a better understanding of what might be the underlying motivation for the construct we call structure. Even Derrida's notion of *trace*, "the arch-phenomenon of memory," and *difference*, is designed to perform the same function.

The methodic context I suggested completes the historic map given above. We stepped outside the time and geographic confines assumed by this conference only in order to discover that with the notion of structure, a hope for a unifying universal perspective is legitimized. Obviously, how this hope nurtures particular attempts (of linguistics, literary critics, artists, anthropologists, etc.) is not yet clear.

2. Humanities and the sciences

No matter where we stand epistemologically, i.e., within the functionalist or structuralist (or combined) explanatory intention, or within a hermeneutic tradition, we could not (or at least should not) separate culture and language from those who identify themselves in a language and within a culture. Ultimately, the human being gives both language and culture their life, that is, the dynamism we all try to understand. If a universal theory of culture is at all possible, as the structuralist-functionalist view ascertains, then by all means it derives from a comprehensive theory of the human being. That in the final analysis scientific theories imply the same was unequivocally confirmed in the recent "non-linear" revolution that led to the notions of chaos and fractal dimensions.

In ascertaining the homology between natural sciences and the humanities, the functionalist thought – not only from Compte onwards – was motivated by gnoseological optimism: infer from what can be measured (in the realm of physics, chemistry, biology) to what members of society experience. This is how sciences were accepted as a guide or model by those attempting to conceptualize structure and the functioning of language, moreover, of culture. Even the preoccupation with the mechanisms of cultural change found in scientific theories good metaphors for describing the never-ending renewal of language or the evolution of culture.

Such a homology is less discernible in the hermeneutic effort, in the first place because natural sciences are, from the epistemological perspective assumed in hermeneutics, fundamentally different from humanities. The difference, as it was again and again shown from Dilthey on, concerns the reflexive condition of the human being as interpretive entity concerned with both the world in which it lives and its own world. If indeed, as the argument goes (and has gone for a long time), laws similar to those in the realm of physics, chemistry, or biology could be ascertained in the humanities, wouldn't this mean that all there is to human existence is predestined? And wouldn't this negate the subjective component regarding who we are and how and why we pursue our goals? After all, the major distinction between a structural or functional (or combined) attempt and a hermeneutic exercise is the eminence of the object and of the subject, respectively. Many have tried to overcome this epistemological gap. Giddens' structuration theory (1984) and some post-structuralist models in fashion just now testify to this effort. As a result, the nature of structure itself (subjective, objective, or an interplay of the two) was questioned.

The distinction subject-object, at the origin of the dualistic horizon of most of the known attempts to understand the world, including self-understanding of the human being as part of this world and agent of its change, is reproduced *volens nolens* in the results of language or culture inquiry. Moreover, as these results feed back into science, as the functionalist and structuralist attempts did, they entail the fundamental ontological attitudes on which they are grounded. As any theory becomes part of the subject-object domain of distinctions, a universal (or less than universal) theory of culture becomes part of the culture. In the process, such a theory introduces, through its authors, interpreters, and critics, conceptual assumptions and legitimizes logical, ontological, gnoseological, and epistemological viewpoints.

It is quite exciting to revisit the great gnoseological monuments of the past. Not unlike the ruins of ancient Greek temples, Roman viaducts and aqueducts, or imperial or less imperial roads, public buildings, bridges, amphitheaters, colossea, they are telling, in the details of their language and logic and in the explanatory schemes used, of obsessions never exhausted, and of a gnoseological optimism which later generations were trying to match. "How does language occur?" is almost as old a question as culture itself. And how language changes is no less a matter of wonderment as it is one of concerted action within culture to give change the desired direction, or to turn awareness of change into a useful force. These monuments are also telling of the many ways in which the tension between a subjective and objective grounding of our knowledge of language and culture comes to expression. As modern theories of complex dynamics started challenging previous epistemological positions, researchers of language and culture arrived at the understanding that the opposition subjective-objective need not mean reciprocal exclusion, but integration. If one and only one reason why structuralism could not produce a dynamic theory of culture had to be given, then this is clearly that it failed to integrate the subjective component. That there is more than one reason for the missing dynamic component does not change the significance of the mentioned shortcoming. Structuralism attempted this performance but in the final analysis did not succeed in carrying it out. This is why the dynamic element of its theory of culture remains quite limited.

Allow me to submit to you that one possible point of departure in producing a coherent theory in which the subjective and the objective are united without being annihilated in their respective conditions is to consider a cognitive homology between humanities and natural science. This homology is different from the one advanced by the reciprocally incompatible functionalist-structuralist and hermeneutic approaches. In full translation, it means that the humanities and the sciences define and represent, although differently, similar attributes of the process through which human minds are constituted. (The peculiarity of my choice of the plural form, "minds," as well as of the verb "constitute" will be explained.) At some moment pursuant to the Prague School approach, Lévi-Strauss tried something similar in order to free the powerful notion of structure from the biological analogies it entailed, even when used in a different context, and – alas! – to oppose the much too rapidly spreading generalizations of evolutionist models.

The cognitive homology between humanities and science is for me expressed in the recursive nature of the interaction among human minds. We become aware of this recursivity through the fact that all means of human interaction, expression, communication, and signification, although of a cognitive condition different from that of the world in which they take place, are in the final

analysis self-reproduced. The characteristic we call self-reproduction is obvious in the self-reproductive processes in nature. It testifies to the quality of recursiveness, i.e., objectivity, and also to the awareness of the process, i.e., subjectivity. Human interaction, human expression, the intent and the ability to communicate, moreover the praxis of signification are the embodiment of the act through which individuals continuously constitute their identity. Without placing the subject of language, and actually the broader subject of means for interaction, expression, communication, and signification in the pragmatic context of continuous human self-constitution, we will probably not succeed in understanding why, for instance, a functionalist, a structuralist, or a hermeneutic approach will remain as partial as any other attempt, morphologic, historic, genetic, or whatever.

Structure, introduced in the discourse of the Prague School of thought by Trubetzkoy, came into the rational discourse as external to the human being. As we have seen, naive analogies suggestive of structure were inspired by the skeleton of an organism or by building plans (the girders as structure). Patterning of presence and, in post-structuralist discourse, intersection of presence and absence are also suggestive of the mental image of structure we are forming. Giddens summarizes this perspective by pointing out that structure is a "matrix of admissible transformation," of "rules" for such transformations, and of resources (the power element). From a social perspective, structure exists in a time-space presence, "only in its instantiations in social practices and as memory traces orienting the conduct of knowledgeable human agents," (1984, p. 17)

Function, on the other hand, is driven by an underlying teleological force: there is no functionalism that does not assume purposes, reasons, or at least needs. As it crystallizes in the encompassing notion of system, functionalism operates paradigmatically. Its guiding model became the organism or, after the emergence of digital processing, the computer. Within a structure, either projected as a gnoseological net or extracted as representative of the object of inquiry, there are always connections to be identified and meanings to be assigned. The dynamics of functionalism is that of the system (closed or open). A nominalist attitude ascertains an epistemological relevance to representations; realism places all its bets on the anthropomorphic power of its ascertainments. But whether analogous (culture analogous to one or another known system) or literal (culture as a system composed of the particular components and rules for functioning), dynamic functionalism is, after all is said and done, deductive. Given the system, or defining a system, this is how it can work. Meanings are derived from the many possibilities subject to the deductive effort.

It should come as no surprise then that the lineage of Russian Formalism or of the Prague School can be traced back to none other than Durkheim. The broad intellectual traditions to which structuralism, in its many contradictory embodiments, belongs testify to reactions to speculative evolutionary anthropology and to related notions arduously disseminated by Neo-grammarians. While in retrospect it is clear what prompted the focus on synchrony, and the manifest according to which only synchrony allows us to grasp the nature of what Saussure defined as "langue" (language, in opposition to "parole," speech), it is less clear why structure emerges as such a powerful instrument of thinking. Sure, Derrida, right as only Derrida and the Delphic oracle can be, tells us that structure comes face to face with its adversary, history, and adopts it. Where or how this happened cannot be really traced by the Russian Formalists or their colleagues in

Prague or elsewhere. Mathesius' method of analytical comparison, as much ahead of its time as many of his ideas, is a suggestion so vague that neither in 1911, when he first formulated the goal of synchronic research, nor at any future time does it mean more than what it meant in the works of Wilhelm von Humboldt, G. v. d. Gabelentz, or J. Baudouin de Courtenay. The many critical distinctions vis-à-vis Saussure made by the Prague School and by other structuralists regardless of their epistemological affiliation do not help either.

We are better off in understanding the second component of the works grouped in the Prague School – those of the Russian nucleus (Jakobson, Trubetzkoy) – dealing with the systemic and structural conception of language and, by extension, of culture. But better off does not mean that the synchronic thought and the structural-systemic context merge harmoniously. Probably the cultural dimension remains the most productive: language as a tool performing quite a number of essential functions in the community using it. But once in this realm, the methods and motivations of the work as we know it appear less homogenous (no crime in this) and even less revolutionary. Karl Bühler's model of the functions of language predates and influences the Prague School approach, in particular Jakobson's famous attempt.

