

Mercedes Vilanova
Frederic Chordá
Editors

A Mind at Work

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WE ARE OUR QUESTIONS



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Table of Contents

Introduction //	Mercedes Vilanova and Frederic Chordá	1
------------------------	---------------------------------------	----------

Chapter 1 //	Ahead of His Time	4
---------------------	--------------------------	----------

Themes in Mihai Nadin's work

The Digital Age	7
------------------------	----------

Peter Bøgh Andersen, Cohesion and Coherence in Programs 7

Frieder Nake, Third Culture Man 21

A Civilization of Many Literacies	32
--	-----------

Frederic Chordá, Civilization of Illiteracy: Language, Reality and Renewal 32

Steven Bleicher, Literacy Lost 58

Blossom Kirschenbaum, We don't have to join the culture of illiteracy,
but it helps to understand it 60

Victor Terras, A Positive Pragmatist 64

Jay Lemke, Beyond Literacy:

Semiotics and the Civilization of Hypercomplexity 68

E.D. Hirsch, Jr., "...transcends McLuhan" 74

Umberto Eco, "...not among the usual lamentations" 75

Intelligence is Process	77
--------------------------------	-----------

Philip L. Smith, Go Reconfigure: Ideas About Education in the Digital Age 77

Corinne Whitaker, Reinventing the Mind 81

Jeffrey V. Nickerson, Cognitive Energy:

Twelve Themes in the Work of Mihai Nadin 84

Heinz von Foerster, "Mind manifests itself in dialogue...." 101

Identity	102
-----------------	------------

Mercedes Vilanova, The values of the civilization of literacy

are no longer valid 102

Thomas Gillespie, Ich Bin Ein Illiteratus 107

Solomon Marcus, He was never only what he seemed to be 119

Chapter 2 //	Mihai Nadin: Imprints of Knowledge	122
---------------------	---	------------

The History of the Future	124
----------------------------------	------------

The Message is the Medium	147
----------------------------------	------------

The Architecture of Thought	151
------------------------------------	------------

History and Awareness of the Future	158
Anticipation – A Spooky Computation	162
Aesthetics	167
Negotiating the World of Make-Believe	167
Art and Technology	173
Science and Beauty: Aesthetic Structuring of Knowledge	177
Art history and criticism	189
...That Old Sire	189
Chapter 3 // Mihai Nadin: Fiction, Poetry, Drama	196
Short stories	198
Letters	198
Suicide	199
In the Right Direction	202
Enthusiasm	203
Words	204
Permission to Think	209
The Ruins of Utopia	210
Novels (excerpts)	212
A Day for Jewels	212
Suspension of Gravity	215
EXIT	219
Poetry	223
1964 – 1966	223
1978 – 1980	228
Drama	230
The Longest Wait	230
Contributors	246
Index	250

Introduction

How and why this book came about

Mercedes Vilanova and Frederic Chordá

EACH AGE IS THE AGE OF THOSE WHO EXPERIENCE IT. In certain cases, we refer to the Age (or Time) of Aristotle, and of Plato and Socrates. In other cases, we refer to the Age of Napoleon, or to the Age of Einstein. There are yet other occasions when we refer to what the individuals living through the age actually did – the time when the wheel was invented, for example; or the time when writing emerged. Or the time of the global economy. Whether we name individuals or only acknowledge what they did, it is the same. Time is the time of our individual existence, of our lives, of everything we do and feel – including ageing. To understand a certain moment in time is to understand the ones who live it. The ones who make it happen. The ones who reflect upon it. The ones who ask the questions pertinent to a particular age.

This is how we, the editors of this book, come to meet and know our many colleagues. And this is how, from among these colleagues, we felt attracted by one who probably does not fit the categories under which scholars and professors are catalogued today. Indeed, Mihai Nadin is the mind at work presented in this book. But before describing the book, we want to shortly deal with how it came about.

One of us – Frederic Chordá – was a visiting scholar from Spain at the Department of Art Education at the Ohio State University. Nadin was Eminent Scholar in Art and Design Technology, an endowed chair, at the same University. They met at the home of a mutual colleague, the Head of the Department of Art Education. Impressed with each other as individuals and professionals, Nadin and Chordá remained in touch and over the years met again, in Barcelona, and then in Wuppertal, Germany.

It was Nadin's book, *The Civilization of Illiteracy*, that brought Mercedes Vilanova into contact with the author. It was a momentous discovery, at a Cambridge bookstore while she was a visiting scholar at Harvard University, followed by e-mail contact (as he suggested in his book), phone calls, and a visit to his home in Little Compton, Rhode Island. And, years later, in Wuppertal, at a conference on *Trust* in the global environment that digital technology facilitates. The two of us shared many concerns and exchanged many questions. And since Nadin believes in the power of networking, a network did indeed emerge. Mercedes Vilanova was introduced to Frederic Chordá, in Barcelona, where both of us live and work.

The rest is relatively easy to describe: The two of us decided to make Nadin's work available in Spain and in the Spanish-speaking world at large. Thus we dedicated ourselves to a rewarding intellectual endeavor. Let us first point to the issue of *Historia, Antropología y Fuentes Orales* (number 23, "El fin de los escribas"), in which an interview with Mihai Nadin was published and in which his text on the mind (*Mind – Anticipation and Chaos*) was made available to the Spanish-speaking world. Frederic Chordá provided a synthesis of *The Civilization of Illiteracy* in that same, very well received, issue. But we were not yet finished. During these days, a special issue of *Anthropos* (#197) dedicated to Nadin's work will appear in print. *Anthropos* is a high quality journal that captures the "Huellas del Conocimiento" (Imprints of Knowledge). Not unlike this book, it consists of articles dedicated to Nadin's work and also contains a selection of his writings. We are happy to have the opportunity to present articles about him and by him.

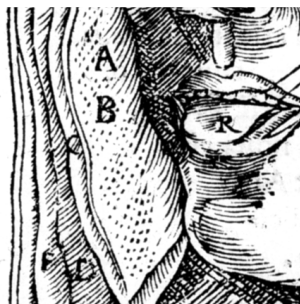
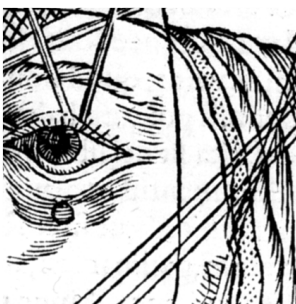
Is this the end of our interest in Nadin and his work? Probably not. He does not seem to slow down. His current dedication to the subject of anticipation places him yet again ahead of those researching new frontiers of knowledge. He himself qualified research in anticipatory systems as the new frontier of science, even a second Cartesian Revolution. This is quite an undertaking, but also an expression of his passion for research and his uncommon broad vision.

It is not our intention to characterize his work in these introductory lines. Neither is it our intention to highlight his contributions. The articles in this book, written by exceptionally dedicated scholars, fully address the originality of Nadin's thinking. We do find this the appropriate place to state that he has always worked hard to share his work with others – through

lectures, print media, and, with the advent of the Internet, through a Web-site in which his writings and other works are publicly available.

Our intention is relatively modest: to make resources available. We are convinced that in so doing, we encourage future research that will carry on what Nadin started. Since his own focus is on the future, we can only conclude these introductory remarks by expressing the hope that the future will acknowledge our conviction that Nadin has made a difference – as a human being, as a professor, as a researcher, and as an author.

December 2002



Chapter

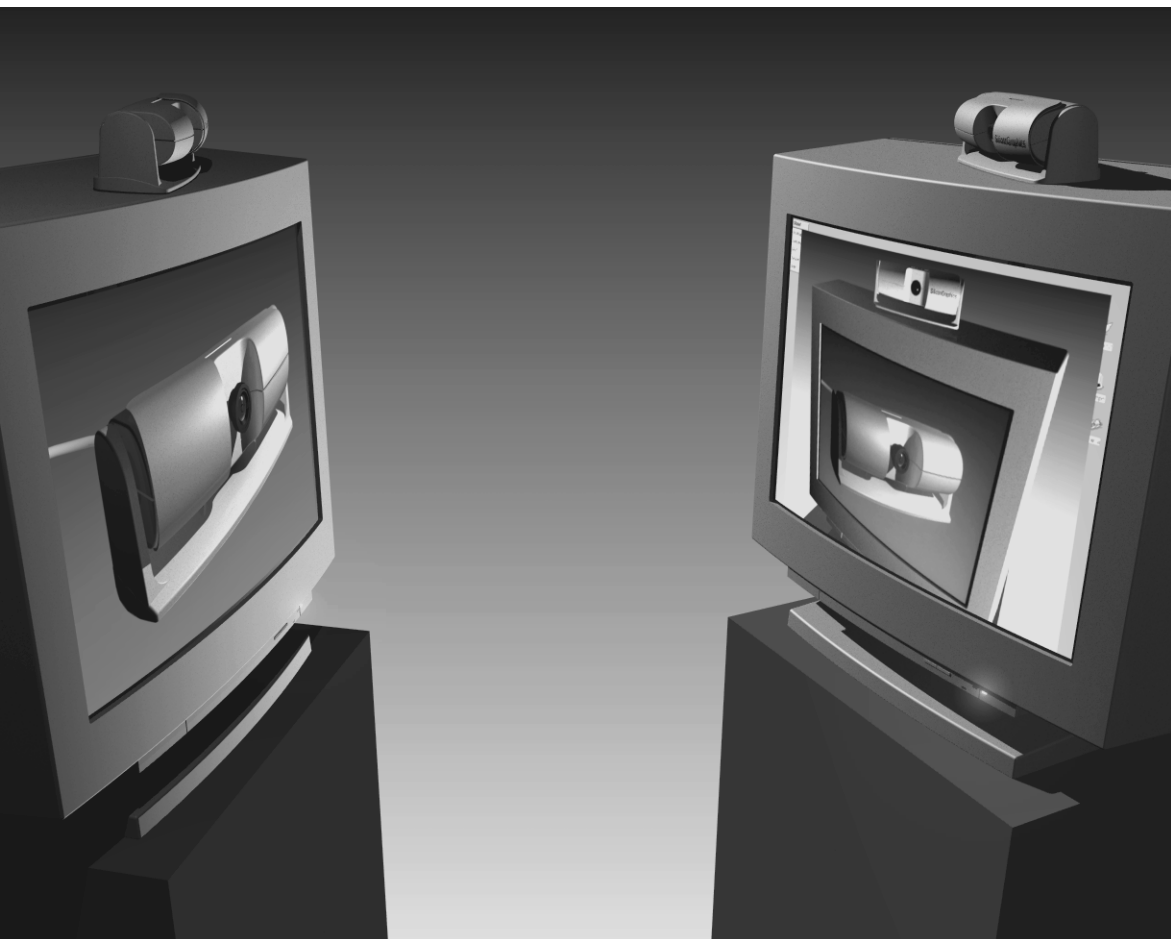
Ahead of His Time

// The Digital Age

// A Civilization of Many Literacies

// Intelligence is Process

// Identity



The Digital Age

Cohesion and Coherence in Programs

Third Culture Man

Cohesion and Coherence in Programs

Peter Bøgh Andersen

Introduction

Although I first met Mihai Nadin in 1996, on the occasion of a seminar on informatics and semiotics at the Dagstuhl Castle (organized by Nadin, Professor Frieder Nake, and myself), I was already acquainted with him through his writings on semiotics and human-computer interface. I had been using his text “Interface Design: a Semiotic Paradigm” (1988) for teaching purposes for several years.

Among his many interests was the triad computers-semiotics-aesthetics, which also happen to belong to my favorite obsessions in pursuing optimal human-computer interaction. The motivation underlying this assemblage was a particular perspective regarding the computer. It was a new medium and consequently, the aesthetic aspect was as important in computers as in any other medium. However, in the early 1980s, computers still belonged to the realm of the technical and natural sciences, whereas the domain of aesthetics was claimed by the humanities. Furthermore, the technology of that time was such that the computer was still considered a tool, an automaton, not a medium with characteristics different from tools known prior to digital technology. For various motives, scientists, programmers, and humanists held to this belief. The later advent of multimedia and virtual reality and the explosion of the world-wide Web changed this situation. Today everybody talks about the “computer medium” as though there were nothing new under the sun.

Semioticians, especially those in the USA, were still enthralled by the written word, the text, so they ignored the possibilities for research that computers opened to the field – if indeed they were aware of them. Nadin, however, had found in semiotics – especially the semiotics set forth in the

writings of the American philosopher Charles S. Peirce – the possibility for interdisciplinary interaction among the technical aspects underlying computer programs and interface (provided by scientists and programmers), the aesthetic aspects that enhance human-computer interaction (provided by artists and designers) and the humanistic aspects (supplied by researchers in the logical system of Peirce's semiotics).

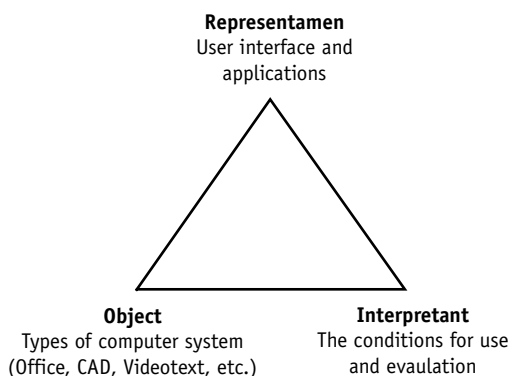
There is a physical reality to any sign (...) and there is a mental process associated with it. Sometimes the balance is inclined towards the physicality of signs, at other times, toward the mental aspects. (Nadin, 1993)

As Nadin recognized years before these lines were published, these two properties make semiotics an inherently interdisciplinary field that enables principled reasoning across academic domains. And this interdisciplinarity is necessary for educational as well as developmental purposes.

In addition...the aesthetics cannot be improved after the VR context is created, i.e., after decisions regarding the nature of representations used have been made. They have to grow together, intertwined, in order to facilitate the much desired effectiveness of the experience. (Nadin, 1995)

Thus there is ample motivation for applying a semiotic perspective to the computer medium. In 1988, Nadin suggested a semiotic analysis of a computer's user interface:

Figure 1:
The interface sign.



His interface concept is very broad, including programming environments. Figure 1 can be understood fairly intuitively. But it was not the last word about computer-based signs. These signs had many surprises in store. As Nadin remarked, computers are more than just a tool or medium. As the Danish inventor of Algol, Peter Naur, realized before many computer scientists, a computer program can be said to embody a theory, and programming shares many features with theory building. This idea of an embodied theory lies at the heart of Nadin's concept of Computational Design:

But as opposed to the pencil, brush, exakto knife, wood or metal type, Hasselblad, etc. that designers used in the past, such programs are condensed theories of the activity they support or invent (as was the case of teleconferencing). None describes design completely. They describe and synthesize design activities related to our interest and need for multimedia, font design, or for CAD, for publication design or for on-line advertisement. Those who authored such programs – quite often large teams of programmers, psychologists, and designers – integrate in them the knowledge of physics, mathematics, aesthetics, semiotics, and ergonomics. In fact, each such program is a theoretic hypothesis. Those using them test this hypothesis. The products that are finally generated are comparable to the products that result after computational engineering is applied for creating new materials, or computational genetics for creating new medicines. (Nadin, 1997)

My point of departure begins here. How should we understand the notion of embodied theories? The concept makes sense only if we delve beneath end-user interface into the program's inner workings; that is, when we begin to analyze the program text itself as a sign complex. If a system is to count as a theory, its program text must be interpretable as the kind of statements that make up a theory. It must contain representations of general laws that can be applied to representations of "facts" (whatever they might be). In addition, these laws must be supported by empirical evidence, as is normal with theories, and they must be consistent. Nadin discussed this problem in "Consistency, Completeness, and the Meaning of Sign Theories" (1982).

There are some programming languages that are very easy to interpret. In PROLOG, for example, one can write a theory consisting of implica-

tions, represent facts by means of assertions, and query whether some new fact follows from the old facts according to the theory:

Theory:

mortal(X) :- human(X).

Facts:

human(socrates).

Queries:

?- human(socrates).

yes

?- mortal(socrates).

yes

?- mortal(zeus).

no

?-

But in order to use a theory properly, one must be able to assess its validity and possibly change it if it is judged false. Consequently, if a theory is embodied in a computer, the user must be able to “read” the system as a theory about some topic. The inner workings of the system must consist of sign-processes that are interpretable to the user. This is not a requirement that is normally demanded from systems (although PROLOG provides an explanation of its reasoning, which is also standard in expert systems; cf. Jackson, 1990: 314 ff.). Since this is possibly a point where Nadin and I disagree slightly, it is completely in Nadin’s spirit to spend the rest of this paper on this issue: can we use semiotics to understand program texts and program executions as sign processes?¹

1) The rest of this text

derives from a joint

project with Frieder Nake.

Interface and program

The first task is to relate the interface signs from Figure 1 to the program text, a very easy task (Andersen, Hasle, Brandt, 1997). Consider Figure 2, which contains Figure 1 as its lower part. The program text is a representation that denotes a (sometimes infinite set of) state changes in the computer. The interpretant relating the program text to the set of state-changes is the semantics of the programming language. This interpretant comes in two varieties: intentional, in which the designer of the programming lan-

guage describes his intentions with the various constructs; and causal, which is a computer program (a compiler or interpreter) that mechanically forces the machine to undergo the state-changes specified in the intentional interpretant.

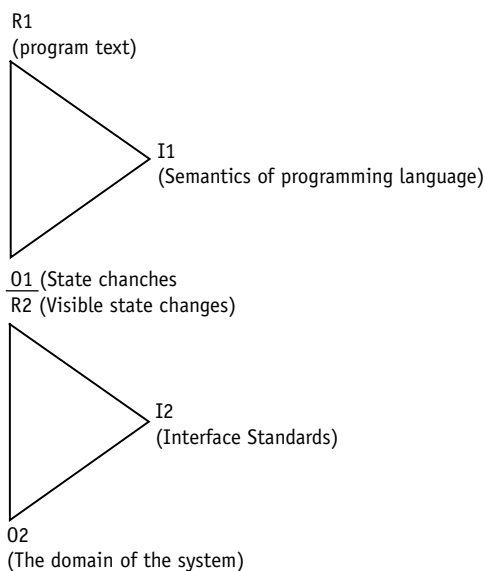


Fig. 2. Program text and user interface.

R = representamen,

O = object,

I = interpretant.

Although this is indeed a part of the semiosis, inspection of real programs reveals a much richer picture. Good program texts turn out to be made up of levels, only a few of which are actually interpreted as referring to the machine's state changes. In fact, programmers prefer to distance themselves from this machine reference as quickly as possible; and to this end they have invented a repertory of interesting semiotic processes. The main tendency is to change the indirect (via the state-changes of the machine) reference to the domain into a direct reference.

An interesting question is to which degree *I1* influences *I2*, i.e., how much the interpretation of the programming language influences the possible interpretations of the interface. On one hand, it is possible to rewrite the program completely, e.g., to give it better structure, without changing the interface at all. On the other hand, there is no doubt that in some cases concepts from the program text migrate into the interface. This is clearly the case with object-oriented programming (a way to structure the program) and object-oriented interfaces (a way to structure the interface).

The question is interesting when we treat computers as media. The possible influences from programming languages on interface are identical to the constraints of the computer medium. Any medium has constraints that make some meanings easier to formulate than others. For example, film is a narrative medium, and it is very difficult to make a film whose main purpose is philosophical argument or pure description. In order to be worth viewing, the movie must contain some element of action.

Interpretability

The first question to ask is: Are program texts really texts? In order for something to be a text, it must have cohesion and coherence.

Cohesion means that the text refers to the same recurrent set of objects by means of nouns and pronouns (Halliday, 1977; Togeby, 1993, vol. I: 268). Cohesion occurs where the interpretation of some element in the discourse is dependent on that of another. The one presupposes the other in the sense that it cannot be effectively decoded except by recourse to it. When this happens, a relation of cohesion is set up, and the two elements – the presupposing and the presupposed – are thereby at least potentially integrated into a text (Halliday, 1977: 4). Typically, a new object is introduced in one sentence, and commented upon in the next. Texts without cohesion seem not to be about the same world from sentence to sentence.

Coherence is a different concept. Coherence occurs when the meaning of the text can be arranged in simple symmetrical structures within a limited set of dimensions. The set of dimensions is normally called the isotopy of the text, because they are meanings that recur as a part of many sentences and words. Most words are ambiguous, possessing a core meaning and many possible isotopies. For example, the word “high” has the core meaning of “at the positive end of some scale.” The dimension in which the scale lives is, however, variable and represents the possible isotopies of the word: spatial, social, mental, etc. When the word co-occurs with other words, the possible isotopies of the individual words mutually select the ones they share, and this becomes the actual isotopy of the text. In “high spirits,” it is “mental;” in “high mountain,” it is spatial; and in “high society,” it is social. Isotopies are structured according to symmetries and oppositions. (On the tendency of language to form symmetries and oppositions, see Aitchison, 1995.) For example, in the spatial isotopy, “high” is opposed to

“low” on the vertical dimension, and both are opposed to “back” and “front” that lie in the depth-dimension.

The preference for symmetries and oppositions is also known in well-structured programs. For example, if we have saving a file, we also have the opposite, opening one. If we can create a file, we can also delete it, if we can lock it, we can also unlock it, and if we can move the file into a directory we can also move it out. A program text describing these facilities is cohesive since it is concerned with the same objects – files. In addition, it is coherent since it deals with a small set of isotopies – existence, access and location – that are heavily interdependent: Only if it exists, it can be located, and only if it can be located, it can be opened, and only if it is opened and is not locked it can be accessed. Finally, the structure of the operations exhibits symmetries and oppositions.

In short, for a text to be cohesive, it must deal with a small set of recurrent objects; for it to be coherent, it must select a few isotopies and structure them according to oppositions and symmetries.

Let us illustrate these ideas with the simple toy student registration system shown in Figure 3. The system allows the secretary to define a new course, enter and delete students, and enter and correct marks. It can print out sheets with the students, their marks, and the grade averages.

The screenshot shows two overlapping windows from a software application. The background window is titled 'Classes' and has a 'File' menu with 'Hollywood' selected. It contains a table with columns 'Class', 'Virtual Reality', 'Term', 'Fall', and 'Year 2000'. Below the table is a list of students: 'Doe, John', 'Marx, Groucho', 'Monroe, Marilyn', and 'Stewart, James'. To the right of the list is a column for 'Enter Marks' with values 'None', '13', '11', and '9'. At the bottom right, it says 'Average 11'. The foreground window is titled 'Print Preview' and shows a 'Print' button. It displays the text 'Results for Virtual Reality, Average: 11' followed by a list of students and their marks: 'Doe, John...None', 'Marx, Groucho...13', 'Monroe, Marilyn...11', and 'Stewart, James...9'.