To revisit the past makes sense only insofar as we are prepared to critically evaluate the intellectual inheritance and how it can further guide investigations of culture as they unfold today. The pragmatic framework at the beginning of the 20th century explains, in retrospect as is usually the case in humanities, the nature of the effort, the kind of questions articulated, the many angles from which they were considered. As we shall see, the moment corresponded to a fundamental change in the conditions and circumstances of human self-constitution. As language dominated all intellectual life, language's structure unfolded in extension of the structure of human activity. Along the entire history of the concept (going back to the Greek philosophers, and no less to Chinese, Indian, Japanese or African conceptual endeavors, too many to be specified here), the association structure-permanence-stability is never challenged. That beyond this apparent layer of stability is more, such as a dynamic underlying structure, was probably intuited at various junctures, but never really made clear. Think of the *meta-physics* of all ancient architecture ü structure as girding for buildings makes up the first layer; next, structure as the set of abstract relations among virtual centers of force. Somewhere here emerged not only Plato, but also Pythagoras. In the same territory are the magnificent Sophists who deal with the underlying structure of language in order to access the process of thinking.

At the core of the enterprise, a question starts to form: Is culture as a background of practical human endeavors dominated by language or is it a participant in the change, including the change of human means of expression, communication, and signification? The clear-cut distinction between the humanities and the sciences that nurtured structuralism explains why the question on the nature of culture (structural background or dynamic agent of change) emerged at the historic juncture discussed. Structuralism provided more than convincing theories (of language and culture). It embodied an intellectual attitude, as evident in science as it was in the humanities. While it would be very difficult to identify particular scientific results inspired by structuralism, it is not an exaggeration to suggest that structuralism qualifies as a *Weltanschauung* that eventually leads to the framework for a dynamic perspective of the world, culture included. Together with Carneiro (1982), we can quote an almost prophetic formulation due to Spencer: "Evolution … is an increase in complexity of structure and function …

incidental to the process of equilibration" (First Principles). It is disappointing that it took almost 100 years until this thought received the attention it deserves.

3. A framework for a dynamic perspective

When we notice how functionalism and structuralism developed, especially how they strive under the guidance of the broader assumed or predicated homology between the physical world and the worlds of language and culture, it is clear why scientific torment and formalist evolution are so closely connected. Hypotheses circulate from one to another. As Jakobson (starting in 1929), for instance, stated the open nature of the language system, Bertalanfy (1932) and Schrödinger (1945) asserted the need to treat biological systems as open.

It is within the spirit of the inquiry we focus upon that structures, whether explicitly described or not, are perceived as an expression of equilibrium. Again, think of Vilem Mathesius and what he defined as elastic stability, as well as of the many other direct or indirect contributions (due to Bogatyrev, Rypka, Vancura, Wellek, Jakobson, Mukarovsky, Trncka, to name a few). Function and structure are studied at great length, not necessarily revealing a lot, but increasing the awareness of their intricate relation. The accent is on cultural growth, including language growth. Function and structure are interrelated.
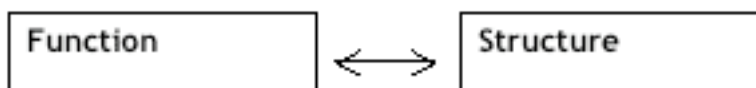

Fig. 1. Function and structure are interrelated.

In the words of a theory signed by Prigogine (1977), among others – a theory that marked more than a departure from structuralism – this subject corresponds to what is defined as deterministic development. The meaning of the qualifier *deterministic* has to be defined in the broader context of human self-constitution in practical activity.

What escapes the program and scope of structuralism is cultural development – and here is where our journey actually starts. This is so because as inquiry deepens, the notions established (phonemes, morphemes, stability, accuracy, specificity, motivation, equilibrium, etc.) could only be indexed to a static state of affairs. Language, the foundation and metrics of culture, had to be brought to a standstill, i.e., a synchronic picture had to be taken a meticulously scrutinized. Even the notions dear to the Formalists (Russian or not) could not otherwise become clear. No "coordinates" (such as past-present-future, or qualifiers of proximity or remoteness) could be "read" and no "meaning" (or what appeared as meaning) could be assigned. The corresponding cultural theory returns, in its letter and spirit, expectations of order and coherence corresponding to the characteristics of human practical activity reflected in language. These are (and I shall return to the subject as I present my dynamic theory): sequentiality, linearity, hierarchy, centralism, generality, determinism. permanence. Missing is the awareness of non-equilibrium as a source of order, or in the jargon of the dynamic theory, the existence of dissipative structures.

A little ahead of ourselves, we can point to a structure-function relation that includes exactly what was eliminated in the travail of the various structuralist endeavors: fluctuations.
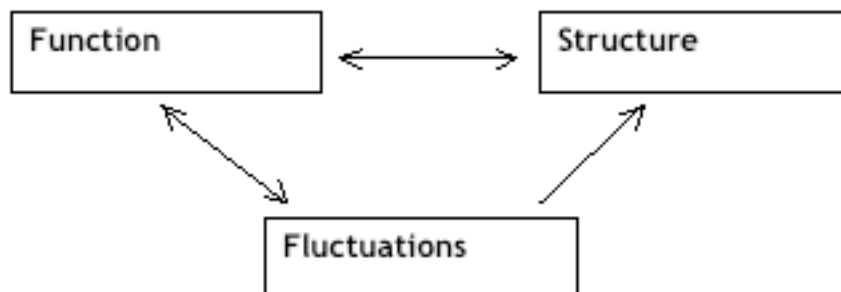

Fig. 2. Cultural development is the process through which new cultural characteristics emerge.

Within this dynamic scheme, cultural development is the process through which new cultural characteristics emerge. These new characteristics reflective of instabilities, in which stochastic elements, corresponding to the multidimensionality of the human being, play a basic role. Let us notice that classical physics (along with the sciences grounded on it) took it upon itself to emphasize stability and permanence. At the climax of this development in the late 19th century, science became aware of an apparent contradiction between what is perceived as biological order and the laws of physics.

Despite the efforts of many scholars, understanding living systems through the methods of equilibrium thermodynamics proved to be impossible. Once fluctuations are acknowledged and no longer explained away, we are closer to understanding living processes, if not in the language of equilibrium thermodynamics, then at least in its spirit. Self-organization – the feature of nature pursued in the homology to society by functionalism – in non-equilibrium systems is characterized by the appearance of dissipative structures through the amplification of appropriate fluctuations. In the dynamics of human activity, in particular the dynamics of culture, the appearance of such dissipative structures is characterized by the emergence of new patterns, moreover the possible branching, known as bifurcation, of the outcome of the effort. Indeed, much like in physical or biological processes, what used to be seen as the cause of one and only one expected result seems to effect two different outcomes. Many possible examples can be given, mainly along the line of equivocal language or equivocal culture features. But if we focused on them, we would miss the fundamental shift from a context of expectations based on coherence and integrity to one of ambiguity.

Dissipative structures eventually evolve along a process of inevitable change. In society or in culture, the path of change contains instances of choice or bifurcation. At such instances, chance can be acknowledged through qualitative changes of the acknowledged structure. (It seems to me that the development leading to the cascade of events marking the fall of the Soviet empire is a good example for the concepts in question.) At points far from bifurcation, the deterministic descriptions (formalized or not in equations) suffice. A closer look shows that all the work leading to the structuralist universal theory of culture under discussion at this conference produced such deterministic descriptions. There is no doubt in my mind, nor in the minds of

many others who dedicated intensive work to the contributions of structuralism, that its solutions assert a fundamental deterministic attitude.

The work of the Russian formalists, or the Prague School, of the many related structuralist branches (including American structuralism) took place when the bifurcation, or conditions for bifurcation, became evident. Nevertheless, captive to the underlying structure of a pragmatic framework based on the assumptions of language – of literacy, especially – they could not but assert the role of equilibrium instead of acknowledging the dynamics of conditions far from equilibrium. The study of stability of non-equilibrium states could not become a subject for the research carried out by the many distinguished scholars involved in the effort due to the fundamental implicit premise of their view of language and culture. That there is a connection, evidently non-trivial, between order (the apparent structural layer of language and its use), stability, and dissipation escaped their way of posing questions. Moreover, the late realization that ordered configurations emerging beyond stability are dissipative structures, and that multiple steady states far from equilibrium are possible simply negates the fundamental premise of structuralism. Before the powerful metaphors of chaos theory became possible, in particular the metaphors of attractors, structuralism was bound to model a culture based on the assumptions of language and its permanency. It is true that the distinction method (for research)-condition (of the subject of research) was repeatedly made by structuralists. Given their own realization that entities of language are embedded in culture and, furthermore, in social reality, it is difficult to explain how a static method can account for a dynamic condition.

A complex system, as we learn from the data describing its functioning, is subject to several adverse tendencies. From among these, we need to account for, in respect to culture, at least complexity, represented by the variables describing inner connections, and for the possibility of fluctuations. Even scholars not mathematically inclined will intuitively accept that the higher the number of variables interconnected, the higher also the degree of instability. And if this does not suffice, consider the possibility that within a wide-open system, fluctuations of all kind, endogenic or exogenic, can occur. This prompted the very broad statement that Nicolis and Prigogine (1977) made in their now classic elaborations: "a sufficiently complex system is generally in a metastable state" (p. 463). Consequently, we can look at the conditions under which the dissipative structures of language or those of culture evolve or revolve from a given long-range order. Among the conditions we can easily identify are that sufficient distance from equilibrium is established, and that branching or bifurcations become possible; that is, alternative uses of language or alternative cultural paths can be pursued.

While structuralism accepts the metaphor of homeostasis and ascertains an expectation of steadiness (of human use of language, of behavior, of culture, of society), a dynamic theory will bring to light the conflict between forces ensuring stability and forces of change. Significant in this respect can be the so-called elastic limits, points of no return in a certain development. Such limits were usually reached when forces at work in wars, natural calamities, biological catastrophes/mutations, etc., determined a change without return (fall of empires, decimation of populations). Under the circumstances of modern societies, much more subtle forces are at work, and changes of higher orders of magnitude are registered.

In entertaining questions regarding the connection between stability and complexity, we can

probably infer from systems similar to language and culture that change toward increased complexity and organization is the consequence of fluctuations in the underlying structure, i.e., in the pragmatic framework. Such changes occur in relatively stable systems (what Marx *et al* identified as the fundamental economic systems), but ultimately drive them toward a new state. This being said, it is obvious that equilibrium, better yet stability, is not an absolute value, but relative to a chosen perspective or to considered variables. One can study stability in regard to entropy; but one can just as well study it in regard to continuity criteria (the so-called Lyaponnov or asymptotic stability), or in regard to time-independent constraints (the so-called orbital stability), or in regard to some degree of change of some representative parameter (let's say language coherence, or grammaticality); that is, in regard to the preservation of structure in a context of change. Structural stability can be subject to what René Thom defined as a catastrophe, i.e., a certain dynamic can be replaced by a dynamic of a qualitatively different character.

A hyper-surface, defining a domain with a certain morphology, separates the two different dynamics. Again, the fall of the soviet system illustrates the concept. The interesting idea advanced in Thom's model is that dynamics and forms are related. Incidentally, this is an idea which we can identify in the naive statements of some of the Prague School scholars, but which unfortunately remained of no real consequence in their work or in the work of their various followers.

There are quite a number of techniques or procedures for approaching the loss of stability in complex systems. Better known are the already mentioned techniques of bifurcation, catastrophe representation, and obviously the encompassing chaos theory embodied in all kinds of mathematical procedures, or better yet in computational models intent on visualizing the dynamics of such systems. This is not surprising, given that theory in general tends to become more and more computational in our day. Regardless of the specific nature of the techniques and procedures in question, they all continue the endeavor of effective handling of the qualitative theory on non-linear phenomena expressed by Poincaré in his celebrated differential equations. He was actually the first to demonstrate the existence of so-called branching solutions (what was later called bifurcations) for certain critical values, and to declare that "it may happen that small differences in the initial conditions produce very great ones in the final phenomena. […] Prediction becomes impossible, and we have the fortuitous phenomenon," (1913, quoted from Baker and Golub, 1990).

Of consequence for our own interest in language and culture as self-organizing processes is the fact that open systems far from equilibrium and subject to non-linear feedback processes are endowed with the capacity to undergo self-organization. More interesting is the fact that beyond a critical value (of a state parameter or of a constraint), the least disturbance compels the system to evolve away from the stable branch, i.e., to a bifurcation of a new branch of possibilities. Indeed, the butterfly effect is the metaphor not only for initial conditions for weather (the fluttering of a butterfly's wings can influence the pattern of a hurricane, goes the elegant story describing Lorenz' weather equations), but also for the "storms" or "earthquakes" in language, and even more so in culture.

Essential to what eventually will be submitted to you as the model of change from a language-

dominated culture to one of many means of expression and communication is the notion of scale. At a "microscopic" level, such as that of phonology, where structuralism excelled, language phenomena display patterns quite different from those emerging at a coarser level. Furthermore, large-scale phenomena are different from low- or medium-scale phenomena by the way in which the coupling among many variables takes place. To study language or culture independent of the scale of human interactions might allow for locally meaningful observations, but in the final analysis will never result in the understanding of what confers dynamic qualities upon language.

After all is said and done, we still have to face the never vanishing dilemma of any homology. Does life follow the laws of physics (or, more generally, of science)? Or is it only compatible with such laws without following them? In some cases, for instance molecular biology, the coherent behavior of living systems was successfully interpreted in terms of the structure of the constituting molecule. In such an instance, the functional order prevailing in living beings appears as a result of an architectural order. Structuralism could not be more vindicated than in the descriptions of vital phenomena in terms of information, of message, or of code. The functionalist horizon abruptly lights up in the spirit of the Prague School; but from a different epistemological perspective it assimilates the genetic material of a cell to the magnetic tape of a computer. In Fodor-*et al* terms, the program printed on this tape describes operations to be carried out sequentially. In other instances, and I would place my own considerations here, compatibility is of pre-eminence, but the level at which cognitive phenomena take place is in the meta-domain.

Human self-constitution in practical activities involves the continuous generation of a reflexive form of knowledge, in particular knowledge of language or of other means of expression and communication. As a result, recursive ordering introduces expectations of conformity (images, foremost). Culture, as a reproduced framework of generation and validation of values, does not have structure, but exhibits structural properties. It certainly exemplifies the duality of structure. Duality of structure means (Giddens, p. 25) that structural properties of social systems are both medium and outcome of the practices they recursively organize. Structure is not external to individuals. Rather, it is instantiated in culture and subject to its dynamics.

4. Structure, sign processes, cognition, minds

> "The whole cultural world, in all its forms, exists through tradition.
> These forms have arisen not merely causally…they have arisen
> within our human space through human activity"
> (Edmund Husserl, *The Origin of Geometry*, 1939)

Fissures in the common ground of structuralism did not re-establish the legitimacy of the babble of rival voices of theory. They rather encouraged critical self-evaluation and an uncompromising search for alternative foundational research. In a relatively short time, infatuation with structure and obsession with elementary carriers of meaning (in language or in culture) crystallized in the revived notion of sign. Obviously, the sign stemming from a synchronic perspective, on which semiology is based, is not necessarily the same as the sign seen as an infinite process, which is the basis of semiotics. But no matter how different these two sign definitions are, it soon became

clear, as the work of Mukarovsky in particular shows, that a new gnoseological horizon was established. From our vantage point, it is clear why any association between structuralism and semiotics needs to be received with suspicion. Structuralism, and the semiology it makes possible, identifies signs as properties of language (in particular, of speaking and writing).

Semiotics examines, mainly from a logical perspective, the recursive grounding of signs in processes leading to the conjuring of meaning. Moreover, with the focus on how people express themselves (not only in language), an opening towards how they think, i.e., their cognitive condition, is suggested. Evidently, I am somehow rushing here, dealing with distinctive developments and leaving aside quite a bit of detail (e.g., Morris and the behaviorist sign foundation belong here). But what matters are not self-fulfilling prophecies (for a while, structures were "seen" all over, after that, everything became a sign – a real logical scandal), but the mutual interpretive interplay of succeeding perspectives. This interplay is reflected in a change of language and in the participatory nature of theories in cultural life. Indeed, structuralism, semiology, semiotics, and cognitive science foster a climate of opinion and further stimulate the social and cultural processes that gave rise to them. This particular characteristic should make us aware of the need to proceed with our own elaborations on culture within a distinguishable concept of culture itself. In its anthropological sense (to the clarification of which Umberto Eco contributed quite a lot, 1976), culture involves the design and production of tools, social relations (as these evolve over time), and exchange of goods. In its semiotic sense, it involves sign processes involved in the above, plus the awareness of semioses. In a cognitive sense, culture is represented by how we know and allows us to proceed towards what we want to discover. The path we are following here is from structure to sign processes, to cognition and minds, as these pertain to or define culture.

If neither culture nor society can be explained by means of the homeostasis metaphor, interdependence of individuals can be conceived of as analogous to homeostatic processes, i.e., akin to mechanisms of self-regulation operating within an organism. It is true, the analogy bears the burden of the science-humanities homology that we want to transcend. But before the cognitive alternative is established, it serves as a positioning conceptual device.