Fig. 3. The toy registration system

In order to be useful, the program has to specify features of four very different worlds:

1. The administrative world of use: The purpose in this world is for the user to apply mice and keyboards to perform student administrative actions in a correct way. The objects are: keyboard, mouse, disk, printer, and screen objects. The actions are: typing, clicking and selecting/deselecting. Important isotopies are: modality (an operation is possible or impossible) and efficiency (an operation succeeds or fails).
2. The social world of the domain: The purpose of this world is to regulate the social status of the students. The objects are: students, courses, and marks. The actions are: enroll, withdraw, pass, fail, grade. If marks are required to have a particular average, the average grade is important.
3. The typographical world of data: The purpose of this typographical world is to edit data that refer to the domain world. In the scripting language employed, its objects are: texts, lines, items, words, and characters. If calculations are performed, the distinction between numbers and non-numbers is relevant. Important properties are: greater/smaller than, identical to. Actions include: adding, deleting, inserting, comparing.
4. The world of the operating system. The purpose of this world is to locate information and to transfer it between two locations: the persistent location on the disk, and the transient location in RAM. The objects are: files, directories, filenames, paths. The actions are: creating, deleting, reading and writing files.

This means that in order to write a cohesive text, we have to divide the program text into four sections, each with its own objects and interpretants. However, as is shown in Figure 4, the language only allows us to directly describe (3), the typographical world of the data, and (4), the world of the operating system. What about world (1), the administrative actions of the secretary, and (2), the social world of the students?

According to Figure 4, what we basically do in programming is to describe changes of data that signify objects and events in the domain of the program. A typical data structure in the program is

Doe, John, None
Marx, Groucho, 13
Monroe, Marilyn, 11
Steward, James, 9

A typical data change is shown in Figure 4. In the social domain, this change means that “John Doe gets the mark 7”.

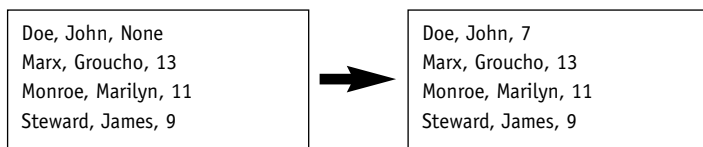


Fig. 4. John Doe gets the mark 7.

In the scripting language, this process can be described as shown in Code 1.

```
On RecordMark aStudent, aMark
  global Studentrecord
  put aMark into item 3 of line aStudent of StudentRecord
End RecordMark
```

Code 1. Defining the action of recording a mark.

Code 1 describes the event as a typographical event consisting of inserting a number into an item of a line. If this is not typography, I do not know what typography is! We could of course write the whole program in this way, as typographical changes of the data, but such programs are very difficult to read and debug. The reason is that errors are often defined in relation to the domain (here a social one) whereas the text is about typography. Therefore various types of semioses have been invented in order to coerce the program to refer to other domains.

One such technique can be called simulation. It consists in defining a mapping *F* that maps operations and states of one worldthe source world – onto operations in another world – the target world. If we can do this, then we can stay in the target-world inside a section of the program, and do not need to be concerned with the source-world that is treated elsewhere in the text. The target world can be made to refer to a set of related objects that are different from the source world, and in this way can be made cohesive.

The mapping itself can be accomplished in various ways, e.g., by declaring functions and procedures whose names can be interpreted by means of

the target-world interpretant, but whose implementation refers to the source-world. The run-time mechanism that replaces a function call by its declaration, transferring variable values from the former to the latter, is the reverse of the F-mapping, and it effectively reduces the target world to events and objects of the source world.

In order to do this in our case, we define a mapping between the typographical world and the social world of the students and we define the social objects, relations, and actions in terms of the typographical world. The concept of a “mark” according to Danish legislation:

*Code 2. Typographical
definition of “a mark”
according to the Danish
grading system.*

```
Function IsMark aMark  
  if aMark = 0 then return true  
  if aMark = 3 then return true  
  if aMark = 5 then return true  
  if aMark = 6 then return true  
  ...  
  return false  
End IsMark
```

The relation “the marks of a student”:

*Code 3. Typographical
definition of the social
concept “the marks of a
student”*

```
Function TheMarksOf aStudent  
  global Studentrecord  
  Return item 3 of line aStudent of Studentrecord  
End TheMarksOf
```

The social action of grading:

*Code 4. Defining the social
action of grading.*

```
function Grade aStudent, aMark  
  if IsMark(aMark) then  
    RecordMark aStudent, aMark  
    Return “success”  
  else  
    return “failure”  
  end if  
end Grade
```

Having mapped the world of examinations and courses into the typographical world, we can stay in the former and use the appropriate names such as students, courses, marks, enroll, withdraw, pass, fail, and grade, as shown in code 5:

```

If Grade(theStudent, aMark) = "success" then
    if theMarksOf(theStudent) < 6 then
        flunk theStudent
    else
        pass theStudent
    end if
end if

```

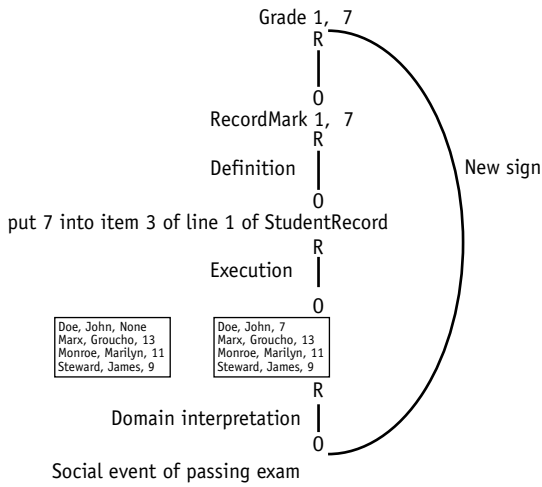
Code 5. Grading in the social world, where Fail and Pass will also map to the typographical world.

What happened? As shown in Figure 5, the text contains a long series of signs that are related in a special way: the object of a “higher” sign works as the representamen of the “lower” sign. For example the definition of “Grade” contains the procedure “RecordMark”, and in this sense “Grade” can be said to refer to “RecordMark.” In the actual execution, the word “Grade” is in fact replaced by its definition, including “RecordMark.” The relationship between RecordMark and “put 7 into item 3 of line 1 of StudentRecord” is the same. The latter denotes the data change shown in Figure 4, and the data-change denotes the social event of passing exam. Such chains of representamina and objects give rise to a “short-cut” sign whose representamen is the first representamen, and whose object is the last object in the chain.

This mechanism is basic in creating cohesive program texts. But others exist, many of which are known as design patterns in computer science. Design patterns are simple recurrent and meaningful configurations of objects and protocols for their interaction. In simulation, the source and target worlds are disjunct, sharing neither objects nor actions. However, some worlds can be more cohesive.

Consider for example the world where secretaries are using the system, compared to the social world of students. In both cases we deal with humans and their actions, only the actions differ. The actions in the social world are performative actions that create social obligations and rights when performed with a person with the right authority. In our case, when a student is enrolled, he has the right to be examined in the course, and his teacher

Fig. 5. Formation of new signs in program texts



has the authority to give him marks bequeathing him new rights. The secretary, however, does not have the right to give marks to the student, but can physically enter marks into his record if in possession of a signed exam form. Thus, the physical actions of the secretary are representamina signifying the social actions of enrolling and marking. The interpretant warranting the validity of this sign includes the signed exam forms.

Thus, at the top of the students' social world, we can define a new world of using the system, where physical use of controls and displays are coupled to social actions as representamen to object. This coupling inside the program text is clearly derived from the sign-relations outside the program between the actions represented by the program text. Code 6 describes two processes in the administrative use-world. The first procedure specifies how a mouseup from the secretary is to be interpreted, namely as a command to enter a mark. The description of EnterMark checks whether the secretary has selected a student on her screen: if not she is advised to select one, otherwise her action is interpreted as signifying the social action of grading.

```
Code 6. Entering marks
in the administrative
world.
on mouseUp
  EnterMark
end mouseUp
on EnterMark
  global selectedStudent
```

```

switch true
  case selectedStudent is empty
    answer "You must select a student first" with OK
    exit switch
  case selectedStudent is not empty
    if Grade(selectedStudent, fld Mark) = "failure"
      then
        answer "The number is not a mark" with OK
      end if
    exit switch
end switch
end EnterMark

```

Please note that we have defined two kinds of action failures: one type was defined in Code 4 in the social world of students and concerned using an “illegal” number as a mark. This failure is the disobeying of the social conventions of the Danish examination system, and therefore belongs to the social world.

The other type of action failure pertains to erroneous operation of the interface, namely forgetting to select a student item before pressing the “Enter Mark” button. This action and its failure do not belong to the social world of students, but to the administrative use situation, and therefore it is defined here.

Thus we capture errors of marks (IsMark) in the social world where this makes sense, and errors of handling the interface (selectedStudent is not empty) in the use-world part.

Conclusion

I have exemplified two types of semioses that programmers use, and the reason for using them, namely to make program texts more cohesive in terms of the different worlds referred to by the program. It is my conviction that as systems become more complex and increase their contents of “knowledge” and “theory,” designers must make access to this embodied knowledge easier for users. As it is now, users are like readers presented with a thick book on a theory and its applications, but only allowed to read the table of contents; the rest of the pages are written in Chinese and, moreover, glued together.

This state of affairs is not equally problematic in all domains of application. The private user of a word processing program may not care, especially if he can afford to send for a specialist each time his system breaks down. However, the doctor using an expert system must know the arguments for the system's diagnosis since the treatment is ultimately his responsibility. And the captain in the middle of the Atlantic Ocean cannot call for a repairman but still has to make decisions in the case of a system breakdown.

References and Bibliography

- Aitchison, J. *Language Change: Progress or Decay?* Cambridge: Cambridge University Press, 1995.
- Andersen, P. Bøgh, P. Hasle, P.A.A. Brandt. Machine semiosis, in *Semiotics: a Handbook about the Sign-Theoretic Foundations of Nature and Culture*, Vol. 1, (R. Posner, K. Robering, T.A. Sebeok, Eds.), Berlin: de Gruyter, 1997, pp. 548-570.
- Halliday, M. & R. Hasan. *Cohesion in English*. London: Longman, 1977.
- Jackson, P. *Introduction to Expert Systems*. Wokingham: Addison-Wesley, 1990.
- Nadin, Mihai. Consistency, completeness, and the meaning of sign theories: The semiotic field, in *The American Journal of Semiotics*, 1:3, 1982. pp. 79-88
- . Interface design: A semiotic paradigm, in *Semiotica* 69-3/4. Amsterdam: Mouton de Gruyter, 1988. pp. 269-302
- . Science and Beauty: Aesthetic Structuring of Knowledge, in *Leonardo*, 24:1, 1991. pp. 67-72
- . Semiotics in action: the pragmatic level, in *Pragmatik*, Vol. IV, Philosophy of language, linguistic pragmatics, and formative pragmatics, (Herbert Stachowiak, Ed.). Hamburg: Felix Meiner Verlag, 1993, pp. 219-250.
- . Negotiating the World of Make-Believe: The Aesthetic Compass, in *Real-Time Imaging*, no. 1 (1995). London: Academic Press.
- . The Art and Science of Multimedia, in *Real-Time Imaging* (P. Laplante, A. Stoyenko, Eds.). Piscataway, NJ: IEEE Press, January, 1996, pp. 261-299.
- . Computational Design. Design in the Age of a Knowledge Society, in *formdiskurs*, Journal of Design and Design Theory, 2, 1/1996. Frankfurt/Main: Verlag Form, pp. 40-60.
- Togeby, O. *Praxt I-II*. Aarhus: Aarhus University Press, 1993.

Third Culture Man

Frieder Nake

DEDICATED, WITH ADMIRATION, TO MIHAI NADIN

“Mihai Nadin is acknowledged by colleagues from around the world as a true Renaissance man,” – so announces the back cover of the book, *Creating Effective Advertising Using Semiotics*¹. And the flap of his perhaps magnum opus, *The Civilization of Illiteracy*,² repeats that same qualification: “Frequently described as a modern-day Renaissance person....”

Renaissance man in post-modern times – a great distinction, and one for which many of us would envy Nadin. Centuries ago, wasn't Leonardo da Vinci supposed to be just that? Would bestowing such a title on someone in our days amount to some sort of comparison with one of the greatest geniuses that humankind has produced? And what exactly would characterize a Renaissance man? Most likely those characteristic features would nowadays be different from what they were 500 years ago – if they then had existed at all. For is it not true that history does not happen when it appears to be happening, but rather is produced whenever it is written and rewritten?

Back covers of books are nothing more than back covers of books – signs for what they are part of, i.e., the books that carry them, or the authors who have written the book's manuscript. In a way they are ads for the product they come with, similar to the popular habit of the fashion industry that turns sweaters, t-shirts, shoes, and pants into ads for themselves. Back covers and labels on clothing constitute an interesting kind of semiosis. The representamen³ of the sign tends to be identical with its object, and the interpretant contains a message for us, the buyers: “How lucky you are to have purchased this product.” So the ad reaches us at the very moment we have decided to follow its command.

This text will not be an elaborate and coherent argument. It will not be a logical sequence of statements leading the reader from some first observation to a final conclusion. It will rather be a lightweight set of scattered remarks that may, and hopefully will, be interpreted in one or the other way by the reader. Reading Mihai Nadin's books triggers these remarks. They implicitly always refer to his writing, or they may just paraphrase him.

- 1) By Mihai Nadin and Richard Zakia; New York: The Consultant Press 1994.
- 2) Published by Dresden University Press 1997.

- 3) Of course, I use the terminology of Charles S. Peirce.

He is, of course, not to blame for my skewed understanding of what he had in mind.

But let us return to what this text is about. It is about the work of the eminent scholar, Mihai Nadin. No doubt, we should take care when reading and interpreting back covers of books, even if a book is authored by a friend. An ad is an ad, and therefore we do not believe all of it. In the current case, how does the friendly characterization make sense? After all, Nadin can be a Renaissance man only in a metaphorical sense. When we turn to Mihai Nadin, we turn to semiotics. And we cannot escape Mihai Nadin when we try to understand computers and interaction, art and science, design and computation, and the role of semiotics in all of this. So, perhaps, combining the two gives us the key we need.

The phrase is catching – Renaissance man! We turn and twist it around, trying to grasp its full meaning. The sciences and the humanities, technology and art, the free-floating mind of fantasy and invention on one hand; the pragmatically oriented economic action of efficiency on the other. We find ourselves caught between the extremes of a deep and unsettling dialectics. Renaissance as the romantic idea of a unity of mind? And, always lurking in the background, the great hero – Leonardo – for whom, we are told, that unity was not a romantic longing but everyday fact and deed: the artist, the inventor, the engineer, the scientist at one time. His outstanding achievements in all of those diverse fields. They have ever since been separate and isolated. In our times, they have become alien to each other, as C. P. Snow so strongly announced to the West four decades ago. Could innocence return, and could Mihai Nadin be its herald? The true Renaissance man?

Books! We have enormous books by Mihai Nadin. Books with many pages. Beautiful, almost luxurious, books. Books full of great ideas, interpretations, associations, connecting lines, daring statements, radical critique, bold anticipations.

Nadin writes essays – mainly in English and German, but he could do it in a number of other languages. His style is rather French. He likes the collection of short notes, but hundreds of them. One observation gives birth to the next. He takes us by surprise, jumps right into his themes, taking his readers for a breathtaking adventure, but without fatiguing them. In the course of a long text, he is the one who keeps everything in his mind as he goes on writing. He forces us to become aware of quick insertions if we want to follow steadily. He helps us in this but his style is never didactic.

He throws an idea out into the open for his reader to pick up and to think about it.

“Minds exist only in relation to other minds,” is his strong conviction, one that he expounded in an astounding book.⁴ He lives that conviction. In relation to others. A semiotic existence, an existence as semiosis.

Minds exist only in relation to other minds, Nadin tells us. So what is a “mind?” The naive questioner wonders and, probably, hopes for an answer. Yet, epistemological skepticism would hold that the question of “What?” cannot be answered. All we could hope for is some insight into “How?” Appearance instead of essence, semiotics instead of ontology, style instead of truth.⁵ But even worse, there may be no answers at all. Science would not produce answers but only questions, series and cascades of questions would replace answers. An answer might emerge from structures of questions. An interesting question would be answered by transforming it into a structure of questions. So there would be no questions or answers, but rather only shifts of focus, and explicit signs to describe such shifts. Only within a formalism, questions would allow for answers. But formalisms presuppose neglect of context. Indeed, a phenomenon may be formalized to the extent that it gets ripped off its context.

To view minds as relational phenomena, as Nadin does, means they require at least the category of Secondness when we speak of them. Secondness⁶: that which is how it is only in relation to a First. We leave the domain of pure immediacy and enter the domain of semiotics when we turn to minds. Minds do not come as such. They come with. Their reality is co-reality, contingency. It does not make much sense to look for a location in order to there find a piece of material that constituted the mind. The same is true for media. They are phenomena of Secondness, too. The phone I hold in my hand is not the medium “telephone.” It is the device empowering me to participate in the medium of telecommunication. That medium emerges. It is in-between and is constituted only through human acts.

Minds are not brains. But minds need brains to emerge. Brains, moreover, are not like computers. But certain decontextualized functions of brains can be simulated by computers. It is liberating to observe that Artificial Intelligence seems to have suffered its decisive blow a while ago. Yet there are still followers of the Physical Symbol Systems Hypothesis. They describe certain more or less formal systems by inventing and defining them. They do so with the intention of explaining brain functioning, or intelligence, as

4) *Mind. Anticipation and Chaos*, by Mihai Nadin, Stuttgart, Zürich: Belser Presse, 1991

5) *I use in translation the title of a remarkable book*, by Lambert Wiesing, on Kurt Schwitters and Ludwig Wittgenstein: *Stil statt Wahrheit*; München: Wilhelm Fink Verlag 1991

6) *Again, this is Peirce's category.*

a human capacity. As formal systems they are obviously not brains that, if viewed as systems, are biological. Any system that is not a formal system needs an environment to even become thinkable. Only the formal system may on paper be defined as such. But even then do we need the contexts of mathematics or language to even write down, or to interpret, a formal definition.

Wasn't Renaissance science – science as we know it, and which originated in Renaissance times – a science that proved extremely powerful and successful through the process of reducing any given phenomenon to elements, by inventing such elements as the final and most basic units, by isolating elements and their structures from their situations, by decontextualizing phenomena, by formalizing them (which is almost the same), and by replacing a given phenomenon by mathematical models that could be used to derive predictions about future developments and events? Wasn't the devastating success of scientific man rooted in precisely this approach towards reality: separate, isolate, formalize, calculate! The cruelty of this approach was its success. People hesitatingly started to understand diseases by dividing the human body into pieces, and by doing weird experiments on separate models. We cannot have the whole but in pieces. The more precise our rationalistic knowledge, the more detached and fragmented it is. Was not scientific man the same as Renaissance man?

The critique of the rationalistic heritage of computer science has been formulated in wonderful books over the last 20 years.⁷ Many of these come from, or are influenced by, the Scandinavian tradition. Mihai Nadin has not explicitly contributed to that critique, although we can assume that he shares important facets of it. He explicitly refers to Humberto Maturana and to Terry Winograd. They are important witnesses to the critique. Winograd was Nadin's host at Stanford University for the term of a sabbatical. Both of their perspectives are sign/design-oriented. Nadin's orientation is computational design. Winograd comes from computational linguistics. Elsewhere in Germany, at the University of Magdeburg, there is a new field of research called computational visualistics.⁸ Three attempts of very different origin, intended to combine or even unite certain capacities of human activities – the generation of images, the study of language, the endeavor of creating useful and beautiful things – with those of ultimate rationalism, i.e., computerization. All these activities have remained untouched by, and

7) Just to mention the

very few: T. Winograd, F.

Flores: *Understanding*

Computers and Cognition.

Norwood, NJ: Ablex 1986.

- Pelle Ehn: *Work-*

Oriented Design of

Computer Artifacts.

Stockholm:

Arbeitslivcenter 1988.

- Bo Dahlbom, Lars

Mathiassen: *Computers in*

Context. 1993.

8) Founded by Thomas

Strothotte. See, e.g.,

Seeing Between the

Pixels; Berlin, New York:

Springer Verlag 1997.

outside of, the rationalistic tradition – until recently (at least in their aesthetic dimensions). “Recently” means “until the advent of the computer.”

The computer is the machine that mechanizes mental labor. There can be no doubt that this simple observation characterizes the computer as the latest development in the long series of artifacts reflecting the Renaissance attitude. This attitude is overcome by a tremendous irony. It does not attain what it sets out to, but creates the opposite. The attempt to explain the natural regularly ends in creating the artificial. When mechanics and other areas of physics are claimed to be able to explain natural phenomena, by virtue of natural laws, then this is utterly twisted. Instead of explaining natural reality, physics creates artificial reality. The attempt to explain nature fails miserably. Instead, an artificial world of machines is created. The triumph of the natural sciences is not our insight into nature, but capital’s investment in industry. Chomsky’s great attempt to explain natural language failed; but his syntactic structures became the theoretical foundation for the invention of the artificial languages that formed the foundation for programming languages and their automatic “translation.” As already mentioned, to some the computer serves as the model of intelligent behavior, despite Varela’s attacks against such a shortsighted view. But if we reduce thinking to decontextualized calculation, the computer indeed emerges as the thinking machine. Artificial intelligence mistakes the part for the whole.

Mistaking the part for the whole, the artificially created for the naturally given, is an extreme outcome of the rationalistic mind. It seems that humans are not willing to accept that their striving for ultimate insight is marred by a terrifying dialectics. Modern man, brave and daring, embarks on a journey to probe nature in order to decipher God’s handwriting in it. He develops powerful methods that are so successful that, within almost no time, large parts of the globe’s surface are turned into a productive layer that surpasses by ten-, hundred, even thousand-fold, everything known before. However, this success does not manifest itself as nature well understood, but as nature’s replacement by formal and artificial surrogates. For each human victory over nature, Frederic Engels noted in his *Dialectics of Nature*, she retaliates twice and thrice.

The unique victories of the Renaissance man are, at the same time, his defeat. His success on one side is his failure on the other. Leonardo da Vinci paints the *Mona Lisa*, and serves as an engineer for the military the next morning.

It seems as though current thinking – the thinking in system-and-environment, dialectical thinking, a thinking that has given up all hope for chains of cause-and-effect, a thinking that no longer claims to be able to come up with last explanations – it seems as if this type of thinking could show a way out of the dilemma. The type of thinking that acknowledges our very limited capacity to understand, and that instead develops our almost endless capacity to describe, is now sometimes called the Third Culture. Or this is what comes to my mind when talking of that Third. Mihai Nadin, it appears to me, belongs to the Third Culture.

What could it mean to identify a person, or better, a person's work, as belonging to the Third Culture? It means to place that person's books, articles, lectures, programs, statements, approach and method, theory, the topics he picks up, the way he treats them, the results he produces, the perspectives he opens, the way he presents all that, the way, in short, he or she relates mind to other minds – to place all these into a specific tradition, and to justify and interpret them as a remarkable fact. Dividing culture into types goes back to Charles P. Snow's lectures in 1959 in Cambridge, *The Two Cultures and the Scientific Revolution*, followed by publication as a book. A debate among intellectuals around the world ensued. In 1962, Frank R. Leavis lectured, also in Cambridge, on "Two cultures? The significance of C. P. Snow." The German edition of the Two Cultures Debate,⁹ from which I draw my knowledge, points out that the mere claim of a divide in Western culture into a scientific and a literary culture had been around long before Snow publicly presented it. So when his way of dealing with a schism caused a major turmoil of minds, this must be seen as a sign that the general conditions of society had already undergone changes. All our interpretations are a network of links to contexts that we choose as relevant in a situation. Most likely Snow had found a convincing expression for a condition that many felt was prevalent and of utmost importance to the state of affairs and, therefore, of minds. If culture was the human answer to nature, if Renaissance culture was the beginning of the total artificialization of nature in the name of culture and civilization, if the attack against nature needed the split into two opposing approaches, then the effectiveness and efficiency of culture's grip on nature meanwhile had gone so far as to produce, for the first time, a warning sign. Could it not be necessary to consciously go the step that Hegel and Marx had felt so intensively as the mind's genuine predicament: the dialectic step of synthesis?