It has been stated here more than once that if there is life to culture (or to language), it is the life of human beings. Moreover, the self-reproduction aspect of culture, very different from the self-reproduction of nature, testifies to the cognitive component of the practical activity, i.e., human pragmatics, through which continuous human self-constitution takes place. At the center of this cognitive component are mind processes. Regardless of which culture we are concerned with – that of the distant past, of remote places, or the culture of the present, here or elsewhere – it is impossible to understand how culture emerges and changes without understanding human minds in the interaction. The relatively brief outline of a mind model, which builds extensively on notions of semiotics, cognitive science, and chaos theory following the structuralist approach, should allow us to understand cultural dynamics as part of the broader dynamics of human existence.

The reality of our existence – at the biological, social, or cultural level – and the dynamics of our experience are brought to expression in human praxis. We know who we are, i.e., we know our minds in virtue of our awareness of what we do. This applies to everything involved in our

relation to the natural environment, to kinship relations at the core of institutionalized social relations, and to the exchange of goods. In other words, cultural identity is an expression of self-awareness. Minds can be understood only within their dynamic reality (Nadin 1991). The underlying reality of mind constitution and interaction is that of a process.

Categories of the mind are categories of distinguishable experiences and can be expressed through distinctive forms of intelligence, as displayed by human beings in their practical life (Gardner 1983). The variety of human praxis and its inherent rational dimension reflect foremostly our own variety. Cultural richness is an indication of what from human potential (the realm of possibility) is realized (the realm of reality). Minds are media for interaction and exchange of information related to human experience.

The relation among minds becomes constitutive for each of the minds when a critical mass is reached. Minds are thus identified in the physical world, social environment, and cultural contexts (defined as artificial, i.e., products of human art in the broadest sense of the term). This is the macro-level of our minds. The critical mass can be defined only in respect to circumstances of interaction, which explains why I define minds as the sense of context. The critical mass leading to the relations through which minds identify themselves depends on the nature of the interaction, the characteristics of the interacting subjects, and the nature of the relations established. It is a dynamic coefficient resulting from the shared world of minds interacting.

Peirce defined intuition as a "cognition not determined by a previous cognition," i.e., nonrepresentational. He also stated that our notion of ourselves is the result of an inference. Since it is not based on previous knowledge, this inference must result from something else – precisely from instantiating, i.e., being representations of ourselves before we externalize them, before we share them with others, before they become our language or any of the sign systems (visual, auditory, olfactory, etc.) we use. The process is one of self–constitution performed by our minds as we interact when we project ourselves upon the reality of our physical existence. The micro-level of the mind is the level of this self-constitution, non-representational but experiential, with a pattern of self-similarity and the condition of a dynamic configuration. The physical reality of the human being (our body, in short) is much more stable than the reality of the mind. It took thousands and thousands of years before we noticed changes of height, anatomy, and physiology, and concomitant changes of functions. It takes a very short time to notice changes of mind. One can say that the "hardware" (the body) is relatively invariable.

Nonetheless, our relation to the world takes place at various levels, one being the level of the body. There are direct interactions, such as those manifest in the pace of our movement when we climb a hill or walk on an icy surface. And there are mediated relations, such as the ones we establish with other human beings or with tools (material or spiritual). Tools are defined here as the artifacts acknowledged in culture and which we use in our practical experience, whether this experience is in the biophysical environment of our existence or in the conceptual environment of our spiritual existence. In both types mentioned, our mind is present as the medium of our continuous self–constitution. We project ourselves in the understanding of circumstances: whether we ask ourselves "Why do I slow my pace when climbing a hill?" or simply do it; whether we take time to understand what others tell us; whether we reflect upon the nature of the

tools we use or simply make use of them to achieve some goal. We embody both direct interactions and the interpretation of mediated relations, thus projecting our sense of continuity against the background of changing contexts. Each instantiation comes into existence in a domain of infinite possibilities characterized in terms of the potential relations through which minds are constituted and identified.

Minds can be appropriately described as succeeding configurations, all in anticipation of events and occurrences, respecting patterns of similarity (which account for the notion of personality), and of scaling (which accounts for the notion of human types). Minds are in anticipation of contingencies, of future contexts – another reason for my calling them the human sense of context. Anticipation means nothing more nor less than that a present change of state of a system depends on future circumstances rather than merely on the present or past. Structuralism tried to free the definition of language or culture from the past. Synchrony proved to be the method for achieving this. Anticipation goes one step further. It violates causal foundation and introduces a telic element not incompatible with the teleology of functionalism. In fact, it ascertains an internal predictive mechanism, and it does so on the basis of ascertaining the creative nature of humans and with the support of neurological data characteristic of our species. The micro-level of mind dynamics cannot be uncoupled from the biological reality of the human brain and body. If we are part of our representations, and part of our interpretation of representations, we actually confer upon them the reality of our own existence. At the same time, we make the existence of the world dependent upon our self-constitution. Such representations are no longer relevant as individual entities, but as networks corresponding to the entirety of the context in which they are generated. These networks do not reflect the context as it appears, but as we anticipate it in view of our needs, desires, and strivings.

Minds are in anticipation of images, sounds, mytho-magical occurrences, political ceremonies, legal principles, and symptoms (meteorological, medical, mechanical, etc.). Before a work of art, a mathematical theory, or a book becomes a reality, it is anticipated in many works, formulae, or narratives that might never make it to the minds of those we interact with. Those who are accustomed to interpreting everything as a representation of something else, and not as a constituted human experience which we interpret by becoming part of the experience, pursue the practice of asking how appropriate the representation is, instead of continuing the experience. Minds as configurations are in anticipation of every image or text in the sense that minds appropriate them and make them part of the dynamics of our own experience.

I suggest that any theory of representation should be founded on the idea that representations reflect only a small part of our experience and that, for a better understanding of our own nature and the parameters of our existence, we need to consider not only reflective mechanisms, but also constitutive and communicative mechanisms as they relate to human experience. These three aspects are connected and correspond to the relational condition of our integrated existence. Our practical life, whether physical or spiritual, always involves a triadic basic relation: the elements related (a and b, such as two individuals, groups, or larger entities), and the relation in its concrete determination.

Structuralism almost realized the need to transcend representation. In some of its most intriguing contributions, structures are projected upon the subject of inquiry, not "read" as some visible or

less visible matrix. Structuralism almost figured out that representations are not solely containers of information or knowledge about other things or events; they are completed through our participation in the interpretation of those representations and shared in successive acts of communication. The curse of objectivity to the detriment of acknowledging the subjective nature of creativity prevented structuralism from reaching the dynamics of interpretation.

Representation, especially minds, are processually completed. The completion takes place in every concrete instance that our practical life requires. It results in the projection of our own continuous change in a continuum of varying expectations, desires, and striving. This is where structures become dissipative structures. Thus, each mind is in anticipation of representations in the sense that it is a perspective through which presentations are interpreted; and it is also an instance in bringing them together, which is their communication, for practical purposes. Culture as structure means the past, history; culture as dissipative structure means dynamic change, future in the making.

Minds facilitate understanding contexts in the sense that they embody pre-understanding, or intentionality, as well as the conditions of existence under which we acknowledge any given context. Minds search in the domain of the possible and allow us to choose, so that the possible becomes real – a given culture – for the instance of interaction among minds. Minds refer to actions and are the center of our activity, not of our contemplative existence (thinking, as Descartes called it). Therefore, minds have a practical nature, which is embodied in the anticipatory configurations through which they come into existence when people interact while projecting their own identity into the environment of their existence.

Human coherence and integrity, which our minds seek and which are reflected in the coherence and integrity of culture, result from the dynamics of the succeeding configurations and from self-similarity. This human coherence and integrity is not homogeneously preserved in all our practical experiences. The experience involving visual contexts is quite different from language-based practice, from the experience of sounds, smells, etc. Structuralism was so dedicated to a logocratic model that it failed to acknowledge everything distinctive from language.
The constitution and continuous reconfiguration of our minds take place as new experiences, which we are physically and spiritually part of, develop, and make "that which is at variance with itself agree with itself" (Heraclitus). That is, they not only engage the human being, but also become understood. Understanding, and the dynamics of understanding by our minds are what we call "intelligence." In the framework of representation, the understanding and solving of problems are related. Our entire experience with tools (anticipation of new practical circumstances, goals, and actions) results from understanding, which is the content of intelligence and the context of culture. In the paradigm of constitution, understanding is of our own nature and mind. In communication, understanding is of what brings us together and allows for sharing. The dynamics of interaction of minds confers upon our intelligence the nature of processes, sometimes integrative, other times differentiating, and more often than not, synthesizing.

Thinking as language is quite different from thinking as rationalization. Experiences in language are the best proof of this. As Quine (1960) put it, sentences meet the test of experience "as a corporate body," not one by one. Thus, language embodies the same relational mechanism and

does not express, as some believe, functional states of the brain (such as desires, beliefs, etc.). Understanding, whether logical (through the proper use of the formal rules of language), rational (through discovery of the *ratio*, the measure of things or events, and the inference drawn from it to functionality), or intuitive (not mediated by previous knowledge), takes place in time. In the course of the process of understanding, the mind continuously checks against the understandings of others as expressed in language, rationality, intuition, or means of expression different from language. Understanding is the initial level of interpretation of everything pertinent to our life. It requires the cooperative activity of minds interacting, and embodies "the benefit of the doubt." (We settle for an understanding after discounting differences in the measures applied or in intuitions. Putnam calls this the "charity" in interpretation.)

Now the neurological data promised: Shortly after World War II, Donald Hebb (in *Organization of Behavior*, 1949) suggested that the repeated use of particular neurons – let me recall that a normal brain consists of about one hundred billion neurons connected with other brain cells through axons – causes a long-term change in their structure and facilitates the future passage of information between them (as one can learn from medical literature or any decent psychology book). He also wondered how neural structures sustain though and noticed that learning exerts a *direct* effect on the configuration of neurons and influences maturation.

We know that our language ascertains the entity of mind; that our use of the word, in various context, hardly suggests the identity "brain = mind," that our existence, while determined in many ways by our biological status, extends beyond it; that striving to understand our own functioning, we are able to reflect upon ourselves almost detaching our thoughts about thinking from the thinking itself. In short, it seems that we implicitly acknowledge, together with the meta-realm, the higher order of the activity of the mind (in respect to that of the brain). The brain does not "know" the world in which we live, or our internal world. The mind does. And the source of this "labeling" activity is not the ever-suspect homunculus, but other minds, or more generally speaking, our cultural existence in the network of relations that constitute our life experience (in which and through which we project our biological identity).

Information is a weak description of organization; messages of high information are rather disorganized. The message, affecting intensities and directions of synapses, gets "engraved," "hard-wired" in that profoundly redundant system that our brain constitutes. The enormous number of variables necessary to describe the biophysical system of the brain does not remain constant since over the life span of an individual, changes (in the number, intensity, and direction of synapses) take place. In the language of dynamic systems theory, the variables describing the system can be represented as coordinates in an abstract state space usually called phase space. Hence, we are contemplating a phase space with a changing number of variables necessary to describe the brain as a system. I would argue that there must be a meta-phase-space (a higher level of phase space) with a finite number of variables defining the state of the space of brain variables (i.e., the change through which the brain goes).

Mathematical descriptions of the brain system and mind descriptions are by their nature simplifying abstractions. The burden of interpretation of any mathematical description results from the tension between the abstracted and the abstraction. The brain, as a self-organizing system, lowers its entropy into the surroundings; it is a dissipative structure. Its state changes

continuously. In some ways, the brain is a set of brains, each with its own states. Within the brain, some modes are likely to dominate others, and stability can be reached in states of broken symmetry (such as the dominance of the verbal or the visual). What we know from biological research is that learning takes place (via the mechanism of the mind) and that if damage is induced to the location associated with a trained function, that function is lost. If damage occurs before training, learning is still possible, i.e., the system reallocates resources.

Each time explanations such as the above are given, there is the chance of finding the homunculus behind the explanation. Indeed, the mind, as I defined it, seems to be the homunculus; it "knows" – or seems to know – how to operate on the phase space of the brain and optimize its activity. It "is" in anticipation of events and controls the intellectual identity of the person.

It was initially established that neurological control of body movement originates in the cerebral cortex. In 1930, Wilder Penfield triggered actions by electric stimulation of electrodes attached to subjects' brains (Penfield 1958). Conversely, it was shown by Hans Kornhuber and Lüder Decke (1990) that changes in the voltage of brain waves precede movements. The so-called readiness potential is the time before the action when neurological activity is measured. This time is 800 milliseconds, much longer than the time needed to transmit a command from the motor cortex to the muscle. This first anticipatory step was interpreted in various ways ("Has the brain a mind of its own?") until new measurements of the time when the subject actually becomes aware of its intention to act showed that this happens 450 milliseconds before the act. The final 150 milliseconds remain an interval of reconsideration. This final research is the work of Benjamin Libet (1989); (he also worked with John C. Eccles, one of the main proponents of the independent reality of the mind). While some were quick to celebrate a proof of Freud's notion of the unconscious domain (where human will according to his theory is rooted), as far as my model of the mind is concerned, this provides evidence of the anticipatory nature of mind activity. The rather ample interval between the initiation of movement and the movement suggests that the mind is in anticipation of events. From the meta-phase-space to the phase-space of the brain, various possible events are triggered, from among which, according to circumstances, only few are actually realized (some even stopped shortly before being carried out).

Concerning the processes of our self-constitution, it can be stated that minds represent the medium of our continuous self-constitution. As agents of our interaction with other minds, and with the world, they make us part of all these interactions. Let us recall that Peirce, in his semiotics, expressed this idea when he defined the human being as part of the sign it interprets. Each of our instantiations takes place in a domain of infinite possibilities characterized in terms of the possible relations through which minds are constituted and identified.

Indeed, if minds exist only in relation to other minds, it is not false to assume that this relation is of the order of one (the entropy dissipating brain) to many (minds) and thus of self-configurational potential. Culture certainly displays such a characteristic. Growth results from differentiation – a process from which the biological endowment benefits over generations. Returning to language. brains do not label the world; they receive it either labeled (and categorized) via the optimization process from the meta-phase-space or in non-coherent frames,

when minds have not yet organized it according to those practical rules that are established within human interaction. The knowledge of human interaction is necessary to the extent that, to survive and prosper, we interact, and not only through language. The selection process is indeed relevant at this level, but not at the level of neuronal groups. In this process, there is always something ahead of us (time, places, events, other minds), thus an intrinsic anticipation striving. What minds know originates not from the homunculus, but from the other minds in relation to which they are continuously defined.

5. Negating the legacy of literacy

The major assumption of structuralism is the central role of language in culture. In a way, the universality of their cultural theory is that of language. That under certain circumstances the role of language might change, moreover that the characteristics of the pragmatic framework that made language, and subsequently writing, possible and necessary might be replaced did not make it to structuralism's agenda. It is now time to challenge the assumption on the basis of the dynamics of the new pragmatic framework of human self-constitution (Nadin 1997) For this purpose, I shall revisit the subject of how necessary or accidental languages are, the subject of bifurcation, and the subject of literacy, critical to any theory of culture.

Are languages accidental?

A good translation of this question would be: How accidental is human activity in its amazing variety? First comes the pressure of primeval survival. There is no need for language in the practical experience of surviving. Just as in the integrated biosphere there are no languages. The differentiation of species is a process within which global *sameness* is replaced by *distinctiveness*. In particular, the differentiation of the human species from the rest of nature involves un-natural components: tools, language, inter-individual relations (family, tribe, community), i.e., culture as humanized nature. They all affect the condition and the outcome of the practical experience of human self-constitution. But our species is not an end in itself, rather an ongoing project. Despite common characteristics, it displays variety, of races, for example, as well as of practical experiences. But it also displays unity. For instance, the unity of what became known as the dominant practical experiences within a certain time frame. Obviously, the hunters and gatherers of the initial pragmatic framework within which the species was constituted are different in many ways from the humans later involved in agriculture and herding. Biological, cognitive, and social characteristics, amply documented in every historic commentary and museum of anthropology, are different from one pragmatic context to another. This difference increases as the journey in time of the species continues.

If we decide to focus on the process of differentiation in order to account for the dynamics of change, we soon arrive at a logical observation: An entity equal to itself over time reached a stable state. A species in the process of its dynamic unfolding over millions of years goes through phases of instability before shifting from one state to the other. Each phase can be seen as a state of relative equilibrium. But between the stable states there are transitions. These transitions are very rich in detail. The description, or mapping, of such transitions is a source of knowledge regarding the forces at work. To see how and why change occurs, it is quite useful to examine the transition from one dominant pragmatics to the succeeding. Such transitions are

characterized, as any other transition in the real world of physical, chemical, or genetic phenomena, by instability. It is during intervals of instability that changes in the underlying structure make it to the social surface. They propagate like waves from the depths, impacting upon the life and work of human beings. This is how we become aware of them. They take the appearance of forces affecting the definition of human goals, or of means for improved activity, or even of motivations.

A pragmatic context is defined by the nature and scope of human activities in a given time and space frame. As an open dynamic system, each pragmatic context evolves over space and time. The space and time in question can be understood as a domain of possibilities. Such a domain of possibilities is society. It is the process of human inter-conditioning. Within society, individuals "create themselves" as they successfully pursue goals vital to their existence. In the human space, things that don't exist in nature become possible and real. These we call "artifacts." Rocks become weapons and cutting implements; branches become spears; sticks become levers; words and letters become language. Within the human space, a lot of replication takes place as means and methods are refined and adapted to the goals pursued. Tools – from simple to complex – facilitate new work. Together with language they impact on inter-human cooperation.