9) Helmut Kreuzer (ed.):

Die zwei Kulturen.

Literarische und naturwissenschaftliche Intelligenz. C.P. Snows

These in der Diskussion.

Stuttgart: Klett-Cotta

1987.

Dialectics is not reducible to what textbooks occasionally tell us, to the three-step of thesis, antithesis, and synthesis. Dialectics is about the world as process in motion. Motion is based on contradiction. There is motion where there is contradiction. Motion is the form a contradiction takes on in order to develop. We think dialectically if we think utmost radically, i.e., if we think consciously. Dialectics cannot be avoided. But we nevertheless try to avoid it all the time because dialectics is the attempt to escape prejudices, and we prefer to keep our prejudices. However, all our judgments are prejudices (pre-judgments). The best we can hope for is to set in motion the dialectics of judgment, which means the dynamics of turning one prejudice into another one, and yet another one, and so on without end. In the case of practical man (the artist, the engineer), however, this process has to be forced to an end. So engineering is the remarkable process of turning prejudices into steel, concrete, and electronics for the sake of a proclaimed objectivity. Art, on the other hand, is the remarkable process of turning prejudices into oil, canvas, and sounds for the sake of a touted subjectivity. Philosophy, it then turns out, is the remarkable process by which theoretical man attempts to evade the incredible shortcomings of art and engineering for the sake of deeper and deeper insight into what it is that keeps the universe together. Humankind, in order to fully develop human capacities, had first to tear apart these capacities, separate them, isolate them and thereby go for an insane sanity. Renaissance man set out to do so. C.P. Snow formulated the clash, or rather the split, in his lectures and book. But he went on, in an addendum (1963), to again look at modernity and modernization, the beautiful world of design and the terrifying world of rationalization, and to foreshadow the coming of a Third Culture. He essentially took that Third Culture as an exercise in language problems. One side had to speak differently to the others so that the layperson would understand.

John Brockman, Kevin Kelly, and others claim that the Third Culture is now with us. Their concept is heavily dependent on all the latest scientific models, as well as on the great changes that digital media bring about. Whether or not C.P. Snow's idea agrees with that view doesn't make much of a difference. What has, and continues to, come about is a growing awareness of the importance of semiotics, and the hidden recognition of dialectics, in much of current theory.

My humble observation is that Mihai Nadin is one of the proponents of that (new) Third Culture. We may take it as the dialectics of the two cultures divide. Mihai Nadin knows about dialectics, even if Marx does not play an overly important role in his writing. The Third Culture is the culture of the media. Mihai Nadin contributes to the theory and practice of media. The Third Culture cannot be thought of without thinking of computation. Mihai Nadin relates everything he does to processes of computation as the ultimate test-bed for the Renaissance dream (cf. Leibniz). The Third Culture is deeply entrenched in semiotics. Indeed, if culture is always about semiotization, then the Third Culture is about a semiotization *prima et ultima facie*. Mihai Nadin identified the computer as the semiotic machine.¹⁰ He is one of the first to recognize the eminent importance of the notion of sign (in Peirce's theory) for a theoretical understanding of computation, interaction, digital media, computer art, and culture in general in times after modernity, i.e., post-modern.

10) See also Winfried
Nöth, *Semiotic machines*,
forthcoming. - Peter Bøgh
Andersen and the author
are preparing a book on
informatics and
semiotics. There we make
an attempt to extend the
Peircean concept of sign
to an algorithmic sign
which is a sign that gets
interpreted by humans
but, at the same time,
processed by computers.
We believe to be able to
describe the differences,
but also the similarities,
of humans and
computers. We find
similar intentions, only
different forms, in
Nadin's work.

Isn't it a wonderful irony that modernity, the project of the continued semiotization of the word, approaches its climax with the computer as the semiotic machine, and in that same moment breaks into a crisis of permanent "postness"? Art paved the way of self-reference throughout the twentieth century. Mathematics had to precisely formulate recursion in order to get itself out of the bogs and to become the first and only scientific endeavor that was able to prove, without leaving its own formal confines, that there are inherent limitations to formalization and to formal theory (Kurt Gödel). Biology, cognitive science, and even sociology had to acknowledge, or rather to invent, the concept of self-production (autopoiesis) in order, in a second attempt, to thrive on the great engineering concepts of cybernetics and systems theory. So we are witnesses to a tremendous advancement of an idea not really in sync with modern thinking. For in self-referential systems, chains of cause and effect disappear behind exchanges that go both ways, and in circles. This is the time of recursiveness, and the computer is its machine.

In a giant leap ahead of his time, Charles Sanders Peirce had thought up the notion of a sign as a recursive and dialectical concept of the greatest power. There were things in the world, entities, or states, of Firstness. They could enter into relations with other such entities, thereby creating states of Secondness. Had this been the end, the theoretical view of communication would have remained a detached and isolated theory of

Renaissance kind, an ivory-tower view of culture. If, however, as a Renaissance and enlightenment man, you wanted to better understand by becoming an active part of affairs, you had to break out of those detached confines. You had to relate Secondness to your own intentions, interests, interpretations, and intuitions. You had to create a seemingly objective theory that always remained open to further injections of subjectivity. That is what Peirce did when he created the state of Thirdness. Its most prominent example is the sign itself. So in Peirce's semiotics, Renaissance thinking reaches a point where it negates itself for the sake of integrity.

Still in Rumania, Mihai Nadin sensed the power of semiotics, turned it into a few very early specimens of computer art, went to meet Max Bense in Germany and smell some of that strange culture of disruption, cruelty and great art, then embarked to live in God's own country and became fully acquainted with pragmatism. He continued to write all the time, move between distant questions in the way a *Gelehrter* (learned man) must, and finally returned to Europe for another phase of his professional life – without really leaving the east coast of North America – in order to continue living, thinking, writing, understanding. It is totally impossible, without becoming his biographer, to pay justice to Mihai Nadin's work. From my limited point of view – of informatics, digital media, and computer art – Mihai Nadin's contributions may perhaps be compressed into the following sentences:

Minds are deeply semiotic, thus recursive.

They are our concepts for understanding anticipation and chaos; they are our way of making sense.

We may turn much of this into computational machinery because of the affinity, grounded in recursion, between semiotics and computation. When we do so, we have to delimit, to decontextualize, and to formalize.

But when we do so, we change what we started out with.

Therefore the brain is no computer, and minds are no brains.

Cause and effect are interesting concepts, but relations are stronger!

Mihai Nadin's work, in my opinion, belongs to the melancholic section of a Third Culture. This section, not really a caucus, comprises those who try harder. They try hard in their continuous attempt to understand. Yet they

feel that all we can achieve is to acknowledge our innate limits. So they generate beautiful signs of distance and nearness.



A Civilization of Many Literacies

Civilization of Illiteracy: Language, Reality and Renewal

Literacy Lost

We don't have to join the culture of illiteracy, but it helps to understand it

A Positive Pragmatist

Beyond Literacy: Semiotics and the Civilization of Hypercomplexity

"...transcends McLuhan"

"...not among the usual lamentations"

Civilization of Illiteracy: Language, Reality and Renewal

An Interpretive Summary of Mihai Nadin's The Civilization of Illiteracy

Frederic Chordá

MY INTENTION TO PRESENT THE CIVILIZATION OF ILLITERACY to the Spanish reader made me realize that the task involves more than translation from the English. Beginning with the title, I also realized that my task was to act as an interpretive medium in the process of communicating Nadin's ideas. For example, it is possible to translate "illiteracy" as "analphabetism," (ignorance of or inability to read due to lack of learning). The meaning of this word is univocal and does not encompass the variety of languages that Nadin describes. "Illiteracy" could also have been translated as "Alternative Languages" or "Languages Transcending Written Language," which was one of my early ideas. I believe that the emphasis on means of expression different from, yet concurrent with our natural language is the essential element that defines the Civilization referred to in the title. So, the Spanish title could well read "The Civilization Beyond Literacy." These considerations might be significant to readers of languages other than Spanish.

Professor Nadin's main thesis is that language derives from human pragmatics, that is, from the activities humans require in order to survive, in the first place, and then to progress; in other words to develop means that render human effort more efficient. Indeed, according to Nadin, mediation is one of the main defining characteristics of human activity. The practice of inserting something – a medium – to enhance human capabilities is probably older than spoken language. Physical tools are extensions of the human's physical endowment: arms, hands, legs, feet, back. Non-physical media – and our so-called natural language is one of these – are extensions of the human mind. Mediation entails the interposition of signs and tools between the human and the natural environment. Thus signs are the expression of methods, or algorithms, for repetitive tasks. Signs combined with tools improve the mediating function of each artifact used. Consequently, complex mediations arise, and

this complexity is an essential characteristic of the human species. Human beings consistently seek more mediations in order to increase productivity even further.

Thus the immediate and direct experiences of early human beings are holistic. Over time, they become increasingly complex, varied, and partial (the whole is broken into parts) as an expression of the aim of improving the condition of life. The sequence is as follows: from the primeval hunter-gatherers, who were totally dependent on nature, to new situations that allow for some freedom from and control over natural processes. These means of managing the natural and eventually crafted, or artificial, environment are repeatedly affirmed in human “self-constitution.”

The word, or natural language, has been the bearer of patterns of work that human beings put in place in order to optimize agricultural practice, creating artifacts, and constructing various edifices. Language is thus also a medium of anticipation that contains the models for achieving various objectives. Eventually, spoken language proved inadequate to handle the variety and scale of human activities. Here, Nadin points to another important human characteristic. Humans are heuristic beings; that is, they develop creative solutions to various problems. Thus, various notational forms of communication were developed to transcend space and time.

Mediation

Before proceeding, I would like to mention some of the forms of mediation on which our early ancestors relied. Prehistoric hunters relied on magical practices in the hope of taming elements beyond their control: prey and the uncertain outcome of the hunt. The paintings of animals found in caves were likely magical signs, a form of algorithm for the successful hunt, rather than mere decoration. Even at this early stage of human development, a mediating element, however primitive, was inserted in order to enhance human effort. The myth was another, later, type of mediation intended to support human activity. The myth of Isis and Osiris is an example. Isis and Osiris were twins who were promised to each other in marriage in the womb of their mother, Nut, goddess of the sky, who was pregnant with another pair of twins, Seth and Neftis. Isis and Osiris married, but Seth became jealous of his brother Osiris and killed him, cutting the corps into pieces that he buried in different parts of Egypt. Isis learned about this and, through magic, recovered Osiris’ body parts, put them back together, and returned life to him. This myth describes the ear of wheat from which the farmer had to take the parts (the grains) and bury them in the earth in order to recover the whole stalk at harvest time. This myth recounts, in a poetic fashion, the pragmatics of the food cycle, thus endowing the agricultural cycle with meaning.

As agricultural practice developed, primitive tools extended the ability of the human hands: tools of stone, later of forged metal, the use of animal power, a growing variety of tools. With the Industrial Revolution, agricultural practice became exponentially more effective through the introduction of mechanized tools and the ability to transport soil amendments from far away (seaweed from coastal regions to the inland, guano from islands in the ocean). Today, agriculture is carried out under artificial conditions, that is, through the use of chemicals (fertilizers and pesticides) and created environments, as in hydroponics and desert irrigation. What used to be a practice that required the labor of many men and women, has been practically totally mechanized, eliminating human effort for the most part. Last but not least, genetic manipulation of plants and animals holds out the promise of even more efficient agricultural practice.

This concept of mediation is one of Professor Nadin's original contributions in respect to the use of technologies that other authors reporting on the technology society seem not to have considered.

Historic changes in productivity, language, and the human being's relation to nature

Human beings have gone through four periods, in which scale the scale of human activity extended to ever-greater levels. This comes about when pragmatic factors lead to a threshold that marks the beginning of a new stage. Please understand that this threshold crossing is not an event in itself, such as entry into a new millennium. Neither is it a complete break with past practices. Nadin describes the development of a critical mass, the accumulation of various factors, each developing at its own rhythm within a period. Eventually a point is reached at which, when one looks back, is markedly different from the stage from which it departs. In the spirit of dynamic systems, Nadin calls this departure a "bifurcation," and maintains that while a new pragmatic framework becomes dominant, the former one is still carried on, although it has lost in the pragmatic value that had once made it dominant.

The chart I developed on the basis of Nadin's descriptions should provide the reader with an easy pictorial overview of the four stages of human pragmatic development. They are designated as circular, linear, proportional, and exponential (or non-linear, discontinuous).

Stages of Human Evolution

	Circular To 3000 BCE	Linear To 1800	Proportional To 1970	Exponential Since 1970
Nature	Hunting, foraging	Relative control	Dominance over nature	Limited resources, sustainable growth
Organization	In groups; dependent on natural cycle	Adapting to the natural cycle, linear, hierarchical	Strong control of the natural cycle, normative, hierarchic, global, rapid change	Self-organizing systems, transitory, relative
Language	Interpersonal denotative communication	Mediating, sign-based, linear, sequential, hierarchized, centralized, analytic	Climax of literacy, new languages, standardized communication	Crisis of dominant literacy and appearance of new languages, interactivity, impersonal communication
Family	Clan	Patrimonial, centered on reproduction in order to preserve property	Looser, in transition	Varied forms of family-like relations
Psychological profile	Day-to-day, fleeting	Linearity, tradition, permanence	Change in values, instability	Instability, state of flux
Relation between Nature and Economy	Based on survival needs	Subsistence level, with surpluses	Strong control, high productivity and surpluses	Management of scarce resources, very high productivity, productivity on demand to avoid unwanted surplus
Main economic activity	Foraging, hunting, nature-based	Agriculture and based on natural resources, crafts	Industry	Knowledge-based, digitally transmitted
Settlement	Nomad	Stable, rise of cities	Intense urbanization	Virtual
Work	Division based on strength or sex (for hunting, foraging)	Division into 3 sectors: primary, secondary, and tertiary	Rapidly increasing labor division and specialization, assembly line	Complete mechanization of routine activities, creativity and self-determination

	Circular To 3000 BCE	Linear To 1800	Proportional To 1970	Exponential Since 1970
Mediation	None. Direct contact with nature, holistic experiences	Primitive, with little control over nature	High degree of mediation, assembly line, natural and man-made energy	Total, complex and indirect processes, artificial condition
Market	None	Limited, autarchic, barter, growing commerce, use of money as symbolic means of exchange	Plays a major role, global	Essential to global movement of goods and ideas
Knowledge	Magic-based, representations	Religion-based	Scientific	Global dissemination of rapidly changing data and knowledge
Education	Memory	Literate individuals, increasing literate minorities	Generalized, institutional, universal, preparing for lifetime professions	Unlimited and continuous learning based on cognitive needs

The Evolution of Language

	To the 8 th /3 rd Millennium BCE	To 1750	To 1970	Since 1970
Economy:				
System	Hunter-gatherer	Agrarian	Industrial	Knowledge-based
Interpersonal productive relation	Inseparable	Very important	Less important	Unnecessary
Language				
Integration	Total	Global coherence, differentiation of expressive resources (word, writing, images, music, etc	Specialization, labor division and expansion (scientific, technological, radio, visual, film, TV)	Expressive synthesis: multimedia (digital platform
Characteristics	Syncretic	Centralization, linearity, hierarchy, permanence/ tradition, alienation (decontextualization, reification), dualism (unity). Plays a major role, global	Information renewal (in waves); incipient decentralization	Great increase of task- specific languages and information, in waves, greater decentralization, nonlinearity, ubiquity (via WWW)
Behavior	Direct expression within context	Word and writing (out of context), other languages considered less important	Literacy, plus other “literacies”	Great synthetic variety of languages/ literacies
Information				
Scale & renewal	Little	Limited	Large and growing	Continuous exponential flow
Diffusion	Interpersonal	Limited, manufactured	Standardized, mechanized, massive	Flow in global digital networks
Control	Total, individual	Possible individually	Impossible individually	Via digital means
Human-information relation	Universal	Encyclopedic	Specialized	Global
Symbolic Expression				
Rite (varied, integrated, alienated)	Possible	Exists	Regressing	None
Virtuality (mediation of alienated reality)	Symbolization (art), duplication by magic (belief in the double or complementary form)	Symbolization, magic, obectification of configurations (perspective, representation: real=appearance) model formation	Symbolization: photography, cinema, television, models; rejection of strict representation	Symbolization: virtual simulation models (multimedia)

1. The Circular Stage

This first stage is the oldest and longest. The human being is totally dependent on nature, which he takes advantage of through gathering, hunting, and fishing. He obtains from nature all he needs, since he lives in a state of need, day by day. This stage is called “circular” because in it, the human being cannot escape or transcend his condition as creature in order to become independent of nature. There is no division of labor except that determined by force or strength. Individuals with more strength carry out the tasks that require it, such as hunting and fighting. The less strong – women, children, older people – carry out the tasks requiring less physical strength. The only energy used is what the human body can generate, directly, in the form of striking, pressure, throwing, carrying, or through the use of objects such as stones and sticks.

Human beings live as nomads, traveling routes according to their needs, especially water. Where there is water, there is food. Each group of people is relatively homogenous, loosely organized, allowing for individual action, without hierarchy. Neither family, as such, nor other institutions exist. Clans are formed of individuals who acknowledge their descent from the same type of being. The human group is small and does not increase due to high infant mortality and to a high childhood and adult death rate. Goods are shared within the clan; there is no notion of personal property. The various groups of people have little contact with one another, each group occupying the space it needs in order to survive, and fighting to keep their territory. Language relates to actual experiences and is expressed through the uttering sounds or dynamically, through gestures. For example, if I want to say “The wolf bites,” I bear my teeth and simulate biting. Language is directed to a person or persons present, who share the same experiences and thus understand.

Experiences are all related and based on survival needs. They are syncretic, univocal, and universal (applicable to the entire group), since life is rather holistic. The group relies on magical practices in the hope of obtaining success in hunting, gathering, procreation, and other vital needs. This magic is the origin of religion and art.

2. The Linear Stage

In this second stage of development, the human species is now capable of some mastery over nature. Based on the observation of repetitive cycles in weather and seasons, in the sky – the moon and stars – and on the earth – reproduction in animal and plant life, they can use this information to their benefit. They collect animals prone to domestication into herds and lead them to areas where these will have food and water. Humans aid their fecundity so that they can in turn use the milk, meat, hair, and skin that the animals produce. Settled groups start to plant seeds, care for growing vegetation, and harvest the fruits.

The most important activity is based on extracting resources directly from nature, especially agricultural products. The earth is the main source of wealth and the entire human practice derive from this fact.

The human being relies on his own strength, now enhancing their efforts through the use of primitive tools – hoes, spears, bows and arrows. They enlist the strength of domesticated animals (horses, oxen, mules, camels) and learn to use natural sources of energy (wind, water, fire). Mediation thus supports the relation between humans and their environment and becomes part of the practical self-constitution of the human being as individual and species. Mediation is no longer a question of magic, which now gives way to descriptions of actions, i.e., algorithms. The use of tools that humans can use for particular purposes leads to a rudimentary technology. Tools can be improved and refined. Activities are constantly tested and made more efficient.

All these developments allow for a way of life that transcends day-to-day survival. Humans are capable of creating more than they need for survival. They either save the surplus or trade it for goods that other groups have in surplus. Agriculture entails settling, which leads to the growth of rudimentary cities, which become centers of government, labor, and social events. Activities start becoming more complex and lead to human cooperation, on one hand, and to specialization, on the other, in the following areas: obtaining resources directly from nature (agriculture, animal husbandry, fishing, mining); transforming these resources (e.g., treating animal pelts, working milk into yogurt and cheese, drying fish and meat, working clay into pottery, turning iron into tools); or trading raw materials and processed goods. Although commerce brings people together, the various human groups remain separate from each other. Their organizations are autarchic in nature, each group trying to assure its own survival, limiting social exchange in order to maintain language and customs. Each group develops its own norms, which are applied to the practices that the group has tested and found pragmatically valuable for ensuring its continued existence.

This more complex economic organization requires the appropriate social structure. Groups are no longer so loosely constituted as in the preceding stage. More efficient activity allows for a relative independence from nature; but new pragmatic conditions arise that tend to limit freedom. Groups are no longer syncretic, but divided. They are now led by a chief who maintains his power based on established norms. Hierarchies arise based on familial relations and the ability to maintain the welfare of the group as a whole. The leader can override individual inclinations and even assign roles: servants, workers, subordinates, priests, traders, warriors. Human experience is no longer univocal and universal. Distinctions arise in social class and legal status.

The notion of property develops, especially in relation to the head of the group, who passes it on through exchange or inheritance. The need to ensure property rights gives rise

to tight family structures. Sexual relations are intended mainly for procreation; other sexual practices are marginalized. Populations making up viable entities are relatively small, still due to infant mortality, disease, wars, and other dangers.

Certain institutions develop as the pragmatic framework requires. Where previously magic, for example, was a mediating mechanism associated with successful activity, religion takes its place. It tries to explain and influence the still indomitable nature and to constitute a rational basis for new social institutions. History, as a practice of recollection, begins. Groups store memories of persons and events significant to them and what they do, and recount these memories orally from generation to generation, or as the context of activity changes.

Language assumes the characteristics of the linear stage. Just as activities carried out in certain sequences are proven successful, so does language reflect the sequentiality, or most efficient order, for successful pragmatic activities. Means of expressing language through words (uttered or sung) or images follow the lineal pattern, as opposed to configurational patterns, for example. The order subject-verb-object displays a hierarchy – what is most important in expressing an idea – that reflects the hierarchic structure of the societies in which language develops. The centrality of the human and his world is reflected in language as its efficiency in pragmatic endeavors of this time proves itself. Language now serves to stabilize experiences, codifying them. Language turns experiences into objects through its ability to store the memory of successful algorithms. As language reflects the experiences that form it, a two-way process begins in which language also forms those who use it.

It is during this stage that means of notation are developed that lead to the alphabet and writing systems of the Western world. As the scale of human activity extends in time (from immediacy to planning to history) and space (longer voyages over land and sea to obtain desired resources), memory proves less reliable for practical activities, especially in the exchange of goods. Hieroglyphics are meant to be pictorial representations of the seen and unseen. Eventually representations of reality give way to symbols representing the basic elements of language, i.e., sounds. Writing progresses from the specific to the general, liberating events from time and space. At the same time, symbols no longer reflect direct experience with whatever it refers to, turning experiences into things (reification) that seem to have a life of their own. No longer based on direct experience, language, especially written language, alienates the human from the experience. That is, the human relation to the experience is affected in such a way that individuals can no longer fully understand the experience. However, language did ensure the permanence and immutability of the experience. Such a powerful instrument, able to conjure up the unseen – inventories, algorithms, events going back to the beginning of time, laws that determined life and death, thoughts of ancestors deemed wise – appear as having a powerful magic. It seems as though it could create

and alter life itself, and those who could master writing were accordingly granted a high status. The power of the word at this stage is summarized in the book of John the Evangelist: “In the beginning was the word, and the word was with God, and the word was God.”

Rome became the epitome of pragmatic experiences embedded in the language it spread throughout the areas it conquered. The wars within the Empire are the expression of conflicting pragmatic perspectives. The Roman Catholic Church filled the void that the fall of the Roman Empire left in its wake. The Church assumed the role of a central governing body, extending its authority over the barbarians who drove out the Roman presence. With a center in the city of Rome, the Church made sure that the hierarchy developed under Roman rule, and which it adopted for its own organization, was installed throughout Europe. It also spread the Roman symbols of executing authority: the 23 or so letters, to which the richness of the sounds of a multitude of languages and the experiences they contained was forced to reduce itself. Since the Church embodied the dominant pragmatics, its language was dominant. All other languages of the Middle Ages – pertaining to orality, art, architecture, mechanics, hydraulics, astronomy, mathematics, metallurgy – were considered common, “vulgar.” The word that claimed its origins in God’s creation could be inferior only to the Creator and the Book of Creation.

3. The Proportional Stage

With the 17th century, the Scientific Revolution is said to have begun. This is when the foundations of the technologies leading to industrial development were laid. This is also when the need for new languages arose. Finance, physics, mathematics, chemistry, and biology pushed the limits of natural language and its patterns.

The settled and tamed populations of Europe grew despite wars and plagues. The wealth of nations grew as the scale of pragmatic activity expanded yet again in the search for resources and trading partners. Since the survival needs of a certain number of individuals was practically assured, they were able to inquire about the world around them. The innate heuristics of the human species came to the forefront. New philosophies regarding the nature of humans and the systems they created were circulated through the most efficient means: writing. This is when science bifurcates from philosophy in its inquiry into all the things going on in nature. The characteristics of physical phenomena are captured and eventually applied in the technology that enables industry to flourish. There are great developments in mechanics. Labor division, standardization of parts, and eventually the assembly line ensure fast and abundant industrial production of goods. Labor moves from household craftsmanship to the central factory. The increase in productions is proportional. This means that for each effort applied through tools, the result is a number of times higher than would result from effort without tools. More and more mechanisms mediating between the raw material and

the final product, between the manufacturer and the final user are introduced. Human domination over the natural environment is almost complete. Nature alone can no longer support the rhythm of human activity. Production of goods is no longer related to nature, but to manufacture and results in pollution of the environment. However, agriculture is made more efficient through the invention of machines to replace human labor and through scientific breakthroughs that produce artificial fertilizers and improved seeds. Other farming methods ensure more than enough food to feed growing populations.

During this period, the centralization of power – in the Church and under monarchs – is eventually challenged by movements for more individual freedom and democratic forms of government. The nuclear family, along with methods to maintain it, is institutionalized. Family roles change as the demand for female and child labor in factories grows.

With the discovery of new continents, human activity extends around the globe, mainly in the search for resources that the factories will turn into a vast variety of goods. Nations impose themselves through economic power in addition to military might. Industry and governments work hand in hand. Europe extends its sphere of influence through colonies of people sent to exploit nature for growing national industrial base. Means of transportation powered by energy other than human or animal make it possible for Europeans to reach all corners of the earth. Means of communication over distance via post are enhanced by telematic means – telegraph, radio, telephone, television – that conquer time as well as space.

While the epitome of literacy is reached in the Industrial Age, this is also the age when the threshold to a new civilization is reached. Education becomes practically universal because an educated workforce is deemed a better resource for the various stages of industrial work. Since social movement is more vertical, the worker on the assembly line could one day become the president of a company. Moreover, individual unfolding was encouraged by democracy, and humans were free to develop themselves through non-literate means. Each medium entailed its own language in order to function most efficiently. Visual means of communication marked the crossing over the threshold into the next stage.

As means for producing and transmitting images were developed, people rediscovered the old truth: One picture is worth a thousand words. Traditional literate media (books, newspapers) started to incorporate pictures, which attracted a greater “readership.” While radio made it possible for more people to obtain information, cinema and television made information dissemination a multimedia experience. Experts in communication discovered that the human was more open to visual means of communication than through the written word and directed their efforts towards more and more refined visual media for commerce first of all, but also for information, entertainment, and influencing beliefs.

The advent of digital technology, which is based on viewing information on a screen, seems to have dealt the final blow to the civilization of literacy. As with all other means to

achieve an end, digital technology has proven its efficiency for the new types of human practice and thus the new types of human self-constitution. At the same time, other fields of human activity began to transcend the literate paradigm.

Art begins to move beyond the duality of reality-likeness (imitation). Beginning with the Impressionists, artists are no longer interested in rendering reality as perceived by the senses. They tend to re-present reality filtered through their own, highly individual way of “seeing” things. Cinema, which starts out by emulating the linearity of nature and language, is subject to industrial methods. Shooting scenes is neither linear nor sequential, but is carried on the basis of priorities governed by efficiency. The film capturing the story is processed chemically. Music enhances the visuals, communicating happiness, sadness, violence, agitation, or other emotions. Television, with its foundation in physics and electronics, also starts from the linearity of language in its early days as a means for bringing drama and film into the home. Today, it conquers time and space, bringing us events as they happen around the world, in real time. At the threshold of a new stage, it is becoming interactive.

The proportional stage was the age of the Human Specialist, the Human Industrialist. Information has increased greatly and no one can master it all. Thus the division of knowledge into specializations. To be efficient, a person must know more and more about fewer things. Each of these fields is no longer reducible to the natural language as it is expressed in literate means. Partialized and specialized knowledge creates the need for partial and special languages, especially in science and technology.

4. The Exponential Stage

As with the previous stages, this one goes hand in hand with an increase in the scale of human practice and entails a break with the previous stage. Productivity in this fourth stage is no longer mathematical-additive, but geometrical-multiplicative. Another characteristic of this new stage is discontinuity. The present and the future, especially, do not represent a continuation of past practices, but a break with sequentiality, hierarchy, linearity, and centralization. The languages required in this new stage of human self-constitution change as the pragmatic circumstance require. They are impermanent in relation to the permanence humans are used to with natural language that once dominated human activity. New languages are valid as long as their referents are useful. Due to the rapid change in scientific discovery and technological developments, the languages utilized also change rapidly. Instruments for transmitting multimedia, mostly through digital processes, have proven their efficiency in the new ways of work. Today, a physician specializing in genito-urinary tract can view a patient’s kidneys through a colored rendering transmitted on a monitor, or through an image captured by a camera that is the latest improvement in nanotechnology. The language upon which this technology is based is machine language.

Nature is no longer the inexhaustible source it was considered to be. In this stage, it has to be treated as a limited resource that humans have to wisely manage in order to avoid irreversible damage. In this stage, the fundamental economic resources are neither natural (as in the circular and lineal stages) nor manufactured (as in the proportional stage), but cognitive – knowledge mediated by machines in which it is expressed and embedded (as programs).

Digital technology is an important element in this exponential stage characterized by discontinuity. Computer languages do not derive from natural language, but from mathematics, from numbers (also called “digits”). This technology imposes a framework that encompasses all activities to the extent that human beings are practically in a digital state. Digital science has two intrinsic characteristics. It accelerates all the processes in which it is applied, leading to a speed heretofore impossible. It is also able to multiply these processes geometrically, exponentially. Productivity benefits from these characteristics.

Another important characteristic is interactivity, which facilitates communication (bringing humans together) as well as discontinuity. The machine allows the user to establish relations along the line of a dialog. He decides what capabilities of the machine to utilize or pursue, and which to ignore. However, the user can start and stop the communication whenever he desires, leading to sudden discontinuity. The user can enter and leave the world-wide community whenever he wishes.

Humans are in the process of discovering the different characteristics of this stage – extreme specialization and mediation, partial (as opposed to holistic) experiences, discontinuity, interconnectivity, globality – and how they fit together. Nadin maintains that the digital age is still in its infancy. Practices developed in previous stages – communication, machines of all types – are changing in nature, due to digital technology and to a new scale of human practice, to such an extent that they cannot relate to former practices. Extreme specialization leads to small worlds unto themselves, each with its own language, as in the various specializations within medicine alone. Only those using them understand them fully. The market, too, has created its own language. These small worlds are not self-sufficient, but interdependent within the global scale of thousands of human activities carried on in a matter of seconds, or even in shorter time units.

Another characteristic of this new stage is the breakdown of social institutions. For instance, communication is no longer tied to a place. Telephones and mail have become portable services that human beings carry with them and use wherever and whenever they want or need. This is one aspect of what Nadin calls “ubiquitous computing.” Society tends towards more individualism: more people who want to live by themselves, to work in home offices, to entertain themselves through the Internet. That is, they want to constitute their own ways of working and relaxing. The traditional family is disappearing. Fewer couples

have more than one child (if any). Mobility usually means that grandparents and children, even spouses, live far apart from each other. Sexual relationships, within and outside of marriage, are more brief, and partnerships begin and end more frequently. Religion is losing its hierarchical condition as the laity demand changes from religious leaders. Many “religions” form spontaneously and disappear when others arise. They are no longer limited to a church. Services from Rome or California can be televised around the world. Various religions take advantage of all the capabilities that the Internet provides in order to keep in touch with their global congregations.

Probably the greatest area to be affected in this stage will be education, which is still playing catch-up instead of embracing the possibilities that digital technology provides for disseminating knowledge at almost every age, from three to ninety-three.

Language Today

The dominance of traditional literacy is still maintained even though its justification in the pragmatics of human activity and self-constitution has disappeared. Knowledge and information are the greatest resources of this age. And these are expressed in specialized languages used in various practical domains; and they have more value. Take the case of AIDS medications in South Africa as an example. South Africa has the highest population infected with AIDS. In order to distribute anti-HIV drugs in a poor country such as South Africa, several laboratories have begun to produce such drugs without permission from the pharmaceutical companies that developed them. These companies demanded payment for something that is not a piece of real estate, not a natural resource, but information contained in the chemical language of the formula. [One of the darker sides of globality and market mechanisms is that once the pharmaceutical companies lowered prices for South Africa, greedy entrepreneurs from rich countries traveled to Africa to buy up the lower-priced medicines in order to sell them in their home markets at a profit.]

Language has dynamic characteristics that evolve as the pragmatics of human activity do. The evolution of these characteristics can be listed as follows:

1. From direct to mediated
2. From sequential to parallel
3. From centralized to decentralized
4. From universal to relative, or local
5. From deterministic to non-deterministic (hierarchic to non-hierarchic)
6. From closed systems to open systems
7. From static/permanent to dynamic/transitory

1. Humans learned to use physical tools to enhance the outcome of their efforts, thus inserting a mediator between subject and object. Humans discovered that their activity could be enhanced even further through the insertion of even more mediating tools and methods. These eventually became specializations in their own right, each with its own language. Some of these specializations do not deal with material, as such, but with abstractions, as in physics, chemistry, and computer science. Just as human activity is more mediated than direct, so have languages developed along this line.
2. Human activity followed a sequential pattern: Do this first, then this, etc. until the task is complete. Each step depended on the successful execution of the previous one. In today's highly complex activities, in which many objects of mediated praxis must be integrated, many activities must go on simultaneously, parallel to the main object of an individual's or group's efforts, due to efficiency expectations. Parallel computing is one example; but automobile manufacture also applies parallel processing. (Various components are made in various locations and delivered "just-in-time" for assembly.) Hyper-text and flow diagrams are a good example of parallel processing. Internet, in the way it organized and transmits information does not follow a linear pattern. It evolves in various directions (like a fluid mass in continuous flux) before the user receives an answer to his inquiry. The user is not aware of how complicated the trajectory of an inquiry can be.
3. One consequence of linearity is centralization, since a line must start from a certain point or center upon which it depends. Modern productivity does not rely on the centralized model since decentralized processes have proven to be more efficient. A factory is an example of a centralized institution, in which all activities leading to the final product were carried out. Within a factory, productive processes can be better controlled and organized. The manufacturers owned the means of production that ensured higher efficiency than work in the home by an individual. Homogeneity of the goods produced was also ensured. Today, a holding company, for example, is composed of various different enterprises, most unrelated, in which a certain degree of independence from the central office is allowed. Even competition within such enterprises is desired. Total independence of the processes that compose the final product dominates in the new pragmatics. Instead of manufacturing an automobile part in the auto factory, a totally independent enterprise will manufacture the part not for just one auto manufacturer, but for several. The same process applies to virtual firms in which the parts form self-organizing systems as the particular activity requires.
4. Outcomes are no longer good or bad. Neither is it possible that one solution apply to all problems. In the first case, results are placed on a continuum of values that depend on the circumstances for which a product or method is used. Nuclear energy is a very good

example in this case. In the second case, agriculture presents many good examples. Instead of applying one pesticide that eradicates all types of insects, local natural enemies – diseases that attack pests, for example – are applied.

5. Hand-in-hand with centralization and hierarchy, determinism has proved a hindrance to efficiency. Instead of one individual or a small group of individuals isolated from the process or activity determining what and how something should be produced, the impetus comes from the user or from a mediating entity. Government is a good example here. Instead of one centralized governing body determining what is right for all areas under its control, the parts function better when they, on the basis of better information, can decide and execute. Deterministic methods are slow to employ and are not suitable to the fast rate of change manifested in practical activity. The former Soviet Union, with its five-year plans, was the epitome of deterministic reasoning. Regulation in centralized states negatively affects performance.
6. Various systems of knowledge and organization (social, economic, legal, scientific, etc.) used to form coherent, clear-cut, and closed entities. Each system was sufficient unto itself. Movement out of and into each system was very difficult, if not impossible. Tradition kept “everything in its place.” Today, there is mobility among social classes. This is due partly to open systems that allowed for mobility, since mobility proved to have more pragmatic worth than a closed system in which the members stagnated and finally collapsed. Open systems allow for more energetic expression. This is obvious in music, painting, the dance, and literature. Scientific endeavors have profited from openness in the sense that scientists can view their endeavors in relation to other phenomena, not as isolated cases within a system such as astronomy, for example. Ecology is an even better example.
7. Distances (space) and slow means of production and communication (the time element) limited the scale of human activity and the speed at which activities were carried out. With each stage, as described above, both space and time were overcome. Activities could be carried out on a broader geographic scale and at a faster rate of change. Static also meant permanent, unchanging. Once a tool or method was developed, it was meant to last forever. A machine usually outlasted the person operating it. This was once considered a virtue. Today, humans look forward to change because they expect innovation and improvement. Individuals can access any part of the globe through telephone and Internet in a matter of seconds. They can reach a destination thousand of miles away in a matter of hours. In addition, humans can virtually “be” where they want to be, or in more than one location, thanks to the power of the world-wide Web.

Characteristics of the new literacies

The new scale requires higher efficiency. In order to achieve it, the new means for efficient work have permitted human beings to transcend the limitations of literacy. There is no longer one language or literacy that can capture the diversity of human experience. If natural language had been able to do this, all the notations used in linguistics, mathematics, physics, machine language, music, etc. would not have come about. Religious rituals, art, and the dance would have lost their meaning.

The new languages are partial, representing that specific part of knowledge to which they refer. At the same time, they are global in that the language is used by persons or machines involved in the activity, regardless of location – around the world and even in outer space.

In respect to machines, they incorporate all the data needed to carry out a task that a human being used to do, thanks to digital technology and to a variety of other developments. One example is banking, in which the machine acts as teller, dispensing cash, accepting deposits, executing transfers. This is a complex program that can easily be kept current. The digital cash register not only rings up the price, but keeps inventory at the same time, along with a record of what products consumers prefer. This way, inventories are reduced and efficiency is increased because resources are used only as necessary. Machines carry out all kinds of biological analyses more reliably than human beings can. Programs determine what kind of feed and how much is given to cattle in order to increase meat and milk production. They also associate feeding with the animal's health and with the cycles of meat production. All these machines include many mediating elements that remove the subject of an activity from the object. These new systems support higher efficiency; they are faster than human beings can be, and are practically error-free. The human component becomes superfluous, although simultaneously more important in the conception of programs and their connection. Grey matter, not muscle mass, is required.

Under these circumstances, new ways of self-constitution arise, especially in areas where creativity is called for: invention of new options, revision and improvement of existing methods and mechanisms. Today, work is undergoing the greatest change since the introduction of labor division and the development of the three sectors of economic activity in the Neolithic Age.

Language and Logic

Each language-based human activity has its own logic, just as each manner of human self-constitution (farmer, architect, builder, physicist, chemist, mathematician, computer scientist, sculpture, painter, etc., etc.) does. The logic of language is contained in its structure. Human activities are marked by this logic and are eventually submitted to it. The primitive

logic of unmediated action is lost; the notion of efficiency that this logic contains is redefined.

The logic of literacy, which was useful for organizing many of the activities in the agrarian and industrial stages, is no longer valid for the new pragmatic activities of this new stage. One of the main reasons for the downfall of the Soviet Union was its literate pattern of action: strong central control, determinism, continuity, permanence, and hierarchic, linear and sequential modes of operation. Other countries that insist on the literate paradigm are undergoing problems similar to the ones faced by the former USSR. The European Community is a good example in this case. The current crises faced in countries such as Germany, France, Italy, and Spain reflect the negative affect of literate structures.

The logic required for the activities of the new stage forms a clear-cut break with the logic of literacy. Due to the demand of efficiency, activities change at a faster rate; highly adaptable solutions are called for. The digital languages that run the machines through which many activities are mediated are not subject to the logic of natural language. The language of art displays the characteristics of the new stage. It is not determined by any style except the artist's own, as in Jackson Pollock's drippings and Duchamps' found objects. Sampling – taking parts or samples from various sources and rearranging them into something new – is practiced in the performing (music, theater, dance), as well as in the plastic, arts.

Some Practical Consequences

Discontinuity has come about due to the differences between the literacy-dominated activity that humans were used to for millennia and the new literacies required for effective pragmatic activity. An automobile can be formally and conceptually compared to a horse-drawn carriage, and indeed, one of the characteristics of the car is its "horsepower." But air travel, especially rocket travel, cannot be compared to any form of transportation preceding it. Writing, with its characteristics of sequentiality, linearity, hierarchy, permanence, homogeneity, etc. can be compared to the hieroglyphics and notational forms that preceded it. But it cannot be compared to digital languages and hypertext.

The languages of this new stage tend to be highly visual; that is, they rely on the holistic image. New forms of work and communication do not rely on the written word. Many of these forms existed before literacy and alongside it. Religious rites, drawing, music, the visual arts were concurrent means of practical human activity considered inferior to literacy. Visual forms are synthetic and holistic. However, they tend to be open to interpretation unless the context is defined. Writing tends to be analytic and precise. Visualizations allow humans to see the unseeable: objects in space detected by radar; the formation of stars in the universe; sounds coming from the cosmos; the heartbeat (via electrocardiograph); the formation of a new human being in the womb; the areas of the brain; and so much more.

All these images in turn have allowed human beings to expand their activity, to do something useful with them. Virtual reality allows humans to experience events otherwise inaccessible, such as travel in outer space, or learning difficult skills.

The complex mediations that go into human undertakings are evidence of the fact that minds are interacting, through different languages, transmitted by means other than that of a dominant literacy based on natural language. Our applied knowledge does not search for final causes, the “Why?” of things. Our knowledge is a set of procedures that allow for processes with economic value. Literacy is being overtaken by the many languages of science and technology in particular. The crisis of literacy will eventually become a matter of the past. Within literacy the “Why?” was not pertinent. Beyond literacy, it becomes possible and even necessary. The expressive means that have led to spectacular accomplishments, such as the eradication of diseases, space travel, and new artistic forms are means that transcend literacy.

Language, Individual and Community

The transition from literacy to literacies entail new relations between the individual and society through the extensive means of communication that do away with the need for person-to-person contact. In some cases, people interact more with machines than with other people. Or their interaction is mediated by some device. The Internet opens the way for interaction with more communities, around the world, around the clock. There is no real give-and-take because the individuals connected through the Internet are not subject to any control but self-control. The social norms that a community of real, not virtual, people exercises is absent. On the other hand, the information facilitated by the Internet allows for personal unfolding never before experienced. Information on health, medicine, gardening, cooking, music, government, and so much more is only instants away, delivered to the place we want or happen to be (while moving). Searches lasting months in a library, to which one must travel, or a research center, where access might be restricted, take minutes through the Internet. The only problem that might arise is managing all the information available, making sense out of it.

Knowledge

The first and original source of riches was nature. In this new stage, human beings take precedence over obtaining and processing raw material. Knowledge is processed. More important, knowledge is created.

Conclusion

The story of human self-constitution unfolds through practical activities, that is, what individuals and groups do, first in order to survive, then to satisfy needs, and today, to satisfy ever-higher expectations. In order to achieve this, the activity through which human beings become what they are need to be ever more efficient. Each step towards efficiency opens the way to further possibilities. The natural language that humans speak, and on which reading, and writing – i.e., literacy – is based has helped in human endeavors for millennia. Formed by practical experiences, literacy later shaped the practical activities and the human beings carrying them out due to circumstances both material and spiritual. However, due to the same human characteristics and requirements that made literacy important, in our days modern society is progressing towards illiteracy. That is, human activities can no longer fit under the umbrella of one dominant literacy. Specialized languages, which correspond to high-efficiency specialized activities, are called for. Most of these bear no relation to the characteristics of literacy because the practical experiences to which they refer have none of the characteristics of literacy.

In the end, as throughout the history of human activity, pragmatics and efficiency will determine the outcome. Understanding why society is going through the changes it is – entailing almost a complete break with literate traditions – will only help us make the best of change.

Glossary

Alienation: basically, a feeling or perception that something (body, thoughts, work, feelings, beliefs, etc.) that is part of an individual or a group of individuals is foreign. The term is also used to describe the estrangement of human beings from the object of their effort either because they do not directly partake in enjoying the result of their effort, or because the production effort is carried out through extreme labor division and layers of mediation. In the long run, mediation and labor division severs the relation between an individual or group and the social and natural environments. A long chain of mediations separates the working person from the object to be processed, be this object raw material, processed goods, thoughts, and other products. Labor division and mediation, correspond to a scale of human interaction that makes self-constitution through various signs necessary.

Centralism/centrality: the expectation of a center that is important in a practical context (state, church, city, etc.)

Centralism implies the existence of a particular type of hierarchy that emphasizes the importance of an individual or entity in the administration or direction of human activity and

thought. Activity and thought revolve around this central authority and refer back to it before attempting further action or thought. Centralism implies that some empowered individual or group is best capable of controlling whatever lies outside the center. Centralism arose out of a perceived need for order. In the evolution of centralism, it was usually the most powerful or the most effective individual (or group of individuals) who dictated. As time went by, the individual at the center was endowed with the power that centralism implied, no matter how ineffective or unskilled. Bureaucracies, monarchies, executive governments, and the papacy are examples of centralism.

Centralization is the reference to centralism as a criterion for organizing activity. Early cities are examples of centralization.

Determinism: the doctrine that all events and human choices have sufficient causes; the notion that what preceded has a direct effect on what will happen in the future.

Direct: without any mediating element, or with very few mediating elements. An example is lifting a heavy rock without the aid of a lever or other tool. Another example is self-defense using one's body. A toothache is a direct experience; so is falling and breaking one's leg. (See also immediate).