There is no need for history – oral or written – when survival takes all one's time. Even the notion or awareness of time is superfluous. Natural time dominates life in the integrated biosphere in absolute terms. At this level, there is only a biological clock. Hunting is direct confrontation with the prey. Its efficiency depends upon the physical performance of the hunter. Progressively, hunting integrates knowledge resulting from separation and distinction from the prey – decoupling. But once differentiated from the biosphere, the human species will find ways to decouple from the one and only clock. For example, there are physical times during which the animal can be hunted with more success. Or times when the hunter's natural abilities are more effective. With this human time emerging, a sense of cycles, of past, present, and future is slowly acquired and experimented with in practical experiences. Even the distinction between day and night takes place relatively late. We know this from tribes still surviving as hunters and gatherers in the Amazons. Even in our days of the ubiquitous presence of clocks and watches, they do not distinguish in a clear-cut manner between a time to be active and a time to sleep.

Pragmatically defined space and time is different from physical space and the biological clock. Feedback, involving the cognitive awareness of time, leads to positive reinforcement, and thus to more effective effort. With the *pragmatic* constitution of the human being, possibilities are created for replication of needs beyond the immediate. The cognitive underlying condition of human activity integrates the distinction between natural space and time and pragmatically defined space and time. In this cognitive realm, for instance, the use of fire is rationalized and made part of the human self-definition. Humans are the only creatures in this universe making use of fire. To prepare meat and other available edibles using fire means to "extract" them from the natural cycle and integrate them into the human cycle, into culture. Replication of fire, a theme of major mythical representations, is one of the most powerful examples of how the cognitive becomes a creative force and shapes culture.

Replication of organization is another example. The unity of human space and time eventually results in the generalized structure of family, tribe, community. In the dynamics of human self-

constitution through successful, and therefore efficient, practical experiences, human interaction shifts from accidental to stable. In order for this replication to take place, another cognitive premise is necessary. It pertains to language, through which human interactions are stabilized. Language captures, rudimentarily in the beginning, the abstraction of organization, as this crystallized in practical experiences. How and which language participated in the process is a matter difficult to clarify. Oral language leaves no direct traces. All we know is that between grunts and words there is a huge cognitive gap. The task at hand then becomes to distinguish between them in terms of how they affect the outcome of the practical endeavor where they occur. The final outcome is, after all, the survival and prevalence of the species. Without language, the human species could not have distinguished itself from the rest of the world and become what we know it did.

What also distinguishes the human species from the rest of the world is the ability to reach higher levels of outcome in activities essential to survival. As a consequence, the results exceeding immediate needs make up a new domain – the domain of expectations. When this level of efficiency is reached, natural forces no longer continue to drive the human being, but forces inherent in the new human nature. That the satisfying of ever higher expectations takes place to the detriment of the rest of nature ought not to be ignored. In order to meet un-natural expectations, individuals rely on cooperation and interaction. This is the primary layer of the never-ending interweaving that makes up society. Contrary to common belief, society is not the sum total of individuals, but rather their increasingly complex inter-conditioning. Only when the natural level of interaction is transcended, that is, on account of cognitive characteristics of human interaction making up society, a higher level of efficiency is reached. Mediation, characteristic of human culture, plays a major role in the process. But mediation itself is subject to change. This is how language evolves, how para-linguistic forms of interaction and communication emerge, and even how technologies of mediation come into being and improve or at times change radically.

The dynamics of change in mediation affects its methods, forms, and technologies. It is influenced by forces embodying the human need to perform efficiently. And it is representative of the dynamics of the species itself. We arrive at this conclusion after acknowledging that what distinguishes the human species from nature is the cognitive substratum from which mediation originates. Accordingly, changes in mediation are changes in the species, as it continuously constitutes itself on individual and collective levels through practical experiences.

Bifurcation

The thought that a mathematical formula, or for that matter several, could capture the dynamics of human development might generate skepticism. And rightly so. But mathematization for its own sake is not the purpose we are pursuing. What we are after is an attempt to understand the *quality* of phenomena of change, moreover, their interrelation. As much as one feels at times attracted to predict, we are not at all convinced that from the understanding of change as it occurred in the past, recent or remote, we could derive a credible picture of the future. A word of caution has to be uttered as we prepare to look at knowledge gained recently in understanding physical, chemical, biological, and other systems. The perspective from which this knowledge was gained literally replaces previous explanatory models (science up to the beginning of the

20th century) anchored in literacy. The operational concept is that of chaos. It was defined in many ways, more strictly by mathematicians, metaphorically by philosophers and artists. For our purposes here, chaos as order without periodicity, i.e., lacking repetitive patterns, is acceptable. This definition should be completed by the understanding that dependence on initial conditions is central to chaotic developments. Initial conditions are those characteristic of the state of a system before it undergoes change. For instance, in the change from one pragmatics to another, the level and forms of mediations are initial conditions.

There is a tendency to sometimes see in new events a repetition of the past or an indicator of similar events. Conditions leading to economic crises, or to wars often make it into the media. This means that people are aware of the fact that initial conditions in a system affect its functioning. It also means that some are inclined to equate things that are far from being the same. In spite of this inclination, the dynamics of fundamental pragmatic change is, as far as we can say, non-periodic. It has its order, but essentially it results from developments that cannot be predicted. They appear as chaotic to those involved. For us, readers and writer, as well as our contemporaries, the proof is in the perception of chaos in our own time. We experience the appearance of chaos in the restructuring of the economy, the fall of rigid state structures, in the high incidence of crime, the questioning of religion, of the family, of nationalism, of education. We experience it, too, in the many iconoclastic tendencies and movements capturing public attention. The homosexual family, the feminist movement, and children's rights activism are but a few examples. In some ways, paradoxically though, we would prefer some order. For instance: to know where we will work during our lifetime; to know that our skills are appropriate to the tasks we will face; to live and work under the assumption that contracts are secure; that we will enjoy stable political relations (especially since peace broke out we are seeing so many local conflicts flare up in bloody confrontations); to benefit from the certitude once provided by religion, family life, and even education. On the other hand, the background of instability is also one of challenge and opportunity. This aspect cannot be stressed enough. It is exemplified by a real explosion of energy and creativity. And it is embodied in the most spectacular innovations humankind experiences.

One of the main theses I advance here is that the current time of change corresponds to a chaotic shift from a literacy-based culture to one of illiteracy or, if you prefer, of a multitude of means of expression and communication. This shift is from the order and expectations of industrial society, based on and integrating values of literacy – which can be seen as part of the initial conditions of the system – to an emergent pragmatics contradicting these values. The emergent pragmatics integrates literacy but is not limited by its basic assumptions. It is a context of practical experiences based on many literacies. They correspond to a new underlying structure of very complex cognitive mechanisms of mediation.

The discussion of structuralism and of the cultural theory it made possible should not become a nostalgic journey. For me, the benefit of this journey is to add new arguments to what can be called the reconstruction of the chaotic phases of change, in particular the change that made literacy necessary. This reconstruction should help us infer from a relatively recent time of stability and obsession with permanence to the new circumstances of instability we are experiencing. The change in condition, from a literacy-based civilization to one of many literacies, is fundamental. The expectation of permanence and linearity is characteristic of the

entire sequence leading from incipient human pragmatics to the Industrial Revolution. The ephemeral and non-linearity characterize the sequence starting at the bifurcation of our new pragmatic framework. In order to understand what this means, let me submit to you that we have to address basic questions inspired by the formulations of chaos in science.

Where do the successive pragmatic frameworks arise from? What makes them possible, moreover necessary? These are questions related to the internal dynamics of the system of human culture. In order to pose such questions, in physics one would look, as chaos theoreticians do, for something of a universal nature. The same would be pursued in modeling the parametric growth of populations (people, plants, animals, you name it). Or in analyzing weather patterns, behavior of fluids or gases, oscillations of all kinds, the price of commodities. Structuralism was animated by the same thought. Cycles of change could be read, as some suggested, metaphorically or literally, as the shadow of a deeper universal entity. Complex relations in the physical realm are non-linear. This means that such relations cannot be represented by a proportional progression. Evidenced through their chaotic behavior, many natural phenomena are non-linear, and to understand them, the reduction from non-linear to linear is simply misleading. There is order in their development – what we perceive as their behavior – but this order is not predictable, and it is not periodic.
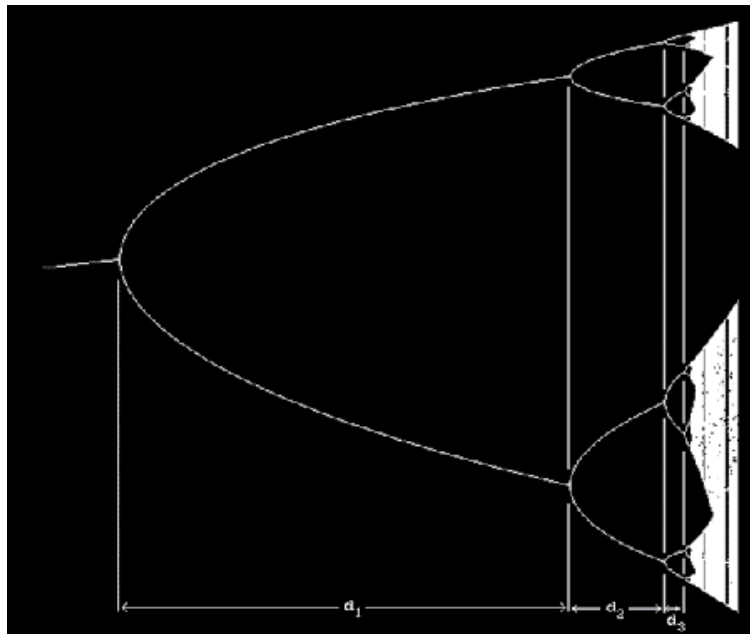

Fig. 3. Changes in the initial conditions, affect changes in the behavior of the entire system.

This diagram (Fig. 3, Gleick1987) is an aggregate of representations. Robert May was studying the behavior of populations with different degrees of fertility. Changes in one parameter (the x-axis), i.e., changes in the initial conditions, affect changes in the behavior of the entire system. At a low value of the parameter the population is extinct; as the parameter rises, the equilibrium level changes. A splitting, or bifurcation, takes place. At this bifurcation the population alternates between two different levels. Bifurcations succeed faster and faster, leading to chaotic states. A

pattern of self-similarity is present all the while. Examples from other fields of scientific inquiry are basically similar.

As complicated as such accounts are, things are even more difficult to grasp in regard to human beings and their pragmatic self-constitution, or to culture. Weather patterns, oscillations, and fluid dynamics can be very complex, but still infinitely less so than human life and human activity. There is, though, one important commonalty: Once a system – physical, genetic, meteorological, or human – is destabilized by some action from outside, it enters a chaotic state. Its dynamics is abruptly freed from its path and attracted to some other path, of a new kind of implicit irregularity. Once in such a chaotic state, the system never returns to its previous or initial state. Its newly acquired stability is in relation to even more complex patterns of irregularity. This locking in a new chaotic state can be compared – but only to get an idea of the behavior in question – to what happens on a dance floor. Once the rhythm changes from a simple beat to more elaborate syncopations, a new "dance" becomes dominant.

On account of the interaction between the differentiating human being (extracting himself from the integrated biosphere constituting culture) and nature, the encompassing system to which they belong is destabilized. Further on in time, the change in the condition of the relations among individuals becomes as important as, and even more than, the relation between the species and nature. Hunting and foraging are part of a limited nomadic experience. In this experience, adaptation to changing conditions is unavoidable. Interaction with nature and among individuals is minimally mediated. Time is perceived in the rough periodicity of seasons and of the cycles of day and night. Space is experienced as proximity.

Settlement, brought about by agriculture, follows the instability of needs of survival not matched by the outcome of hunting. A shift from adapting to the changing environment of nomadic hunting and foraging to establishing an activity – agriculture – related to the chosen place marks this episode. Time is perceived at a less coarse scale than in hunting. Duration, an indirect perception of time, is related to the now new dominant pragmatic. Between planting and collecting there are operations to be performed at precise intervals. Immediacy, implicit in the nature of the previous pragmatic framework, is replaced by longer term patterned activities. Space is experienced as a dimension to explore. On a biological level, major genetic mutations mark this bifurcation. Plants and animals are identified and selected for their usefulness to the community. It might seem a one-way street, but in reality the process involved reciprocal influences. For example, some of the diseases affecting the species since that time (the flu, among others) result from the pragmatics of herding. All in all, life expectancy increases and life resources diversify. As a result, even anatomy changes. Increased height is documented at this time. Population growth leads to a wider variety of inter-individual relations. Human inter-conditioning, which is the ultimate embodiment of society, becomes more complex.

The dynamics of human biology, and in particular of the cognitive substratum, are at the foundation of human self-constitution through work and at the constitution of culture. Resting upon them, human pragmatics is indicative of the many aspects of dynamic changes across scale, from the individual to the species. Scale affects needs and expectations. The reconstruction of pragmatic bifurcations has to reflect how scale, together with mediation, affects pragmatic change (Fig. 4). Scale and the nature and depth of mediation are initial conditions to which

pragmatic changes are sensitive. Let us notice an important pattern: Each historically acknowledged phase of instability prior to a pragmatic bifurcation is related to a modification in the human scale of existence and activity.
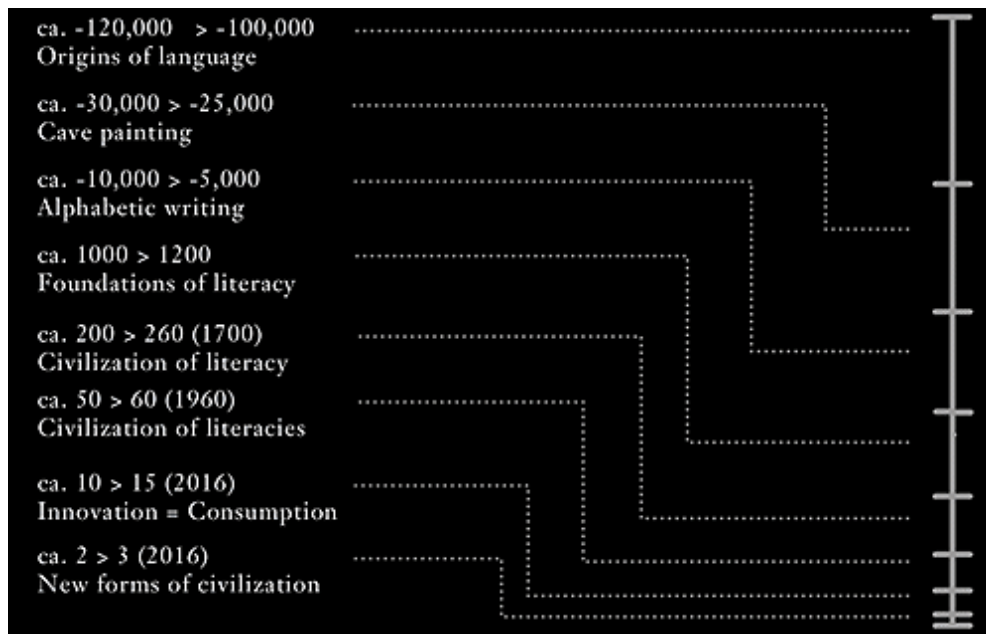

Fig. 4. Human pragmatics is indicative of the many aspects of dynamic changes across scale.

A particular pragmatic characteristic at times dominates all others. Over a certain time, it becomes definitory, while everything else in the life of the species seems to vary. Each particular bifurcation is unpredictable. But each bifurcation follows instability. However, the sequence of changes is from low efficiency – a context of literal fight for survival of the individual – to levels of efficiency ascertaining the human species as progressively autonomous. Scale changes from individual to family, limited community, tribe, etc. With the emerging pragmatics of the industrial, human scale reaches the scale of national states, international coalitions and, in our time, that of the global sphere of relations. The sequence also testifies to the increased complexity of the pragmatic framework.

Zeroing in on a moving target

Human life is attested at roughly 2.5 million years ago. Incipient language can be traced to some 252,000 years in the past. The differentiation of various families of languages (Indo-European, Semitic, etc.) took place at around the same time that agriculture and animal husbandry can be documented, i.e., only 19,000-20,000 years before the common era. Writing evolved from rudimentary notation, record keeping and attempts to describe simple objects or events. Those who study its origins place writing between 10,000 and 5,000 years ago. The moment is of extreme importance in the dynamics of human pragmatics. After writing, the succession of pragmatic cycles accelerates considerably. The progression from immediacy and directness to indirectness, intermediaries, and mediation affects the condition of human practical experiences.

It actually parallels the drive for higher efficiency as the scale of human existence changes. The nature of mediation reflects the underlying cognitive structure of the human being.

Incipient language affected foraging and hunting. It allowed people to become progressively more efficient through better coordination of effort. Agriculture and settlements are a new qualitative stage. Rudimentary writing contributes to this stage, a temporal dimension in the form of very simple record keeping and planning. The process of converting natural abilities to human characteristics was one of ascertaining an identity unprecedented in the integrated biosphere. In order for this to happen, a change from the stable natural state to the succeeding less stable human states had to occur.