Discontinuity: described in dynamic systems theory as phase shifts, in which no obvious connection between the past and present can be perceived and instability is noticeable.

Distributed: without reference to a center from which power or impetus emanates.

Efficiency: the state the greatest effectiveness of an activity at the lowest cost.

Fuzzy: derived from mathematical set theory, according to which objects can belong to a set with various degrees of membership. Fuzziness describes objects or processes not amenable to precise definition or measurement. Fuzzy processes are vaguely defined and have some degree of uncertainty. Data from fuzzy sets have no precise boundaries. Applications of fuzzy sets can be found in large-scale engineering of complex systems, social systems, economics, management systems, medical diagnostic processes, and human perception. Fuzzy set theory was developed by L. Zadeh around 1965. In the late 19th century, the American philosopher Charles S. Peirce developed the notion of a logic of vagueness.

Heuristics: the invention, expansion, or discovery of new options; the exercise of expanding choices.

Hierarchy:	an ordering principle based on attaching higher importance to some elements; any system of persons or things ranked one above another.
Maieutics:	part of the Socratic method; the means to assist in giving birth (to ideas, in Socrates method).
Immediate:	without any mediating element, especially in relation to time and distance. A kiss would be an immediate expression of affection; a love-letter would be mediated through the use of words on paper, in time (the time needed to write), and in distance (the letter would be sent beyond one's sphere of activity).
Linearity:	a progression from cause to effect. Linearity describes a relation between cause and effect that can be represented by a straight line. This means that increase in result is proportional to the increase in the cause, e.g., typing 5 times faster will result in 5 times more text typed.
Mediation:	the practical experience of reducing a task to manageable size through the insertion of an element or elements between the actor and the object of the action. The element can be an object (such as a tool), a language, or a plan (algorithm) or a combination of these. In each mediation, there is the potential for further mediation. That is, the inserted third can be divided in turn, resulting in mediations of mediation ad infinitum. A mediation can become a specialization of its own, requiring its own mediating elements. The tendency towards mediation, along with heuristics, defines the human species.
Parallelism:	very simply, two or more phenomena located alongside each other in space and/or time. In computing, parallel processes refer to several computations being performed simultaneously in order to arrive at a solution to a single problem. Human development has been marked by parallelism in that several paradigms or <i>modus operandi</i> take place in human activity. For instance, one can say that parallel to alphabetic writing as means of communication, drawing, artistic expression, musical notation, as well as sound systems such as aural codes and music were simultaneously in operation. Parallel processes can be contrasted to a dominant process, in which one path is pursued to the exclusion of others. Parallel computing embodies the idea of parallel activities. They can be the same (each processor executes the same operation), or different (in which case the need to coordinate and integrate the outcome arises).

Reification: from the Latin *res*, a thing. To reify means to make a concept into a thing. It also means, to see the world as a collection of things and therefore reduce the realm of ideas and values to objects subject to trade and manipulation.

Representation: implies an act of recognition: the presenter (e.g., a name, a picture, an accent) as related to what it represents (someone who has that name, looks like the picture, speaks with an accent), and as such is a relation. Representations can have different functions: evocation, stimulation, information, association, among others not always under the total control of the encoder and not always transparent to those involved in decoding a representation. In this capacity, representations are functional devices, which constitute the underlying mechanism of behaviorism. A good systematic typology of representations was given by Charles Sanders Peirce⁶: representations based on direct interaction between the represented and the representamen (called “indexical representation” and exemplified by fingerprints, wind direction, or pointing as a sense of movement); on likeness (called “iconic representation” and exemplified by a photograph or drawing of someone, or a graph); and on conventions agreed upon, called “symbols.” Minds are adept at processing each of these various kinds of representation, but human minds, identified in the context of culture, are especially good in processing symbols. This brings about the immediate necessary distinction that symbols are not arbitrary conventions; they are constituted and submitted by minds in their interaction and are dynamic representations. Indeed, indexical signs are quite stable and result from inductions (observations over time). Iconic representations, although affected by time, preserve a series of correspondences between the represented and the actual representation. They result from comparisons, i.e., through deduction. Symbols come about as abduction (hypotheses), when, in the interaction among minds, a critical mass is reached. Representation as the model of the mind leads to behaviorism and finds justification in a behavioral evaluation. In short, behaviorism ascertains that something is a realization of a description (in this case, the representational theory of the mind) if it behaves as though it had this description. The circularity of the realization argument affects the significance of the argument. It projects a concept of the mind based on discrete mental representations corresponding to a rather static world.

Sampling: appropriating bits, pieces, or sequences from various, heterogeneous sources.

Scale: the expression of relations. Within the notion of scale, numbers as such – population in a given area, how many people interact in a particular practical experience, the longevity of people under given circumstances, the mortality rate, family size – are almost meaningless. It is the relation between numbers and circumstances that lead to a meaningful inference

about activity and the quality of this activity. The notion of scale is useful in determining why the pragmatic activity of some populations, remains direct and simple and why others become highly mediated and more complex.

Self-affirmation: See Self-constitution, below.

Self-constitution: the process (what, why, and how) through which a human being, or group of human beings, acquires its identifying characteristics. The making of oneself through the activity in which the person is involved.

Self-organizing nuclei: within dynamic systems, the forces at work within the system affect the emergence of new characteristics. From outside the system, it appears that the system is organizing itself around nuclei that act as attractors.

Sequential: referring to a series of successive steps or processes to be followed in order so as to achieve a desired result.

Structure: a set of stable relations among various components of an entity; a framework upon which a concept is built or an action is supported. For example, dualism has served as the structure for philosophic discourse almost since this began.

Threshold: the point that a critical mass reaches before a transformation in the underlying structure of human activity and a new algorithm or paradigm breaks away from the one in existence. These transformations in the underlying structure occur over larger periods of time, for example, the transition from hunting and foraging to agricultural life. As modifications in scale reach some threshold, they trigger rapidly evolving sequences of change in the world of our pragmatic existence. Threshold is accompanied by experiences of discontinuity (when algorithms or paradigms in place seem to have lost their validity or efficiency) within the existing scale of human activity.

Tool: a mediating element that is inserted between the human and the object of his activity in order to aid in efficiently carrying out a task. Tools can range from simple to complex. A rock can be used for cracking nuts or for breaking other rocks. Its effectiveness depends on its characteristics (shape, weight, density, texture, etc.) and the strength of the human using it, and the manner in which it is used (abruptly, continuously, rhythmically, etc.). A hammer, while simple, is more complex than a rock in that someone has shaped the head and the handle and put the two together. Even more complex, is an electric hammer, which is

the result of many components, each one of which may be a tool in its own right (wires, screws, molded parts), and the electric power used to replace human strength. All these tools are extensions of the human body. Another class of tools extends the human mind. Symbols are examples of mediating entities between humans in the act of communicating an idea, notion, or algorithm. Writing systems are such tools, as are myths, algorithms and computer programs used for carrying out certain tasks as efficiently as possible. A program inserted in a machine that drills holes in components that go into machinery is but one example of the countless ways in which programs can be used as tools. However, a computer should not be considered a tool in the sense that a hammer and a jackhammer, a pencil and typewriter are considered tools. A computer is a tool that makes tools (a meta-tool). A program that corrects spelling and grammar, as well as one that aids in drawing up architectural plans, are not a simple tool in that it appropriates human cognitive functions.

Transitory: lasting for a short time, not expected to last for a long time.

Underlying structure: Underlying structure refers to the foundation upon which rest the things or events human beings experience. The underlying structure of a house is its foundation and its frame. The changing genetic fabric of the living (including the human species) is an example of underlying structure. Cognitive characteristics of the species, including language use, in particular the literate use, are part of this foundation. So is the structure of human activity reflected ultimately in characteristics of social life. And so are the relations between who we are (biological endowment), and how we express our identity through what we do (pragmatic framework). These relations specifically point to the structure of our activity. Transformations in underlying structure occur over longer periods of time. As modifications take place, they trigger rapidly evolving sequences of change in the world of our material existence. The nature of the connections between such modifications and change in the reality of our existence goes well beyond cause and effect. This applies to the foundation and frame of a house, as it does to the genetic fabric of the living, cognitive characteristics of the species, or the nature of human relations. Basic genetic manipulation of the underlying structure of the living leads to biomedicine, biopharmacy, bioagriculture, not to mention the increasing number of products from the biogenetics industry. Consider, as another example, the formation and use of new languages corresponding to unprecedented pragmatic endeavors, or making such endeavors possible. Each new sequence – from cumulative transformations in the underlying structure to the variety of changes we experience – can be spectacularly unique. Our genetics continues to evolve. So does the underlying structure of our social life. But the critical change takes place in the cognitive foundation, the source of the increased efficiency of human pragmatics. Human physical abilities that were essential in the initial stages of development of the species probably

decreased over time. Alternatively, cognitively based functions diversified. Such cognitive functions made possible more effective activities, including the better use and application of natural abilities. Search for knowledge and its creative use, means and methods of human interaction, means for expression and communication, are among the cognitive functions in question. This specifically human underlying structure, on which part of the foundation of the civilization of literacy rests, affects us all. What we experience presently is a fundamental change: from a cognitive underlying structure limited to activities congruent to the characteristics of language, to a broader structure adapted to more than so-called natural language.

Literacy Lost

Steven Bleicher

SOME PEOPLE may be put off by the sheer size of Mihai Nadin's book, *The Civilization of Illiteracy*. For those already comfortable in the civilization he describes, the book is too big and too heavy. And it has no pictures. The loss is theirs. While it is not light reading by any stretch of the imagination, it may be one of the most important volumes of the decade.

The *Civilization of Illiteracy* deals with the subject of literacy in all its aspects. Nadin approaches the subject from the perspective of human pragmatics. He explains the pragmatics that gave rise to writing and literacy, as well as the pragmatics that make these new "literacies" necessary. He explores the transition from the traditional linear concept of literacy to contemporary nonlinear modes of discourse, communication, and understanding. Nadin admits that he must preach to the unconverted through a medium he knows is losing validity in the marketplace. But only those who are literate enough to want to read will understand and profit from the text. Probably the only way around this dilemma would have been for Nadin to create a video or multimedia presentation rather than a book. Therefore, in order to accept his thesis, we have to take a step back to the time when the idea had more value than products or processes.

When Nadin speaks of the *Civilization of Illiteracy*, he means one in which "literate characteristics no longer constitute the underlying structure of effective practical experience." There's no one literacy that dominates over all others. We have evolved into a civilization requiring many different literacies. This seems to make sense in a world in which the global has become local. We have become Netizens, citizens of the Internet and the World Wide Web. As we move deeper into the age of sound bites and surfing the Net, we become overwhelmed by technological hype. Nadin breaks through the confusion. We have moved into an age where everything is pared down to its lowest common denominator, the lowest point that a mass audience can deal with. Our pragmatics demands this!

Starting with the question of which came first, images or language, Nadin reviews the history of language and literacy. How did we develop into a civilization of literacy? While the explanation is as complex as the human condition, we come away with an understanding of how this shift progressed. He follows the evolution from thought and word to image, pictograph, symbol, alphabet and the logic underlying grammatical sentences. Like humans themselves, language and literacy have evolved over a long period of time. Unlike spoken language, writing is a fairly recent event in the evolutionary timeline. The use of signs and symbols predates written language and our traditional concept of literacy. Nadin also points out, that even today, a few societies such as the Netsidik and the Bassari still prefer the intimacy and knowledge of a multimedial oral exchange to the distant univocal-

ity of written language. But it's within the linear tradition of written language that our ideas of literacy developed and flourished.

Nadin explains how humans shaped language and literacy and how these have conditioned human thinking and acting. This sets the stage for his discussion of how literacy has influenced sports, war, religion, sexuality, the family, even our eating habits. He refers to Barthes' (1978) observations on configurational eating habits of the Far East and the sequential eating habits of the West. As human activity becomes global, America exports its own McDonalds all over the world. More "Italian" pizza is exported from the USA than from Italy. As the pragmatic dimension of human activity takes over, paradoxical situations arise that seem to be at odds with our literate values. This is a main preoccupation in Nadin's discussion of the traditional institutions mentioned above.

As expectations of efficiency take us away from literacy and into the digital age and the era of the Internet, we have moved into a new world characterized by different ways of doing things. The linear and sequential give way to non-linear and distributed. The written word that appeals to the mind is giving way to other sources of information: images, sounds, textures that are more quickly perceived through our senses. CD-ROM encyclopedias have been published which primarily rely on the use of small "QuickTime" movies in preference to the written word. These new modes of information and discourse use the nonlinear capabilities that digital technology makes possible.

The USA is the epitome of a civilization of illiteracy according to Nadin's criteria. With the decline of literacy comes the move from the historic to the present. America is the land of the present, the here and now. American society validates itself on the material level, not on the level of the pure idea, through the trademark and sound bite, not literature. Nadin defines this dilemma when he states "We are our language."

As with a good mystery, the ending should not be revealed. This much can be told: the adaptations and solutions that Nadin proposes provide for a happy end. The volume not only defines the problem but also gives a sense of hope, suggesting some positive methods for addressing our current predicament. He lays out a blueprint for new systems of nonlinear education and exchange of ideas. In his vision of new literacies, Nadin feels that education has to become a living process and that we must adapt our pedagogy accordingly.

One of the aspects of the book that is most refreshing is the fact that he doesn't use the traditional academic style of writing. Harking back to all original thinkers and philosophers, Nadin does not base his ideas solely on the work of others, but on what he has directly observed in life. The book presents us with an author unafraid of expressing his own ideas and letting them stand on their own merit. This is a real treat in an age in which most authors use their time and our patience regurgitating the ideas of others.

As an educator, I've seen first hand the evidence of Nadin's thesis, but I've never been able to explain it as fully or comprehend its far-reaching effects until now. *The Civilization of Illiteracy* clarifies the many aspects of an issue currently confronting our society. How we address these issues will determine the future of civilization itself.

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We don't have to join the culture of illiteracy, but it helps to understand it

Blossom S. Kirschenbaum

MIHAI NADIN INVITES HIS READERS (page 404) to "look at all the contraptions of illiteracy filling the inventory of the modern household: radio, photo camera, TV set, video recorder, video cassette player, Walkman, CD player, electronic and digital games, laser disc player, CD-ROM, telephone, computer, modem." Whether one- or two-directional, all these paraphernalia have affected every aspect of our lives, even the most intimate, including sexual practices and family relationships, including also our religious practices or abandonment of them. Yet even as he proclaims the end of literacy, Nadin is offering what looks like a conventional (and easy to read, though particularly heavy at 767 pages plus references and index) printed book. Does this imply self-contradiction? Not really; this is the first book I have ever known to include an e-mail address facilitating dialogue with the author. He wishes, in his Foreword, that he could hand over the interconnected digital book that his cover illustration suggests. His text anticipates an interactive version of itself.

Decline of literacy is usually reported in terms of symptoms, explains Professor Nadin. Yet he himself, a Romanian-born computer scientist, electrical engineer, philosopher, semiotician, etc., immigrating from a culture of rigidly structured literacy into a land of new technologies, perceived people as living with immediacy rather than for permanency. (It is true that in the United States we say "that's history" about what we mean to put behind us and forget.) As we hurtle onward, abandoning the Slowness that Milan Kundera, in his novel of that title, sees as enhancing pleasure, Nadin reminds us that literacy is a late acquisition in human culture, and dispensable. Acknowledgment of change allows us to make the best of it. "The ozone hole of over-information broke the protective bubble of literacy," he argues, and we become processors rather than repositories of data. Inexorably, the illiterate flourish while educational systems worldwide are in turmoil. Faster living means a glut of information from many sources, their credibility hard to sort. Yet Nadin is not dismayed by "the chasm between yesterday and tomorrow."

Is his book then meant to reassure? Hard to say, for it seems a book about everything, taking a reader from signs to language, from orality to writing, through the functioning of language and the relation of language to logic – a dazzling galaxy of subject-matter. Are the pages strictly theoretical? – no; but they are practical, as they discuss the language of the market, the language of products, transaction and advertisement, matters we deal with every day. Chapters on visualization and images, their ubiquity in our lives and their more democratic accessibility (since they require a smaller background of shared knowledge), and incorporation of visual materials in print media lead to a discussion of the complementarity of visual and verbal and a plea for visual education to enhance utilization of appropriate alternatives. Not substituting visual for verbal literacy, but moving from one dominant form of literacy to multiple adaptive sign-systems, is the goal proposed by an author who elsewhere writes in Romanian, French, and German, as well as English; who cites sources from Russian, Hebrew, Japanese; refers to the Yupik Eskimo Dictionary and the invented Klingon language for fictional characters and World Alphabets, Their Origin and Development; moves at ease among Confucius, Aristotle, Joan of Arc, Ludwig Wittgenstein, Isaac Asimov; and has published on prehistoric cave images, multimedia, virtual reality, advertising, Laurence Olivier, *The Name of the Rose*. In the chapter “A God for Each of Us,” he encapsulates without misrepresenting the world’s major faiths and can discuss how pastors use marketing techniques to form congregations. In short, Nadin’s compass is global, respectful of antiquity, preparing for whatever future comes hurtling toward us.

If it is presumptuous for a reviewer who has never read Vitruvius or Le Corbusier, let alone C. S. Peirce, to criticize an expert who has advised major corporations, it is easy enough for me as author of a paper given to the Northeast Modern Language Society this past April to find useful hints in a chapter on “Unbounded Sexuality.” The paper was about Francesca Mazzucato’s novel called, in the original Italian, *Hot Line*, whose protagonist-narrator earns her livelihood doing telephone sex. What should a grandmother-scholar like me think about telephone sex? “Instead of the immediacy of the sexual urge, projected through patterns subject to natural cycles, humans experience ever more mediated forms of sexual attraction and gratification, which are not necessarily associated with reproduction” (p. 355) – this is a good starting-point. Nadin goes on, “Literacy enrolled sexuality in the quest for higher productivity and sustained consumption characteristic of the pragmatics associated with the Industrial Revolution. Once conditions making literacy necessary are overruled by new conditions, sexuality undergoes corresponding changes. Basically, sexuality seems to return to immediateness, ... It now bridges dramatically between life and death, in a world where the currency of both life and death is, for all practical purposes, devaluated” (p. 370). Is this true? All I can say is, this helps explain the novel, which, unlike Nicholson Baker’s *Vox* or Spike Lee’s film *Girl 6*, is an unhappy tale. Furthermore, even parents and grandparents

need to be aware, as Nadin points out, “Striptease has moved from the back alleys of bigoted enjoyment into movie theaters, museums, prime-time television, the Internet. And so has the language of arousal, the voice of pleasure, the groan of post-coital exhaustion, or disappointment from teleporn services to the pay-per-session Websites, where credit card numbers are submitted without fear of their being used beyond payment for the service” (pp. 372-373). Nadin provides a remarkably strong and simple economic context for commercial sex: “It is much cheaper – and I cringe to say this so bluntly – to buy sexual pleasure, regardless how vulgar and limited it can be, than to commit oneself to a life of reciprocal responsibility, and unavoidable moments of inequity,” (p. 374). Yet: “To continuously tend towards having more at the cheapest price ... means to exhaust not only the object, but also the subject. ... To want all (especially all at once) means to want nothing in particular,” (p. 376). And when human sexuality is no longer profoundly subjective, deeply individual, then it cannot be an integrating factor in personal destiny.

Changes in family life, increasing secularism, evolving diets (in a chapter that begins “Have you ever ordered a pizza over the Internet?”), commodification and consumption of sports (“Every square inch on the body of a tennis player or a track and field athlete can be rented,” (p. 498) make more sense when discussed in context of literacy and illiteracy. Dissemination of scientific findings and their philosophic implications require that a comprehending person be an information integrator, in Nadin’s term, with multiple literacies – including philosophic literacy. According to Nadin, “Philosophy can practically help people to free themselves from the obsession with progress – seen as a sequence of ever-escalating records (or production, distribution, expectation) – and moreover, from the fear of all its consequences. It can also focus people’s attention on alternatives to everything that affects the integrity of the species and its sense of quality, including the relation to the environment,” (p. 533). The very opposite of pessimistic, Nadin helps his readers to new views of much that distresses us daily, for, as he says, banalities will not do. He guides us, as agents of change and observers of change, through perplexities about art both canonized and dubious: “Never before has more kitsch been produced and more money spent to satisfy the obsession with celebrity that is the hallmark of the time,” (p. 535). A shift away from artifact to process and artist (Nadin discusses work by Christo and Jeanne-Claude and by Keijo Yamamoto) and to self-referential, cultural-quoting, self-ironic art, and technological elaboration of artistic skills like drawing and composition to fashion new challenges, entertainments, and inspirations (he discusses MTV) make more sense in the post-literate contexts he lays out.

He does not predict the demise of the book, since people derive pleasure and profit from the printed word, but he insists that the book “is only one among many literary and non-literary domains of interaction,” (p. 572). Yet he warns, and none too soon, “The demand for

more at the lowest price that heralds the multi-headed creature called the civilization of illiteracy affects more than the production of clothes and dishes, or of cars and an insatiable appetite for travel. It affects our ways of writing, reading, painting, singing, dancing, composing, interpreting, and acting – our entire aesthetic experience,” (p. 573). Tracing out political implications (one passage is called “Of Tribal Chiefs, Kings, and Presidents” and another, “Judging Justice”), and military implications, the book concludes by balancing collapse and catastrophe against hope and “unprecedented possibilities” – and votes for “alternative media that support the empowerment of individuals, not the further consolidation of power structures that were relevant in the past but which prevent the unfolding of the future,” (p. 703). As against media-bashing, Nadin invokes what could be called “media-ocracy” to allow for fuller democracy. Practical hints are offered in “Coping with Choice,” “Trade-Off,” and other sections meant to help readers navigate alarming realities that may even seem like science fiction. Reasonably, he would like educators to face their own apprehensions and encourage self-definition and diversity of skills among students, acknowledging greater complementarity of the ways in which we learn.

We will still have to prefer our own choices in the information marketplace. Another 1997 book on *What Will Be: How the New World of Information Will Change Our Lives*, by the head of MIT's Laboratory for Computer Science, projects a “21st-century village marketplace where people and computers buy sell and freely exchange information and information services.” As a vastly more evolved Internet and the world economy converge in an automated utopia, says one reviewer of that work, “I'm not so sure I want to live there. (...) There seems to be little room for crankiness, randomness or messes.” Meanwhile we can minimize distress over the upheaval and transition.