At the pinnacle of all known complex changes that we are aware of is our own biological and cognitive transformation. Human minds are the best testimony to this. The diagram of successive pragmatic frameworks is more suggestive than descriptive. From a preoccupation with storing information pertinent to direct practical experiences, human activity shifted to generating new information. This additional information shaped indirect practical experiences. Hunting and foraging are natural endeavors. All animals hunt living prey or search for edible vegetation. The incipient language connected to them stores the very concrete and immediate data pertinent to *what, where, when,* and *how* (hunt, look for food in the surroundings). As language evolved within progressively more complex practical experiences, it captured new aspects of these experiences. Agriculture and herding, although still natural endeavors, already have the imprint of the human cognitive and social condition. The minds of the humans constituting themselves through agriculture are quite different from the minds of hunters and gatherers. New connections, resulting from cognitive functions such as associations, comparisons, simple inferences and new forms of human inter-conditioning are generated. In writing, connections other than those made in real experience become possible.

The non-natural practical experiences, ranging from craftsmanship to pre-industrial activities, and later on to the pragmatics of the industrial correspond to subsequent bifurcations. Embodied in such activities is the experience of language as a pragmatic domain of its own. Religion, the humanities, education, and politics are based on processing language. The practical experience of human self-constitution in language has not only a representational, but also a constitutive aspect. Representations mirror reality, the house in which human existence takes place. Presenting again, i.e., re-presenting some of what human beings experience in reality, affords also a better understanding of their own involvement with it.

Language makes possible the activity through which humans constitute entities that did not occur or exist in reality. In such activity, the mind operates on representations in order to generate new entities. Such newly constituted entities are goals, plans, designs. They are constituted once human practical experience shifts from the holistic stage of undifferentiated existence to division of tasks, and later on to successive divisions of labor. Human inter-conditioning increases all the while and thus society, itself an un-natural condition, appears and constitutes its domain. Without overriding the domain of the individual, it effectively supersedes it. The experience of language as part of human inter-conditioning becomes part of the societal process.

We are currently experiencing the bifurcation from a civilization firmly anchored in the values

and implications of literacy to a civilization that negates part of this legacy. In order to realize the complexity of this fundamental change, we will have to take a closer look at the particular juncture of the emergence of writing, the actual premise of any notion of literacy. The background of instability suggested in the snapshots of our current state of affairs is like the seismographic zig-zags from which seismologists infer what is going on. Disparate facts and events, symptomatic of social and economic tendencies need to be put in a cohesive perspective.

The inheritance of writing

The world viewed through the "spectacles" of the experience of writing is different from the world seen from the perspective of orality. As language came into being (ca. 252,000 years ago) the division between physical and mental activity started. Writing (probably 240,000 years later) deepens this division. Memory before the word was evidenced through repeated actions, gestures, sounds, and colors. These made up some kind of pre-language. Structuring of effort was imposed from outside. The natural environment with its cycles gave the cues. All beings, including those to become humans, reacted to them. Self-reflection filters the information in regard to what is useful. It introduces an element of comparison (some things are more useful than others). Progressively, cues from the experience itself filter elementary observations. Such cues, "extracted" from specific activities, are passed from one person to another. They made it into a memory of higher order than the memory of actions. Against this cognitive background, forms of interaction and cooperation result in successive layers of reciprocal understanding. All that partook in the practical experience of hunting, fishing, scavenging, seeking shelter, etc. – that is objects, sounds, gestures – influenced the activity and its outcome. Reproduction, while still an experience of survival, introduced its own layer of understanding and rudimentary awareness of inter-conditioning. Nevertheless, it also evidenced elements of what would become the very important sexual dimension of humans. All these elements eventually made it to the "tongue", as we know that the etymological origin of the word *language* suggests. But let us be careful: there is as much language in the tongue as is music in the reed of a clarinet. Or, as much language in the vocal chords as in the strings of a violin.

There is a reductionist thought that insinuates itself through the experience of writing in the pragmatic context. This reductionist thought is quite powerful. It supports the attempt to break tasks into small components (the "letters" and "phrases" of actions), or, as structuralism did, into elementary parts (phonemes). But it also inspires, early on, atomistic views of the world and the universe. Everything there is made of smaller and smaller parts. Linear progression, from simple to complex, from immediate to next, from here to there, together with sequentiality, make up a system of reference. This system eventually crystallizes in a deterministic view. The view is reflective of the cause-and-effect-based primitive human pragmatics. Initially, as writing starts a period of transition from remembrance *(mnemai)* to documented accounts *(logoi)*, the question of cause and effect extends from practical experience to language.

With the experience of writing, the expectation of permanence, the pattern of sequentiality, and the awareness of linearity, determinism and reductionism are embodied in the rules and practice of everything involving language. And so are hierarchy and centralism. All the characteristics mentioned – sequentiality, linear progression, determinism, reductionism, hierarchy, centralism –

are objectified in what will emerge as the goal and method of literacy. They are the initial conditions on which the development of the human system is dependent. The pragmatic bifurcation marked by the Industrial Revolution is, after all, the expression of literacy as it embodies fundamental assumptions and characteristics of language.

The ideas of the Industrial Revolution and its affirmed values have in common a romantic notion: unlimited progress. This notion is expressed in the philosophy and social movements of the time. For all we know, the Industrial Revolution could not have happened without literacy. This does not mean that society at large was literate. It does not even mean that literacy automatically became a social, political, cultural or economic goal. Rather, that the characteristics of language experience leading to literacy, in its initial restricted sense – the few who could afford a literate education – make up the background against which the thought of industrial production is ascertained. Building machines and lines of production (what will become the assembly line, associated to Ford's name) of sequential nature and linear relation between effort and output, individuals are shaped by the industrial pragmatics. Education, until this moment an extension of family and religion, would subsequently assume the characteristics of industrial methods. It will mirror the structure of the new pragmatics.

Machines were conceived and built as metaphors of the human being. They answered needs and expectations stemming from a new scale of human existence. This scale necessitated a different type of human inter-conditioning through the dynamic mechanism of society. Work becomes less and less homogenous. Social life replicates the integrating mechanism of industrial production. It integrates young and old, men and women, resident and alien. Reciprocal dependencies of individuals and groups within a larger scale are encoded in laws protecting property and individual freedom. Nevertheless, individuality is dissolved in the anonymity of the product. Even personalized ownership of means of production progressively gives way to the anonymous corporations. Relations to work and through work become increasingly mediated as work itself is less direct, and its results less immediate. As the pragmatics of agriculture and writing are associated with human settlements, pre-industrial and industrial society is associated with the ascertainment of national states and literacy.

Without necessarily providing the means for a universal literacy, industrial society, as it advanced from primitive to more advanced technology, needed literacy in order to get the most out of machines. It needed literacy also in order to preserve the physical and intellectual capability of the human operator. The post-industrial, as yet another instance of instability and chaotic development, is characterized by, among other things, increased speed and shorter durations of human interactions, a growing number of mediating elements, fragmentation and interconnectedness of work, a new technology of synchronization. The fundamental characteristics of the practical experience of human self-constitution, i.e., of the pragmatic framework, can no longer be supported exclusively by language means. Literacy is slow and expensive, it relies on centralization, and it discriminates. In this new pragmatic framework, distributed, non-sequential forms of human activity, non-linear dependencies, and inclusion (of resources, modes of interaction, distribution) are characteristic. It is a framework constituted at a new scale – global – and with many levels of complexity. The new means for human interaction are less "universal" and less "encompassing" than language. They have a local, partial potential for geometric and exponential growth resulting from their connectivity (to which networking is a

testimony) and expandability. Now that the world entered the phase of global interdependencies, many "local" languages and their "literacies," of relative, restrictive significance and differentiating function, emerge as instruments of optimization. What takes precedence today is interconnectivity, a function for which language is ill prepared and literacy ill adapted. The encompassing system of culture broke into subsystems (not just the two cultures of science and literacy that C.P. Snow discussed in 1959), coupled with the mechanism of the market, itself emancipated from literacy. (The emancipation of the market took place because, at its current scale, it would break down if kept in the Procustian bed of literacy and could not stimulate the generation of alternative means appropriate to its new dynamics.)

Obviously, these remarks are mainly a sketch of a picture that is taking shape as we ourselves constitute our new identities as scholars and teachers in universities facing their deepest crisis since the inception of higher education. The process we witness and participate in already fully assimilated the visual, which in some cultures became the dominant form of knowledge acquisition, expression, and communication. For many, digital technology embodies this new stage, since indeed the digital facilitates activities of a fundamentally different nature than those reflected in the obsolete ideal of literacy. As I submit to you these thoughts – the result of many years of research – I understand that not only do they challenge the cultural theory stemming from the elaborate work of scholars in structuralism, but pose critical questions for our culture as well. My intention is not to pose as, nor to become the prophet of a new, and for many dangerous or disappointing, culture; rather to maintain a dialog, as structuralism, in its many contradictory embodiments, tried also. Vilem Flusser, known by now for his dedication to the theme of change in our age, died on his way back to a Prague he might not have recognized. His death is in many ways a closure to what over many centuries was an example of intellectual foment. Instead of commemorations, I prefer new beginnings. Let me hope that, with my concluding remarks, I draw your attention to some of the most fascinating beginnings that humankind ever experienced.

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