Mihai Nadin, whose book helps us enjoy what we cannot avoid or dismiss, currently heads the program in Computational Design (a discipline he founded) at the University of Wuppertal. While he was still teaching in Providence, before he went to Ohio State University, I took a one-week summer Workshop in Semiotics Applied to Design devised by him, during which I learned to understand advertisement as a semiotic activity, the sign being seen as mediating element between the interpreted object and the interpreter; and I produced an analysis of a Sears ad. This analysis appears in a 1994 book Nadin co-authored with Richard D. Zakia, *Creating Effective Advertising Using Semiotics* (on pages 104-110). That workshop was my wake-up alert to a non-literacy-based culture evolving around me, and so I was not unprepared when a freshman student of mine at Clark University, whose English seemed, to put it kindly, basic, told me that he knew eleven machine languages and had a patented game in production in New York. Books will always be basic, for me, because, as Sven Birkerts put it in *The Gutenberg Elegies: The Fate of Reading in an Electronic Age*, “The time of reading ... is not the world's time, but the soul's,” and “The books that matter to me ... are those that galvanize something inside me. I read books to read myself.” A Stan Mack cartoon sequence in *Modern Maturity* (November-

December 1997) pokes fun at the body-builder who says “I do my reading with audiobooks while jogging. It’s exciting and you don’t use up your optic nerves.” For this earnest athlete, humor and pathos are out: “Laughing and sobbing waste oxygen.” He says, jogging off in the last panel, “For me, a good book is like a good pair of sneakers.” The culture of literacy is not threatened; according to the *New York Times* of 19 October 1997, about 350,000 books are added every year to the groaning shelves of the Library of Congress. One of these “books,” however, Tom Wolfe’s novella *Ambush at Fort Bragg*, was released as “An Audio Exclusive Not Available in Print;” and other book-books were accompanied by musical tapes or separate illustrations. Well, we don’t have to join the culture of illiteracy, but it helps to understand it – and we have Professor Nadin’s support in that.

A Positive Pragmatist

Victor Terras

IMMANUEL KANT was the last man to know everything worth knowing in the humanities and sciences of his age, though he was not quite caught up in the most recent advances in mathematics. Oswald Spengler, one of many philosophers after Kant who, due to the explosion of knowledge in all fields, claimed that philosophers of his time could not be basing their thoughts about the cosmos, nature, and humankind entirely on facts available to them, but on “theory” and second-hand information that they were not competent to judge. Spengler himself developed his “World-historical Perspectives” under a “Reklametitel,” *Der Untergang des Abendlandes* (in English, *The Decline of the West, 1918-1922*) and scored a huge hit. But he was not taken seriously by critics, who could see how flimsy Spengler’s factual material was.

As opposed to Spengler’s prophecy for the future, as well as other similar undertakings known to me, Mihai Nadin’s monumental work, *The Civilization of Illiteracy*, compares favorably for two reasons. First, Nadin is a genuine polyhistor who seems to be at home in every branch of the natural and social sciences, as well as the humanities, at least so far as the evidence he produces is concerned. Second, Nadin’s pragmatic method concentrates on particular instances of transition from “literate” to “illiterate” civilization, without jeopardizing the whole edifice by rash generalizations. Nevertheless, it seems useful to develop some parallels between *The Civilization of Illiteracy* and *Der Untergang des Abendlandes*.

To begin with, Spengler draws a sharp line between “culture” and “civilization,” as, in his scheme of things, civilization, consisting of achievements in the applied sciences and technology, dominates the final stage in the life of a “culture,” when no more great art, music, literature, or philosophy come forth from its body. In a way, this distinction coin-

cides with Nadin's "literate" vs. "illiterate" civilization. However, in Nadin's scheme, the cycle does not end with the civilization of illiteracy, and the latter is not considered inferior to the preceding "literate." Nadin has wisely stayed away from the organic conception of cultures and nations that has dominated German historical thought since Herder.

Like Spengler, Nadin sees a connection between the various branches of human activity. But unlike Spengler, who follows Hegel in seeing manifestations of an identical spirit (the Faustian, in the case of Western civilization) in the various achievements of a society and its works, Nadin points out the specific causes responsible for the development of a given phenomenon in the sciences, art, or social life, then seeks to find a common denominator for them.

To be sure, Nadin, like other authors, gives his work a title that promises an unambiguous answer to the problems treated in it, but his actual presentation of the facts shows the civilization of illiteracy in quite different stages relative to the literate. What is most important is that Nadin's method stays away from the teleological schemes that make history an exact science (a *Wissenschaft*) and claims to have discovered its "law(s)" and in fact to be able to predict its future course.

As much as I admire Nadin's universality, I am also aware of my own limitations and shall therefore limit myself to some observations in the field where I feel competent: Slavic languages and literatures, as well as, by implication, the respective culture(s).

Again, the contrast between Spengler's and Nadin's approach is most instructive. Spengler believed that Russian culture would be the successor to the declining West, Peter the Great being a "contemporary" of Charlemagne. Spengler based this assumption on the religious and philosophical ferment that he saw as a sign of a youthful culture. Russians, unlike the effete West, took this philosophy seriously. Nadin, on the other hand, sees the United States as the leader of the new civilization of illiteracy, with Russian laggard even as a literate society. The Tsars ruled an empire whose illiterate masses were controlled by a literate bureaucracy. The Russian intelligentsia depended on Western ideas: conservative religious tendencies, idealist philosophies, liberal populism, and revolutionary ideologies all had their sources in the West. Nadin points out that perhaps the only success registered by almost a century of communist rule in Russia is that it made Russia a literate (and numerate) nation. This effort had a twofold purpose: to prepare the new generation for industrial jobs that require literacy, and to indoctrinate it with the basics of communist ideology and morality. While the former goal was achieved at least partly, the latter was a dismal failure. Nadin believes that the collapse of the Soviet system provides "unexpected proof of this book's major thesis" (p. 638), that is, of the backwardness of a system based on the principles and values of literacy.

Under no other regime on Earth did people read so much, listen to music more intensely, visit museums with more passion, and care for each other as family, friends, or as human beings (...) The pragmatic framework was set up under the assumption of permanence, stability, centrality, and universality founded on literacy, (p. 639).

Recent developments in the former Soviet Union have shown that Russians, like other nations who have experienced Communism, are not seeking to replace the communist version of a literate society by some other, more humane and less compulsive form of the same, but rather by something altogether different. Solzhenitsyn is no longer read, nor are any other authors of dissident fame. The new literature follows the market, as entertainment, or pursues a variety of esoteric styles (Conceptualism, Metarealism), showing the same proclivity for abandoning traditional "literate" forms that is observed in the West. The expected religious revival has been moderate, except for emergence of maverick sectarian groups, much to the displeasure of the Russian Orthodox Church. The movement that found an at times eloquent expression in the Derevenshchiki ("country") prose has remained marginal and has failed to bring about a revival of the remarkable culture of the Russian peasantry. The presence of a single dominant literacy is being replaced, like elsewhere, with many minor literacies taking its place along with a general process of globalization. Altogether, not only have Spengler's predictions proven wrong, but also the prophecies of Russian nineteenth-century thinkers, right (Dostoevsky, Vladimir Soloviev, Tolstoy), as well as left (Chernyshevsky, Pleknavok). Apparently, the notion of a nation as an "organism," in which the whole is more than the sum of its parts, is simply wrong.

The best one can do is to follow Nadin's method of dealing with the details of each branch of culture separately ("Gott steckt im Detail") and then see if perhaps a common source of their dynamism can be found. Obviously, the God who moves Dostoevsky's Russian is not the one who moves Lenin's. Yet both, and a number of others, are important factors in the destiny of the Russian people and their culture. Dostoevsky and Lenin are typically literate individuals. How far this goes toward an evaluation of Russian culture in the nineteenth century is a different question.

The study of literature bears out the same truths. Like the other arts, literature draws its energy from different sources and addresses different audiences. It grows and changes for reasons intrinsic to it as a medium of expression and communication, as well as to its quality as an art form; but also due to a variety of extrinsic factors: economic, technical, political, ideological, etc. Literature, by virtue of being inherently dialogic, depends on the reaction of its reader as much as on the intent of its writer. I shall present an example from Russian literature to illustrate this point. Alexander Pushkin is recognized by every Russian as Russia's national poet. He is equally cherished by the Left, the Right, and the Center. This has

not always been the case. At one time, Pushkin was attacked by the progressives of the Left, who saw him as a frivolous bard of lovely “little feet” (*pozunki*), insensitive to the many ills of Russian life. Meanwhile, some Slavophiles of the conservative Right found fault with Pushkin’s morals, as did the old Tolstoy. But in 1880, Dostoevsky delivered his celebrated oration on Pushkin, in which he declared Pushkin to be a Prophet who had shown the Russian people the direction to be pursued in realizing their historical destiny. Pushkin, Dostoevsky declared, had embraced the national spirit of every great European nation, thus pointing the way to Russia’s creating a synthesis of European culture and a universal brotherhood in Christ – the Christ of the Russian people. Half a century later, Vladislav Khodasevich, who emigrated from communist Russia, said he had taken all of Russia with him – all eight volumes of it. His contemporary Vladimir Maiakovsky said in a poem that he would have been proud to have Pushkin on his journal, *Left Front*, as a trusted editorial assistant.

How are we to account for these, and many other, contradictory responses to Pushkin? The answer is simple: Pushkin held no strong moral, religious, or ideological opinions of his own, and said many different things in the course of his brief life. Hence every Russian is bound to find something in Pushkin that is to his or her liking, and find it expressed very well, for Pushkin was a great poet. It takes the sober pragmatism that Nadin applies to every subject he touches to arrive at such simple truths.

Beyond Literacy: Semiotics and the Civilization of Hypercomplexity

Jay L. Lemke

IN *THE CIVILIZATION OF ILLITERACY* Mihai Nadin has given us the benefit of a lifetime's reflection, and fifteen years' writing, on the central mystery of our postmodern times: What's really changing? In 800 pages of decent-sized and well-spaced print he has published a work of philosophy in the old key: not a painstaking and systematic inquiry into one of those narrow questions that pre-occupy academic philosophers today, but a cosmopolitan synthesis that addresses the matters most of us really puzzle over late at night. Where is our civilization heading? What from the modernist consensus are we leaving behind, what will soon be superseded or radically transformed? And why? *Quo vadimus?*

I first met Mihai Nadin in the early 1980s at a technical university for the deaf, a few years after he began his activity in the USA. He was teaching philosophy in the Liberal Arts Department and Visible Language in the Design Department at the Rhode Island School of Design. We shared an interest in semiotics as a key tool for understanding meaningful human activity and for analyzing its verbal and non-verbal products. I was trained as a theoretical physicist, late-come to linguistics as a tool for research on science education and scientific meaning-making. We were speaking at a conference hosted by an institution for the deaf in part because we both recognized that language was only one sign system among many and that significant contemporary human activity was increasingly mediated by language only in partnership with other sign systems. In scientific work, engineering, and design, language typically functions in tandem with visual representations and the semiotics of socially meaningful actions. If the sign language of the deaf was still in all respects a language, it was nevertheless also one which forcefully reminded us that the material "expression plane" of a language shapes its affordances beyond those of its abstract syntax and semantics. In ASL, spatial deixis, pacing, intensity of gesticulation, and relative position of sign articulation are all highly visible phenomena that shift the semiotic balance between meaning-by-kind (as in Saussurean *valeur*) and meaning-by-degree (as in visual nuance or mathematical measure) substantially toward the latter pole, adding affordances for meaning less available in speech and scarcely possible in print.

In *The Civilization of Illiteracy*, Nadin has brought the analytical eye and imaginative vision of an inquiring mind to a web of interconnected essays on social, cultural, and technological change. His unifying thesis is that the centuries-long hegemony of traditional literate habits of meaning-making is coming to an end because it cannot encompass the scale of complexity which is the hallmark of our emerging global civilization. That complexity is born from the exponential effects of networking billions of people, artifacts, and human

enterprises to one another, economically and communicatively. In such a complex dynamical system, non-linearities become salient: we can no longer expect outcomes to be simply proportional to inputs, or the properties of wholes to be wholly predictable from a knowledge of their constituent parts. His definition of literacy is really a definition of classical literate traditions of strict logic, universal principles, standardized genres, canonical cultural texts, and modernist norms of social homogeneity, predictability, and control. His “civilization of illiteracy” is partly a description of the present, when literacy has become a much smaller fraction of the total mediation of our activity in society, and partly a projection for the future, when a much more heterogeneous mix of semiotic regimes and cultural styles will barely suffice to keep pace with the practical demands of life in a brave new world.

Nadin’s semiotics is fundamentally Peircean, and his view of the role of semiosis in human life is accordingly functionalist and pragmatic. We make meanings as we do because we act in particular practical ways every day, shaped by the material cultural environment around us. When what life demands of us by way of action changes, so do our ways of making meaning. Nadin analyzes a wide range of domains of contemporary human life: from science, philosophy, religion and the arts to television, cooking, the family, and sex. In each case he identifies the effects of scale, complexity, and emergent self-organization and highlights the role of non-linguistic and especially of non-literate forms of semiotic activity. The literate way to get a pizza is to cook one following a recipe; the post-literate way is to click on images of the desired ingredients on an internet pizza-provider website. The literate way belongs to a small-scale world where meaningful pragmatic outcomes are accomplished by the cooperation of very few people and take relatively long times. The post-literate way is far faster and depends on much larger networks of many more people and artifacts. The literate way enshrines an oral tradition or a valued written text; the post-literate makes trivial use of more preponderantly visual semiotic means and networked infrastructures. In the literate world we do our own work, guided by the textually-mediated traditions of the community. In the post-literate world we don’t make time to even think about how the work is done, we just command and consume and get on with other business. Our relationship to the community changes. We are both freer and more interdependent.

The Civilization of Illiteracy is a contradiction in many senses. The title itself contradicts our long-held belief that civilization can only be founded on literacy and is nearly synonymous with it. The argument of Nadin’s text is for the power of non-linguistic semiotics, but there is not one picture, diagram, or image except on the dust-jacket. The book seeks to define a post-literate civilization, but it is itself a highly literate text, with all the traditional rhetorical and genre forms, even to bibliographical notes. But this is a text that reads as hypertext. Despite the traditionally organized global text-structure of its Table of Contents, each of the 25 chapters and many of the more than 200 headed subsections can be read as

an essay on its own terms, and most make good sense irrespective of the order in which you dip into them. This book should have been a hypertext, and I am sure that under other economic conditions it would have been, as it would no doubt also have been filled with non-textual media and with hypertextual cross-linkages and pathways. Making connections is what this book is really about, as all philosophy should be.

“Illiteracy” for Nadin does not mean the inability to read, but the growing irrelevance of traditional literate forms of reasoning and social organization to a complex networked society. He uses the term “aliteracy” for the disuse of literate skills by those who have acquired them, and his vision of what is newly emergent in contemporary civilization might equally well be called “post-literacy” or the transcendence of traditional literacy. As he frequently notes, this post-literate world is not a world without traditional literacy, but one in which it has lost its dominance and given up its exclusive claims, to become just one component of the fast-changing, flexible, and multi-semiotic hybrid literacies that postmodern life increasingly demands. Traditional literacy is assimilated; resistance is futile.

What is most interesting about this book for me is the extremely wide range of human activities in which Nadin plausibly identifies the signs of post-literacy, from obvious candidates such as computer-aided design and the re-engineering of the content and manner of public education to much less obvious ones like the transformation of the nuclear family, and changing attitudes to eating, religion, and sex. In each domain one can discern the structure of a common argument. The ground of change is new forms of daily human activity, which Nadin terms the “pragmatic scheme” of a society: what we do every day that makes society as a whole work. Engaging in these activities we necessarily re-constitute our selves materially and semiotically in new ways. The old ways assumed smaller-scale communities, slower rates of change, more predictable proportionality between cause and effect, unquestioned definiteness of categories, and ideals of social homogeneity and cultural universals. Those old ways are no longer pragmatically successful in too many domains of human activity because society is rapidly becoming a much larger-scale system, with more interconnectedness and the complexity this brings, and its cycles of change accordingly come faster and less predictably, with interdependence leading to a fuzziness or blurring of category boundaries and more hybridization and mixing of traditional types. The old ideals of homogeneity and universality are no longer functional; we need to link together highly heterogeneous networks of different viewpoints to solve problems on a new scale of complexity. Not mass production of standardized units by interchangeable workers, but niche production of customized artifacts by teams with diverse skills and viewpoints. What works for one occasion should not be expected to work for the next; what represents the best preparation for a fast-changing future for one person should not be expected to be best for everyone.

Arguments in each of the diverse domains that Nadin addresses seem stronger after you have assented to the uncommon sense of precisely parallel arguments in so many other domains. In education, for example, we have often heard in recent years how obsolete the institutional forms of schooling are, unchanged for centuries, and postmodernists have been challenging for some time now the traditional humanistic and scientific belief in a single universal curriculum for all students. Nadin's arguments are less political, less polemical, less ideological, and far more pragmatic, but point in the same direction. The real needs of society today are for people who know how to combine their own knowledge and skills with those of other people who have different knowledge and skills. The skills that are needed are less and less those of familiarity with a unifying canon of sacred texts and more and more an intense and motivated engagement with the know-how of new technologies, right down to a critical understanding of their histories, implications, and hidden assumptions. Nadin indicts schooling for being too slow to bring students into engagement with the world outside schools and textbooks and too fast in its superficial efforts to cover an ever-expanding canon that remains nonetheless still, and ever more uselessly, a canon.

Issues of scale are fundamental to Nadin's analyses, beginning with the scale of the world population and the growing size of social institutions and networks, and proceeding to the accelerating timescales of change in institutional demands on individuals and global demands on institutions. In my own work I have been coming to a similar conclusion about the importance of scale, and particularly of timescales, in the dynamics of complex social systems (e.g., Lemke 2000a, 2000b). Like Nadin, I see semiotic artifacts, whether traditional texts or the more diverse material "texts" of the built- and designed-environment – or even the writable human body itself – as key mediators between social processes on different timescales, from those of the moment to those of a lifetime. Nadin particularly focuses on the role of literacy and more inclusive post-literate or trans-literate semiotic mediators in establishing relationships between the individual and his/her communities. I am particularly fascinated with the question of what new kinds of relationships we can have to global society when we are no longer so tightly bound to single institutions. Just as we surf the web from site to site, institution to institution, genre to genre, making new kinds of meanings along the paths we traverse, so increasingly many people in our society, especially the young and the more privileged, are making new kinds of trans-institutional careers and lives, surfing on ever shorter timescales between institutions, mixing in daily life and not just over whole lifetimes, multiple careers and identities.

Mihai Nadin is not entirely enthusiastic about all the nascent changes he describes. I sense a measure of wariness and perhaps discomfort with the dangers of superficiality and unreflectiveness in fast-paced lives. There are profound value-changes taking place here, perhaps most fundamentally in our attitudes toward family and personal relationships. Long-

term personal bonds, what is seen traditionally as the profundity of emotional and sexual relationships over a lifetime, are at risk in a society where freedom of movement and freedom of choice better serve the fast capitalism of our paymasters. In his early chapter on America as the epitome of the civilization of illiteracy, I also sense the ambivalence of a classically-educated East European toward the off-hand rejection of literate education as pragmatically irrelevant by so many American students. Nadin mostly agrees with their judgment about relevance, but still worries that a tardy response from the educational establishment has left an anomic intellectual and cultural vacuum.

What should we say to this encyclopedic argument for a cultural watershed in our semiotic practices? Can we really take Nadin's unifying metaphor of literacy vs. illiteracy literally? Nadin is clearly fascinated with the interesting thesis of Edmund Carpenter (1970) that much of the civilization of the last few centuries can be seen as a replication of the logic of the literacy of the book in other institutions: the machine as book-logic in cold steel, the army and the school as book-culture transposed into technologies of social organization. Nadin turns this argument around in defining the civilization of illiteracy, identifying parallel syndromes across social domains, all in homology with a transformation of semiotic practices from the literacy of pure text to the post-literacy of complex multi-semiotic practical activity. At least since Levi-Strauss we have known that cultural anthropology can always work this magic, can always construct for us homologies of cultural logics across domains, from the structure of myths to the structure of dwellings and the structure of economic exchanges. How can we say that the logic of literacy, or post-literacy, is the original and all the other instances copies, or consequences?

Perhaps to interpret Nadin's argument in these terms is to take it as being itself more literate than he intends. It is a hallmark of the logic of traditional literacy that there are supposed to be central and original causes whose effects are traced out through the length of the classical treatise. If Nadin has given us instead a hypertext, with no center and no unique starting-point, then he could as readily have named the book *The Civilization of Complexity ...* or *of Rapidity ...* *Multi-modality ...* or *Hypertextuality*. Perhaps we should be sympathetic to the difficulty of naming something that is still coming-to-be. How much easier it is to name it for what it no longer is, for what it is moving beyond. But equally then, there is no single "it" to be transcended, no privileged center to the web of connections Nadin builds in this text. He would be the first to tell us it is the web itself that matters, the connections themselves that we need to be thinking about and responding to as scholars, educators, designers, lovers. His last sentence tells us to respond quickly: the civilization of illiteracy will continue to change quickly, will not maintain the forced stability of its predecessor. If this hypertext were a website, Nadin could continually expand and update it, dynamically keeping pace with the complex dynamic system he describes. As a

printed book, it can only sit beside our working space; it is we who must do the semiotic work of dipping into it and tracing out the extensive web of connections it urges us to think about. My last sentence, too, tells you to respond quickly to this book: the opportunities to help shape the future it portends will pass rapidly by, and what good is all our semiotic sophistication if we miss our chance?

References

- Carpenter, Edmund. *They Became What They Beheld*. New York: Ballantine, 1970.
- Lemke, J. L. (2000a). Opening Up Closure: Semiotics Across Scales, in *Closure: Emergent Organizations and their Dynamics* (Volume 901: Annals of the NYAS), J. Chandler and G. van de Vijver (eds.), 100-111. New York: New York Academy of Science Press.
- Lemke, J.L. (2000b). Across the scales of time: artifacts, activities, and meanings in ecosocial systems, in *Mind, Culture, and Activity* 7(4): 273-290.

"...transcends McLuhan"


E.D. Hirsch, Jr.

The Civilization of Illiteracy is a most impressive work which follows in the tradition of McLuhan in finding a post-literate culture now dominant. But the work transcends McLuhan in the breadth of its learning and the depth of its analysis. Clearly Nadin is a master scholar who has scarcely a peer in his field.

"...not among the usual lamentations"

Umberto Eco, 1996

This is not one among the usual lamentations about the decline of literacy. As the author spells out from the beginning, to write several hundred pages that leave out those who are the very subject of concern would be preposterous. To praise literacy for the literate ones (encouraging their contempt of the illiterate) would be snobbish. This book (which speaks of sex, food, goods, God, supermarkets, computers, sports, TV, virtual reality, philosophy, science – and also of writing and books) does not just deal with the Dark Side of the Gutenberg Galaxy; it speaks mainly to those who believe to live on the luminous one. It is not for THEM, it is only about THEM. It is also for and about US. And we (the literate ones) will discover many things that we did not know – as yet, or enough, in spite of our Wisdom.

The background of the entire page is an abstract, monochromatic image. It features a crumpled piece of paper with faint, handwritten text in cursive. The text is mostly illegible but includes the words "cerebral parity" and "head". The overall tone is grey and textured, with various folds and shadows creating a sense of depth and movement.

Mihai Nadin

mind

anticipation and chaos

Antizipation und Chaos

Intelligence is Process

Go Reconfigure: Ideas About Education in the Digital Age

Reinventing the Mind

Cognitive Energy: Twelve Themes in the Work of Mihai Nadin

Go Reconfigure. Ideas About Education in the Digital Age

Philip L. Smith

EVERY DECADE or so, the academic world proclaims a breakthrough that will profoundly change the way we understand some important aspect of life. Typically these proclamations are overblown, but not always. Who can deny that much has happened to alter our intellectual landscape over the past 30 years, and that somehow developments in cognitive science and computer technology are at the heart of it? The work of Mihai Nadin, currently Head of Computational Design at the University of Wuppertal (Germany), has been central to many of these developments. It is especially noteworthy for its focus on the relationship between philosophy and education.

Nadin defines education, in its broadest context, “by the tendency to pass from the dissemination of declarative knowledge (of facts) to the dissemination of procedural knowledge (of skills, of how to perform an action),” (p.150; all citations refer to *Mind – Anticipation and Chaos*). So, already Nadin is in the spirit of “action-oriented,” modern culture. He regards education as a practical field. Even if it must convey to the learner an appropriate comprehension in the form of declarative knowledge, this is not where education should end. Think of the motives behind a course in Organic Chemistry, for example, as compared with those of a traditional course on Kant or Hegel. Nadin contends that, somehow, declarative knowledge must be translated into behavior that will enhance what people do as worldly creatures. He low-keys the importance of declarative knowledge by associating it with a logic-of-representation, rather than a logic-of-anticipation-and-reconfiguration, which he associates with modern, democratic life.

Accordingly, it remains a huge problem in education today that good performance is judged by pre-established standards and expectations. In a manner reminiscent of John Dewey and American Progressive Education, Nadin would present subject matter as an assemblage of interesting hypotheses, which needed to be tested and judged on their ability to enhance a learner’s actions in specific situations, in terms the learner could see. Nadin’s twist comes from cognitive science and computer technology. They make this approach

more powerful, more effectively pragmatic. Given that it already assumes a great degree of relativity as to subject matter, increasing the power of this approach only adds to its risks. Learners may not take seriously what their teachers say. Or they might employ what they learn for purposes that educators would abhor. Nadin is well aware of these risks, but embraces them, because he regards the alternative as even more dangerous. That would be where the subject matter of education has little or no developmental value for the learners, or for society taken as a whole. To the contrary, it would define what learners (or society) dare not challenge. If the point of education is to foster development, not stifle it, the risks involved in the approach Nadin recommends are far more tolerable.

For Nadin, the prime directive for education is to “constitute minds.” This is no empty slogan for him, no sentimental pap, no ideological proclamation. It requires students to work together, not independently in opposition to each other. Being “nice” has little to do with it. What’s important is working together so as to test each individual’s understanding and to constitute minds. In order to stimulate mind reconfiguration, the educational environment needs to display a considerable degree of structural mobility. A problem-generating attitude must prevail over a problem-solving attitude, because taking education seriously means that the constitution of mind is more important than adaptation to prevailing circumstances. Tightly connecting education to purposes of social function obscures the aim of cultivating human minds, which amounts to selling out education’s most basic values. Even if we believed, as many do, that the preservation and transmission of culture (or some ideology) remains education’s main goal and that education in Nadin’s terms is simply too risky, we would still be compelled to acknowledge that low-grade minds produce low-grade cultures, and that without minds there could be no culture (or ideology).

It follows as a material implication that education should not be burdened by an excessive emphasis on the actual conditions of society. The problem with education today is that it “has become a packaging or canning industry” (p. 154). There needs to be a shield of some kind between what happens in schools and the pressures and political surges of everyday life. “No doubt,” Nadin admits, “education needs exchange with society, but a selective barrier will insure proper conditions for mind-constitution. A balance between how we support representation-oriented functions (in particular, problem-solving), constitutive functions (on which the creation of new values rests), and communication would allow education to play a role that goes beyond servicing needs” (p.160). Education would still provide for society’s wants, but it would also feed the demands of an inquisitive life, which is a critical part of any serious education.

How does all this connect to developments in cognitive science and computer technology? A quick answer is to say that it encourages these developments, while at the same time compelling them. Whether cognitive science is viewed as a form of neo-behaviorism or neo-Kantianism, it puts a renewed emphasis on what's going on inside the black box, or "the inner workings of the mind." The scare quotes around the latter phrase, like the black box metaphor, is an attempt to emphasize that cognitive science is not returning to the old idea of mind as a "ghost in the machine" (of the body), in the manner of philosophical idealism. Nevertheless, it has Kantian-like ambitions, insofar as it reaches beyond raw-boned materialism.

Immanuel Kant's view was that the mind has an intellectual structure that organizes sensations in accordance with a priori concepts that prescribe the basic form of judgments. It was well for David Hume to assert that our knowledge of things and events is grounded in experience. But "experience" is not the simple idea he supposed it to be. In what might be the most brilliant, yet gratuitous, theory ever put forth by a philosopher, Kant argued that experience contains within itself the features of space, time, substance, and causality. These features are not themselves acquired through experience. Rather they are presupposed by experience. They make experience possible. They're involved in every apprehension of the world that our mind can call its own. Hence, by describing its experience, the mind necessarily refers to an ordered perspective that exists independent of that experience. Kant also insisted that this proves the existence of an independently existing (or "noumenal") world. This latter contention turned out to be the gratuitous part of his theory. But for all its difficulties, conceptual and otherwise, the prior contention about the inner workings of the mind is nonetheless plausible.

Cognitive science naturalizes Kantian metaphysics by relating the features of experience to the facts of evolutionary biology, or by merely by assuming these features within a framework of a predictive model. Either way, the mind's inner workings are interpreted wholly in pragmatic terms. Each element is assigned a function. Nadin strives to put a human face on this conception of mind. He makes a case for human agency and uses pragmatism to search for virtues that promote genuine human interests. How does he do this? He envisions the mind as a non-linear dynamic system of endlessly embedded and continually evolving configurations (p. 116). It's a mind that exists mostly within a network of social and institutional relationships. The mind makes projections into the future, considered to be more significant than adjustments to an unstable present or an irrelevant past (p.124). So, it's not by storing, retrieving, and matching information that we understand things and events, but by throwing various conceptual nets onto our experience, nets that are formed in our imagination as possibilities, as attempts to anticipate questions, situations, and decisions that we're expecting to deal with (p. 44).

To ignore this kind of mind constituting activity in favor of an exclusive emphasis on the rules and functions of representation undermines the fact, as well as the quality, of our existence. Nadin compares mind-constituting activity with the activity of bees. No matter how elaborately a hive is organized, bees operate with a fixed repertory of responses. That repertory is neither altered nor influenced by circumstances. Interaction between bees precludes the imaginative construction of alternatives. They're unable to deliberately transform their environment or themselves, whatever the need or advantage. Restricted as they are by their native endowment, bees are condemned to live instinctually within a framework over which they have no control, and from which they cannot escape, except through biological accident. It would be worse than disastrous, it would be tragic, if human beings were to live in this manner, given that they don't have to. Bees at least have the advantage of evolved instincts that have enabled them, so far, to survive as a species. There's no counterpart to bee instincts in people. Human beings are endowed with little more than unstructured, unreliable impulses. Just how these impulses acquire a useful form is the story of human culture and mind-constitution. Were people to live like bees, they would be denied the very conditions that make this story possible. They would hardly have a bee's chance to adapt to a given environment, let alone design an environment of their own. Minds give human impulses a pragmatic structure, and the possibility of shaping a world that will encourage further mind development. A happy by-product of mind-constitution is the possibility of experience itself. It not just for practical reasons that minds have value. It's because they give meaning to the experience of life. What a horrible loss we would suffer if we failed to take advantage of this opportunity.

There's no doubt that Nadin wants to free us from the constraints of old-fashioned metaphysical culture. But he's equally determined to show us a way out of the "iron cage" of contemporary life, to use Max Weber's famous phrase. That's the trap of modern technical rationality, or instrumental reason, that gives us powerful means for achieving irrational, self-destructive ends. Nadin has his finger on the pulse of today's world. He recognizes the forces that have undermined strong, rigid cultural institutions in favor of more flexible pragmatic attitudes. But can he protect us from these attitudes when they seem to go wrong? By associating them with cognitive science and computer technology, he makes pragmatic attitudes more powerful. By using them to repair education, to make it compatible with mind-constitution, he legitimizes these attitudes. Does he give us a clear picture of pragmatic attitudes as virtues? Let's hope so! Otherwise he would be just another romantic intellectual, who has a vision that can't be fulfilled. We would be back where we started, living like bees destined to endless repetition. So long as Nadin is right about education, the virtues of pragmatism will take care of themselves.

Reinventing the Mind

Corinne Whitaker

IMAGINE, IF YOU WILL, a machine that watches a mind at work as that mind contemplates the machine and reflects its interpretation of it. The complex cognitive processes required to conceive such an event, or series of events, and then to objectify it through the metaphor of The Digital Eye/I, is manifest in an extraordinary human being as he surveys and dissects the new experience of digital aesthetics.

Mihai Nadin has been probing the nature of creative output in and around the computer since the early 1960's. For the last forty years, his protean imagination has probed and analyzed the nature of the creative act as it acts upon, and is influenced by, the computer. Rather than declaring all previous forms of art obsolete, or imposing earlier canons of aesthetics onto the digital paradigm, Nadin has consistently demanded that we examine both the drawbacks and advantages of the digital experience, insisting that we question what it is, what we are, what we want, and how this interaction must influence what we call art. He has taken a broad-based approach, examining the work of art itself (from the outside), the process of creating it (from the inside) and the tools that facilitate its expression.

While others slavishly import the postmodern aesthetic into the digital arena, Nadin has confronted us with the fundamental questions necessary to understanding a digital reality:

Does the technology change the artist? The audience?

Is there a technology-neutral art?

Is there really a new "emergent" aesthetic?

Few other minds today have his capacity to open up the entire field of aesthetics to multi-disciplinary investigation and to debunk the myth that art hasn't changed, only the tool has. As opposed to most so-called experts in digital technology, he does not simplistically call the computer "just another tool." The hammer, the ax, the chisel, the pencil, the paintbrush are extensions of our hands. The computer is an extension of our minds, with many cognitive functions built in, functions that an artist often has to work against in order to extract an aesthetic artifact. He further asks:

Can anyone teach this new aesthetic? Are the teachers sufficiently liberated from older forms of expression to encourage radical aesthetic solutions or are they clinging to the old and safe?

Do digital artists, whether in imaging, sound, music, touch, or multimedia, truly create, or do they rather choose from already extant samples supplied by the medium?

According to Nadin, “Art in the civilization of illiteracy is less a matter of invention and discovery, as it was in the civilization of literacy, and more one of selection, framing, and endless variation,” that is, sampling.

Nadin goes on asking: Are we really forcing a new tool to solve old problems whose answers we already know? Are we afraid of being engulfed by this new technology? Is there a sense in which the program itself is the work of art?

He has attempted to answer some of these questions through his numerous articles and lectures. Arriving in the United States at the beginning of the “digital revolution,” when artists and designers were taking tentative steps in the direction of computer-aided art and design, Nadin posed the following questions (and many others) to audiences of teachers and practitioners:

Can the analytic engine run the art machine?
Are we using computers or being used?
What is the cognitive condition of art and design?
Is there an art and design intelligence?

Early on, he insisted that the digital machine not be used for something it is very good at: multiplying and disseminating mediocrity, or “canned art,” as he labeled it before an audience at Yale University in 1983. He demands more from artists than what Vasarely had been able to perform through permutation. “The role of processing current practical experiences of art needs to be properly highlighted. Exacerbated in the self-consciousness of art in the age of illiteracy, artistic processes take precedence over artifacts; the making of art becomes more important than the result.”

In a visual age, Nadin has recognized the complexity of a linear past colliding with a multi-dimensional present. “Within the pragmatics of an underlying structure reflected in literacy, art was as confined as the experience of language, which represented its underpinning. The pragmatics of the civilization of illiteracy makes the experience of art part of the global experience. (...) The entire artistic effort to transcend the figurative and the narrative, to explore the abstract and the gestural, to explore its own reality, and to establish new languages testifies to this striving. (...) Moreover, the eternal conflict inherent in art experiences, between what is and what unfolds, best expressed in the quest for innovation, integrates aspects of the conflict between literacy-dominated pragmatics and pragmatics dominated by illiteracy. Artists would say that we exist not only in the environment of our language projections, but probably just as much (if not more) in the environment of our art projections towards emancipation.”

Nadin is an anomaly. Combining semiotics, philosophy, technology and symbolism, he is one of the few minds today capable of surveying the radically altered topology of the creative act in an unfamiliar visual geography. Through his education, interests, and intellect, he can be described as a Renaissance person. Yet he recognizes that our technological society has no use for the Renaissance. With literate ideals deeply ingrained in him, Nadin boldly announced the death of the dominating written word – and all it entails. But he did not announce the death of the idea. He actually liberated its other modes of expression in science, technology, education, and art. In fact it is his profound recognition of the revolutionary alteration in the thinking process itself that has made him one of the most lucid exponents of the digital aesthetic. We artists who think about our art are fortunate indeed that someone of his brilliance and courage is forcing the world of mark-making and mark-makers to look very closely at what is happening to them and to all of us.

Cognitive Energy: Twelve Themes in the Work of Mihai Nadin

Jeffrey Nickerson

Introduction

When we launch signs into the world, they cause ripples. These signs can have such an effect on an interpreter that the interpreter launches more signs, causing more ripples. The eventual effect is what Charles Peirce refers to as the final interpretant.

Nadin's work is of the sort that causes lots of ripples. It is deep writing that assumes work from the reader, and in return yields ideas that can change minds. The two works I shall draw on the most are *The Civilization of Illiteracy* (1997), and *Mind – Anticipation and Chaos* (1991). Consistent with Nadin's vision, these are available on the world-wide Web, as are many of Nadin's journal papers.

I want to highlight twelve themes from Nadin's work. For readers new to Nadin, understand this is a highly personal map of a large territory. Only a few of the interesting landmarks have been sketched, and the sketches form a networked configuration, not a linear sequence. Please treat this survey as an invitation to visit the original sources and constitute your own experience.

1. The interpretant is a process

Some familiarity with the writing of Charles Peirce is assumed in the reader of Nadin. Yet Nadin can have the effect of sending us back to re-read Peirce. It is not hard to grasp what Peirce means by an object and a representamen. But the third part of the sign, the interpretant, is more elusive. Nadin defines it as

the process of interpretation which, among other things, includes the person interpreting the sign. The interpretation extends to all uses and understandings of a sign. It represents the life of the sign (Nadin and Zakia 1994, 140).

This is a surprise to some – there are many descriptions of the interpretant in Peirce, and not all emphasize the process aspect. We go back to Peirce:

The object branches in two: the immediate and dynamic paths. The interpretant branches in three, the immediate, dynamic, and final path. The dynamic interpretant branches in two. And the final interpretant branches in three. What the visualization helps show is how quickly the sign becomes a number of threads working in parallel.

Nadin's application of modern logical tools to the interpretant has just been touched on here. Interested readers are referred to his early work in which category theory and fuzzy automata, as well as other models, are applied to the sign process. In Nadin's most mathematically dense work (1981b), he discusses the sign in relationship to value – an important theme in his work on aesthetics. Nadin's works (cf., 1977, 1978, 1981a, 1981c, and 1986a) also develop the sign process using mathematical tools. In Nadin's work related to design, we see process thinking applied to the problem of synthesizing ideas using computers (Nadin 1987, 1988).

2. Pragmatics are the start

If we spend our time embodying infinite sign processes, how do we get anything done? We continually reduce, through semiotic procedures belonging to the pragmatic level of the sign, the infinite to the finite of the situation, set of events considered, and language used in a precise context (Nadin 1993, 245).

In most fields, pragmatics is seen as the least important of Morris's trichotomy of syntax, semantics, and pragmatics (cf. Morris, 1938). In computer science, syntax is taught first. Semantics is usually considered a topic to be considered in a graduate-level course on programming languages, and pragmatics is only mentioned to explain the courses that don't have to do with automata and algorithms. Nadin reverses this:

It is not that pragmatics results from a given syntax and the semantics made possible by it but the other way around – a certain pragmatic function requires an appropriate semantics and has as an effect a certain syntax from many others possible (Nadin 1993, 239).

To take a simple example, it is not uncommon for a computer program to compile perfectly – to be syntactically correct – and to produce a valid result – to be semantically correct – but to be so annoying as to be unusable. Such a program is often the result of our bottom-up approach to the difficult

problem of creating programs. It is easier to teach (and test) the syntax than the pragmatics. Nadin's writing on education provides strong suggestions on how to improve the situation (Nadin 1985, 1995, 1996), culminating in a long-running discussion in *The Civilization of Illiteracy*.

Looking at pragmatics means looking at the big questions first. We ask the why first, then the what, finally the how. To take a larger example – the major observation behind the civilization of illiteracy is that our collective pragmatic desire for greater efficiency is changing our world, from one dominated by a particular form of centralized literacy to one of multiple literacies. This is the why behind the growth of illiteracy, and explains what we are moving toward, the civilization of illiteracy, and how it is being manifested, the cultural syntax.

3. We constitute ourselves

Taking the interpretant as a process, and understanding the self as a series of cognitions, it follows 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 interaction. Let us recall that Peirce, in his semiotics, expressed this idea when he defined the human being as part of the sign it interprets (Nadin 1991, 102).

Self-constitution is a major theme of Nadin (1991). And in some ways we can view *The Civilization of Illiteracy* as the application of this concept to a broad set of social questions involving the constitution of our age.

4. Minds make brains

Believing in pragmatics before syntax leads to believing in mind before brain:

It's not from the brain matter to the mind that changes in the mind's state are triggered, but from the mind that biological changes of the brain are induced (Nadin 1991, 74).

Nadin sites ample evidence in his book, *Mind – Anticipation and Chaos*. There is much more evidence today, as we continue to learn about the

growth and plasticity of the brain. In some ways, we can think of current brain research as giving us not a view of the underlying mechanics of the gray matter, but instead clues about something much broader: “Cognition is process, and bio-electric signals are indicative of cognitive processes in our minds” (Nadin 1997, 766).

We are learning about the mind by studying the brain. We have confirmed that we rotate images in our mind, and we can link this to certain behavior in the brain. But our successes in analyzing the brain will be limited: Replicating the full state of a brain will not result in thought, because in the Peircean model the important things are relations, realized through a community of minds.

5. We humans embody signs

In contrast to this Peircean view, many in the field of artificial intelligence believe that sign processes are reducible to computer program. Minsky and Kurzweil are two of the more vocal advocates of this essentially materialistic position. Nadin points out that we need to look further:

Interpreting signs does not mean, as people thought for a long time, only to constitute those signs, but actually to embody them (instantiate) as instances of the process called the interpretant (Nadin 1993, 246).

We become the sign: “Semiosis is a sign process, but only if we accept that to interpret a sign means to be part of the sign,” (Nadin 1993, 240). And to be clearer, we are not disembodied analytic machines. There is a thing called experience:

Those who are accustomed to interpreting everything as a representation of something else, and not as a constituted human experience that we interpret by becoming part of the experience, pursue the practice of asking how appropriate the representation is, instead of continuing the experience (Nadin 1991, 42).

Ideas of embodiment have become part of our vocabulary, championed length in Maturana and Varela (1987), who believe that cognition is essen-

tially a biological phenomenon. Nadin is more careful in about what type of phenomenon we are dealing with:

At this stage of our knowledge about computation, we have accepted that not every aspect of our cognitive condition can be modeled by machines. Turing restricted himself to the computable aspects. Recently Peter Kugel suggested that we “look at parts of human thinking that seem (to some of us) to involve more than computing and try to develop precise uncomputable models of them” (Nadin 1993, 247).

Kugel (1985) is also pertinent to the issue of the interpretant, in that the uncomputable models he discusses are models in which computer programs run forever, just as sign processes might. Kugel’s way of thinking about cognition is in terms of the Turing machine halting problem, which is associated with a set of related theoretical problems that make our everyday thinking appear uncomputable or, at best, intractable.

Another way to look at cognition and machines is in terms of anticipation, our eighth theme. Rosen (1985) argues persuasively that Turing machines can’t anticipate, that anticipation is linked to life. Nadin is again more careful:

The question concerning anticipation in the living and in the non-living is far from being settled, even after we might agree on a computational model or expand to something else, such as co-relation, which could either transcend computation or expand it beyond Turing’s universal machine (Nadin 1999).

6. We constitute with images

In his article, “On the Meaning of the Visual” (1984), Nadin writes: “Sequence and configuration are two fundamental semiotic modes irreducible to each other,” (Nadin 1984, 335). He also details the relative capabilities of the image and language: The image has concreteness, but language has the ability to talk about itself. These two capabilities are in contrast, and complementary, to each other. Having established this, he observes:

Instead of locking ourselves in a centralized model, with language in the center as the most important thing in this semiotic universe, we are able to free ourselves and notice that although some semiotic means become, under certain circumstances, privileged and more important, in general several “centers” are possible. Within the semiotic field, each type of sign can either determine another or be determined by another type (Nadin 1984, 344).

So we can move from configuration to sequence and back to configuration, from image to word to image. This is really the nature of the semiotic field. We are verbal, we are visual, depending on the instant. In *The Civilization of Illiteracy*, this discussion is broadened:

The mathematical theory of dynamic systems introduces, among others, the term “configuration.” In view of the meaning the same word has in current computer science – the structure of a system and the connections among parts – it seems to me that 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) (Nadin 1997, 36).

The configuration of a system may seem at first to be different from the configuration of an image. On deeper consideration, they are the same. The way computer systems are usually designed is through a visual process. Components are drawn, on white boards, napkins, or computer screens. Then the relations between the different components are shown. Finally, the configuration is assessed, i.e., the parts of the system are checked for compatibility. This last step is a parallel process, relying on evaluating many relationships at the same time, which is exactly the strength of an image.

Nadin summarizes: “Language describes; images constitute,” (Nadin 1997, 325). This is a very strong statement. Among other effects, it explains the reason design is so reliant on visualization – even when the end products are not visual. It also suggests that our ideas funnel through the visual on their way to realization. This would suggest that perhaps we need to be trained in the visual, no matter what field we are in. Nadin is very much

an advocate of this, and his writing related to design makes the case strongly (Nadin 1985, 1987, 1988, 1994, 1995, 1996, 2000).

Combining this idea on the visual with the power of networks and the nature of community, Nadin, speaking of virtual reality, writes:

Projections of oneself into something else represent one of the most intriguing forms of interaction in the networked world. The experience of self-constitution as an avatar on the Internet is no longer one of a unique self, but of multiples (Nadin 1997, 221-222).

Because the visual can constitute, the avatar has great semiotic power: it allows our mediated interactions to become experiences.

7. Continuity integrates configurations

All communication from mind to mind is through continuity of being (Peirce 1931, 7.572). In one of Nadin's most important papers, "The logic of vagueness and the category of synechism" (1980), Nadin postulates that Peirce's references to his logic of vagueness are really references to his semiotics. Nadin goes on to show how the three different typologies of signs, including first 10, then 28, then 66 signs make sense if understood as a "network of fundamental reference points in the generalized semiotic field." Nadin (1981b and 1986a) takes this a step further, investigating how precisely the metaphor of a field can be applied to semiosis. Vagueness is a result of the nature of the interpretant:

Vagueness hence represents a sort of relationship between absolute, final determination, which in fact is not attained (the condition of an ideal, therefore) and actual determination of meaning (again as sense, meaning, signification) in concrete semioses (Nadin 1980, 355).

In this paper, Nadin establishes the link between vagueness and Peirce's doctrine of the continuum. In *Mind – Anticipation and Chaos*, Nadin references the continuum again:

There is an important element of continuity (captured in Peirce's category of synechism) that integrates the various configurations making up our minds. Leibniz advanced a maxim which can be applied to understand how continuity of configurations is achieved: "Nature never makes leaps." The preparation phase that our minds maintain in their successive reconfigurations indeed eliminates leaps (Nadin 1981, 50).

This preparation phase is one of anticipation, our next theme.

8. We throw nets

Anticipation is not discussed much by Peirce, certainly not as a major theme. In retrospect, we can find intriguing references. Peirce writes:

The present moment will be a lapse of time, highly confrontational, when looked at as a whole, seeming absolutely so, but when regarded closely, seen not to be absolutely so, its earlier parts being somewhat of the nature of memory, a little vague, and its later parts somewhat of the nature of anticipation, a little generalized (Peirce 1931, 7.653).

Pierce links anticipation to vagueness and continuity, but the idea is not developed. Nadin does so:

It is not by storing retrieving, and matching knowledge that we understand things or events, but by "throwing various nets" in anticipation of questions, situations, and decisions to be made, (Nadin 1991, 44).

Anticipation is a capability often taken for granted. In attempts to program computers, we have found how powerful and difficult it is to emulate anticipation. To take one example, our attempts to recognize speech, to merely translate sound signals into text, has proven to be practically impossible in the general case, as we have found human listeners are not just hearing the signal, but are also anticipating the speech. Nadin looks at anticipation from the most general level: "Minds are in anticipation of contingencies, of future

contexts – another reason for my calling them ‘the human sense of context’” (Nadin 1991, 36).

A more recent paper develops the idea further, in a way that recalls our pragmatics theme:

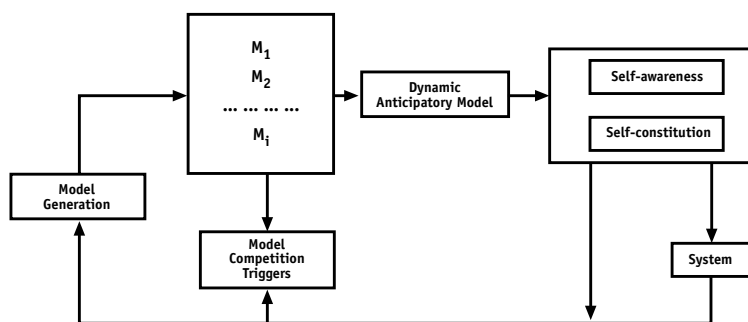
Actually human beings do not process signs within frames, but constitute newer and newer frames, in a process of continuous reconfiguration of both their knowledge and their strategy for processing new information. It is as though semiotic processes were part of this remapping of the mind, and would even anticipate instances of interpretation, pragmatic contexts. The anticipatory nature of our thinking ... corresponds to the way we as signs go through all the instances through which signs are constituted (pragmatic level) defined (semantically), and actually embodied (syntax) (Nadin 1993, 241).

And most recently, Nadin integrates the thinking of Robert Rosen (1985, 1991) on anticipation. Rosen’s work starts from systems theory, with an emphasis on the relational aspects of biology. Rosen concludes that natural systems, things that are alive, cannot be reduced to formal systems, such as Turing machines, and further, that anticipation is an aspect of natural systems. Nadin brings together the ideas of Rosen and many of the themes we have discussed so far:

Pragmatics – expressed in what we do and how and why we do what we do – is where our understanding of anticipation originates. This is also where it returns, in the form of optimizing our actions, including those of defining what these actions should be, what sequence they follow, and how we evaluate them. All these are projections against a future towards which each of us is moving, all tainted by some form of finality (telos), or at least by its less disputed relative called intentionality. The generic why of our existence is embedded in this intentionality. The source of this finality are the others, those we interact with either in cooperating or in competing, or in a sense of belonging, which over time allowed for the constitution of the identity call humanness (Nadin 1999).

Note the integration of pragmatics with Rosen's discussion of teleology, Nadin's concept of self-constitution, and the Peircean sense of community. Nadin also integrates current thinking about dynamic systems, which he expresses in figure 2.

Figure 2. (From Nadin; 1999)



Here we see that self-awareness and self-constitution become part of the overall system. This is necessary: Our observations, and ourselves, have an effect on the system, and in particular on the models we generate and choose.

9. Computers are a medium of interaction

It is clear that current computers are not performing interpretation. Yet they are processing signs. And one of our technological achievements of the past 50 years is in lifting the level of interaction with computers up the level of signs:

Whereas older programs referred to storage cells and registers, modern programs can be read as assertions about wages, addresses, and postings. This was achieved by creating layers of signs within the systems (Nadin 1997b, 3).

But since we need to people to interpret, how does this work? Every time we interact with programs, we interact with those who wrote them (Nadin 1997b, 7). So, just as we interact with the author of a book when we read, we interact with the author of the computer program when we compute. And we are not just interacting with the application program:

Since an operating system is the program through which we address the computer (hardware, software), it follows that HCI considerations can no longer be limited to the cosmetics (or illustration) of the operating system's functionality, but need to start with the design of the operating system (Nadin 2000).

Our interactions are at least partially controlled by the operating system, the program that manages the resources of the computer. So, if we are truly designing interaction, we need to be concerned not only with the design of the application, but with the design of the operating system. This is an extremely timely observation, relevant to the current technical debates over the future of the operating system in a world of highly specialized and networked devices. Nadin writes:

Open systems are the only way we can use the power of computers, because in open systems, the critical mass of mind interaction can be reached. My opinion is that computers are a medium (among other media) for constituting the critical mass of minds, i.e., for engendering new forms of human practice (Nadin 1991, 136).

These words, originally written in 1988, are prescient about the growth of our interactions through computer networks, the WWW being the largest example.

10. Markets are mediating machines

Consistently, Nadin sees pragmatics driving the technological change we have seen in markets: "What drives economic life, market included, is the objective need to achieve levels of efficiency corresponding to the global scale human activity has reached," (Nadin 1997, 250). While even open-air markets make use of mediation, modern stock exchanges take this to another level, with transactions that are often initiated by computer programs. And the transactions have their own dynamics:

There are many levels between the extraction and processing of raw material and the final sale and consumption of a product. At each level, a different language is constituted, very concrete in some instances, very abstract in others. These languages are meant to speed

up processing and transaction cycles, reduce risk, maximize profits, and ensure the effectiveness of the transaction on a global level (Nadin 1997, 234).

This statement has been proven true in just the last three years since the words were published. There are now new technologies based on the use of a framework definition language, XML, which is being used to define specialized languages particular to a set of trading partners. Nadin would probably say this technology has occurred out of necessity.

And linking to a previous theme, Nadin shows us that the distinction between sequence and configuration he made in the context of describing the visual has applications to markets:

In short, we have many mediations against the background of a powerful integrative process: the pragmatic framework of a highly segmented economy, working in shorter production cycles, for a global world. In this process, almost nothing remains sequential, and nothing is centralized. Put in different words, almost all market activity takes place in parallel processes. Configurations, i.e., changing centers of interest, come into existence on the ever fluid map of negotiations (Nadin 1997, 240).

Nadin points out the implications:

Literacy cannot uniformly accommodate these various expectations. The distributive nature of market transactions cannot be held captive to the centralism of literacy without affecting the efficiency of market mediation (Nadin 1997, 234).

In many ways, Nadin's deep thinking about the way processes work – starting with Peirce, thinking through the different modes of sequence and configuration, incorporating what we have learned about processes from computing – is most predictive, and visualizable, in his discussions of markets.

11. Mind is plural

Peirce, in many ways a recluse, fundamentally understood the importance of community:

A person is not absolutely an individual. His thoughts are what he is “saying to himself,” that is, is saying to that other self that is just coming into life in the flow of time. When one reasons, it is that critical self that one is trying to persuade; and all thought whatsoever is a sign, and is mostly of the nature of language. The second thing to remember is that the man’s circle of society (however widely or narrowly this phrase may be understood), is a sort of loosely compacted person, in some respects of higher rank than the person of an individual organism (Peirce 1931, 6.421).

Nadin says more succinctly: “Minds exist only in relation to other minds,” (Nadin 1991, 4). The Peircean sense of self implies we are all external signs, and we are in other people, through the signs we generate: “There is a miserable material and barbarian notion according to which a man cannot be in two places at once; as though he were a thing!” (Peirce 1931, 7.591). In a world of distributed signs, it becomes easier to understand that “to know the mind means to know how minds interact,” (Nadin 1991, 4).

We are constantly in contact with others through the mediation of signs. This leads Nadin to point out that new technologies give us more than ever the potential to choose our communities. And it is our communities in which our constitution takes place. There is the potential for a positive feedback loop, an idea related to our final theme.

12. Cognition is energy

In our time, as literacy falls, cognition rises:

Networking, which at its current stage barely suggests things to come, can only be compared to the time electricity became widely available. Cognitive energy exchanged through networks and focused on cooperative endeavors is part of what lies ahead as we experience exponential growth on digital networks and fast learning curves of efficient handling of their potential (Nadin 1997, 42).

What we give up in a single standard of literacy may be compensated for through the advances made possible by many focused literacies. These depend on people in communities that grow and change rapidly:

Those still unsure about the Internet and the World Wide Web should understand that what makes them so promising is not the potential for surfing, or its impressive publication capabilities, but the access to the cognitive energy that is transported through networks (Nadin 1997, 740).

Cognition as energy forms a powerful metaphor. Our sign processes have a transformational capability: Ideas are produced, communicated through the vehicle of the sign, and released through the interpretation process. Minds exist in relation to other minds – in networks. Nadin is careful to say that the quality of the interactions is more important, that a certain quality of interaction is needed to produce the critical mass necessary to constitute ourselves.

Conclusion

Nadin shows that there is a precise way to talk about the vague and infinite sign process. Starting with Peirce, he makes use of the new logical tools we now have. And he draws from what we are learning about the mind through the traces it leaves on the brain. The ability to anticipate is something current machines don't have, so we would be wise for now to regard our machines as facilitating technology for linking our minds together.

He shows that in our intuition, that the importance of both the visual and the verbal can be made much more explicit. In discussing how we understand the visual, Nadin (1984, 360) says "We learn the image; its sense is determined by resolving the calculus lying at its base." To make an analogy, we can read *The Civilization of Illiteracy* for its ideas. Or we can read it for its method, the application of the concepts in *Mind – Anticipation and Chaos*, which, in turn, we can read for its method, the application of ideas developed in earlier papers.

We know from Nadin's recent work (1999) that we need to look at an arrow of time that runs in two directions, considering the future influencing the present, as well as the present influencing the future. And in read-

ing Nadin's past work, we find he has accurately described the present. The predictive power (not to mention the sheer intellectual flair) of Nadin's work to date suggests a simple heuristic: Read what he writes next.

References

- Kugel, P. Thinking may be more than computing, *Cognition*, 22.2, 1985.
- Maturana, Humberto R. and Francisco J. Varela. *The Tree of Knowledge. The Biological Roots of Human Understanding*. Boston/London: Shambala New Science Library, 1987.
- Morris, Charles. *Foundations of the Theory of Signs*. Chicago: University Press, 1938.
- Nadin, Mihai:
- 1977: Sign and fuzzy automata, *Semiosis*, Heft 1, 5.
- 1978: On the semiotic nature of value, *Ars Semeiotica*, no. 3.
- 1980: The logic of vagueness and the category of synchism, *The Monist*, 63:3.
- 1981a: *Sign and Value in the Energy Crisis* (Kodiaks/Code, vol. 3, no. 3, Tuebingen: Guenter Narr Verlag).
- 1981b: *Zeichen und Wert* (Sign and Value). Tuebingen: Guenter Narr Verlag.
- 1981c: Aesthetic sign processes and aesthetic value (Ästhetische Zeichenprozesse und der ästhetische Wert), *Ästhetik und Semiotik*. Tuebingen: Guenter Narr Verlag.
- 1984: On the meaning of the visual: 12 theses regarding the visual and its interpretation ; and The discipline of interdisciplinarity (introduction), *Semiotics of the Visual: On Defining the Field*. (Mihai Nadin, Ed.) = *Semiotica*, vol. 52, no. 3/4.
- 1985: Computers in design education: a case study, *Visible Language* (special issue: Graphic Design: Computer Graphics, S. Poggenpohl, Ed.) vol. XIX, no. 2, Spring, pp. 272-287.
- 1986a: Can field theory be applied to the semiotics of communication? *Communications* (The European Journal of Communication) 3, pp. 61-80.
- 1986b: Pragmatics in the semiotic framework, *Pragmatik*, vol. II, The rise of pragmatic thought in the 19th and 20th centuries (Prof. Dr. phil. Herbert Stachowiak, Ed.). Hamburg: Felix Meiner Verlag.
- 1987: MIND: A Design Machine (with M. Novak), *Intelligent CAD Systems*, vol. 1 (Ten Hagen, Tomiyama, Eds.). Berlin, New York, Paris, Tokyo: Springer Verlag.
- 1988: Interface design: A semiotic paradigm, *Semiotica* 69-3/4. Amsterdam: Mouton de Gruyter, pp. 269-302.
- 1990: *Die Kunst der Kunst. Metaästhetik* (The Art of Art. Meta-aesthetics). Stuttgart: Belser Verlag,

- 1991: *Mind – Anticipation and Chaos*. From the series Milestones in Thought and Discovery (English-German parallel text). Stuttgart/Zurich: Belser Presse, 176 pp.
- 1993: Semiotics in action: The pragmatic level, *Pragmatik*, vol. IV, Philosophy of language, linguistic pragmatics, and formative pragmatics, (Prof. Dr. phil. habil. Herbert Stachowiak, Ed.). Hamburg: Felix Meiner Verlag, pp. 219-250.
- 1995: The Architecture of Thought, *Living* (Architecture for the Third Millennium), 2/95. Cologne: Halem Verlag, pp. 20-22.
- 1996: Computation Design: Design in the Age of a Knowledge Society, *Form/Diskurs*, Journal of Design and Design Theory, 2, 1/1996. Frankfurt/Main: Verlag Form. pp. 40-60.
- 1997a: *The Civilization of Illiteracy*. Dresden: Dresden University Press, 881 pp.
- 1997b: Signs and System, *Signs and Systems. A Semiotic Introduction to Systems Design*. Cambridge: University Press.
- 1999: Anticipation: A Spooky Computation, CASYS - International Journal of Computing Anticipatory Systems (D. Dubois, Ed.), *Partial Proceedings of CASYS 99*. Liege: CHAOS, Vol. 6, pp. 3-47.
- 2000: One Cannot NOT Interact, *Knowledge-Based Systems*. Amsterdam: Elsevier, Vol. 14/8, December 2001.
- Nadin, Mihai and Richard Zakia. *Creating Effective Advertising Using Semiotics*. New York: Consultant Press, 1994.
- Peirce, Charles Sanders. *The Collected Papers*, Harvard University Press, Cambridge, 1931, 1955.
- Rosen, Robert. *Anticipatory Systems*. New York: Pergamon Press, 1985
- . *Life Itself*. New York: Columbia University Press, 1991.

"Mind manifests itself in dialogue..."

Heinz von Foerster

Two thousand years of learned discussions amongst the best minds has created a wall so dense and so high that it is difficult to see through or over it. Mihai Nadin has cut a few windows into this wall so that we can see with delight, amazement, and with new eyes this old question being alive even in modern clothes. Mind manifests itself in dialogue and makes anticipation possible is his fascinating answer, elegantly presented in a language spoken by us all.

Pescadero, California, October 2000

Identity

The values of the civilization of literacy are no longer valid

Ich Bin Ein Illiteratus: An Interview with Mihai Nadin

He was never only what he seemed to be

The values of the civilization of literacy are no longer valid

Interview in Ajoblanco by Mercedes Vilanova. Translation from the Spanish.

THE NEW SOCIETY ARISING from the digital model has transcended the need for literacy as we know it from the past. As paradoxical as it might seem, a world based on communication and knowledge is making headway without a literate structure.

Mihai Nadin, born and educated in Romania, lives and works in Germany and the USA. He wears a beret that he bought in Barcelona. A Jew who lost 90% of his family during the Holocaust, he is optimistic about the digital revolution and its potential for putting an end to criminal activity (drug and arms dealing, illegal immigration, exploitation of women and children, etc.) because the new media demand transparency.

A few months ago, I came across one of his books, *The Civilization of Illiteracy*, in Cambridge, Massachusetts. It is an extraordinary book! In order to learn about his ideas and intellectual adventures, I visited him at his home in Little Compton, Rhode Island.

“What interests me is how we disconnect ourselves from things that pertain to the past in order to make possible a totally different human experience,” he told me. “We have progressed from a civilization in which we have almost used up the earth’s natural resources and are left with the resources of our minds. The computer is the most appropriate medium for making these resources available around the world and to everyone. But not at its current stage, which is actually very primitive.”

AB: What did you learn in Romania?

MN: My interest in computers began in a country that didn’t have any. I wrote my first programs before I even had a computer. This was a great opportunity, nevertheless, because when you program directly on a computer, you limit your mind since it remains captive to the machine. When I sat in front of a computer for the first time [in Germany, 1965], I

didn't want to touch it. I began to write programs for creating visual and musical representations. The people around me asked, "What are you doing? We use only digits."

AB: What did contact with West German culture mean to you?

MN: I became acquainted with a society that was practically decadent through all its opulence, a society in which you can lose your ability to think critically. As an exporting country, West Germany depends on the rest of the world. Today it promotes the European Community because that is the only way it can maintain its own high standard of living. To Germans, a good person is one who thinks and acts just like they do. When they go to Mallorca, they turn it into a German island. The moment of truth will come when Germany realizes that other Europeans are different, that these differences deserve respect, and that they can learn from these differences.

AB: What about the USA?

MN: If Romania freed me from the computer, the USA liberated me from structure. While Eminent Scholar at the Ohio State University, I discovered what it means to live in a cultural desert. In the USA, universities – especially the state universities – are like canning factories. Students enter as empty containers, are filled, and are shipped out into the world.

*AB: What was the genesis of your book, *The Civilization of Illiteracy*?*

MN: A very trivial observation. When I gave my first class in an American university, I wrote the name of one of the country's most famous and best poets on the blackboard. Nobody recognized the name. As a European, I assumed that my students belonged to the civilization of reading and writing, of literacy. But they did not. I was always told that if you are highly cultured, highly literate, you will be very productive. In the USA, it's not like that; it's almost the opposite. The less your literate culture gets in the way, the better. That evening, I arrived home with tears in my eyes. My book began with the discovery that the values associated with the culture of literacy, which I hold in such high esteem, were no longer valid. Even the professors no longer read books. I remember commenting to a friend, during a conference we both attended in Sicily, that we should visit Pisa before we fly back home. The next day, he asked me to find the place for him on the map because he could not. He was looking for pizza!

AB: Why do you think this is happening?

MN: From the beginning of its history, the USA not only liberated itself from the politics of the civilization of literacy and its negative characteristics, but also from its culture and norms. Now, Europe runs a certain risk that the new models developed in the USA will take over. As things are currently developing, both cultures are on a collision course. For example, the cityscape of skyscrapers on the horizon is the antithesis of what cities used to be: markets of all kinds of small merchants, usually near a river. Today the river no longer serves any function because it is rarely used for transporting merchandise. Those skyscrapers are telling us who exercises power when institutions are no longer financed by bills with very literate slogans, but by bits that travel through cyberspace at speeds for which literate culture is not appropriate. When money is moved from one location on the network to another, it makes no difference to the customer which bank is moving it.

AB: What is the cause of this collision?

MN: Europe has started to decline, but not because it is being Americanized. In order to be economically competitive, Europeans must give up the structures of the civilization of literacy. But this entails giving up a great part of their identity, of what makes European cultures what they are. If you visit the Guggenheim Museum in Bilbao, no one who knows anything about Basque culture will claim that it is a museum that displays the culture of Bilbao. This is one of the victories of the civilization of illiteracy: the area becomes open to global culture, but at the same time culture is negated as great numbers of tourists are processed at airports like data is processed on the information highway. And more serious collisions are on the way.

AB: What do you mean?

MN: Take a look at Greece. The citizen of contemporary Greece holds none of the values associated with classic Greece. In today's Europe, the structure is slowly being liberalized, because economic concerns demand this, but liberal does not necessarily mean democratic in the classic sense. The concept of commercial democracy has captivated Europe to the extent that the continent has become one great bazar.

AB: Would you say, then, that the citizens of the USA have a stronger identity because they were born into the civilization of illiteracy?

MN: That's right. And I just experienced this in one of my classes at Stanford University, in California's Silicon Valley. I saw how the identity of my students manifests itself through values of people who have no sense of permanency, of people who have lived through a time of fast change. They live in the present, as transitory as it is. They don't ask about what went on in the last five minutes, or what will happen in the future. I asked them if there will be people living after we die. Their answer was that they did not know. A very honest answer. But it reveals that they probably did not even think about the issue. They live an identity that practically celebrates having no other dimension than their own present. In Germany, on the contrary, my students are always agonizing over what used to be, what is, and what could be in the future. In Europe there is an identity of agony.

We are going through a great bifurcation, departing from what we know, from what belongs to the civilization of literacy, and branching off into something that is still in development, something that is still not well defined but which presents humankind with a great number of possible means for development. In mathematics, such a zone, before a bifurcation, is known as an area of acceleration and extreme instability. We are going through exactly such a moment of acceleration.

AB: When did it begin?

MN: About 50 or 60 years ago. World War II was the last war of the civilization of literacy. Its maneuvers on the field of battle and its strategies were based on the literate model of waging war. War was a text, with its rules of hierarchy and centralization of authority, sequentiality and linearity of execution, among other characteristics of the text. But with the atomic bomb, we go beyond the literate scenario. You do not bomb a city, you devastate it and everything around it.

AB: Where are we now?

MN: I always tell my students that they will know when we are beyond the primitive stages of the digital era when they no longer see computers. The same thing will happen as did with electricity. I don't have an electric generator at home. I use the electric energy that I need, and which is delivered to my home through its own infrastructure. We are in a period of new ways of communicating among ourselves, of relating to each other. When the postal system became available to the public, letters took a long time in reaching their destination. Then the telephone was invented and with it came the possibility to reach another party at the speed of sound. Electronic mail travels at the speed of light. But its most

important characteristic is not its speed, but the fact that we can begin to think together, at the same time, in parallel; not only your intelligence and mine, but together with many other individuals. For example, all the students in Barcelona can interact with all the students in Ohio. This is what really gets me excited!

AB: Wasn't the acquisition of language a fundamental turning point in the history of humankind?

MN: It was extremely important, but language acquisition and development displayed elements of biological continuity. The current development transcends biology by means of what is known as artificial life and the creation of artificial languages. Today we can create an artificial environment from which a language will emerge.

AB: Does the civilization of illiteracy imply the need to reject God and religion?

MN: No, this need will not end, but it will take on different aspects. What is called New Age belongs to the civilization of illiteracy through its characteristic of sampling – taking bits from here and there from what already exists and synthesizing them in new ways. Individuals constitute themselves as religious in a number of ways, ways that escape the literate model precisely because it is up to the individual, not to a church or religious organization that can impose its will. The current Minister of Foreign Affairs in Germany, Joschka Fischer, is a good example of self-constitution in a realm outside religion. As a member of the Green party, he transcended the world dominated by literacy and constituted himself as an alternative to it. Today, he has returned to the literate model of politics. On the other hand, there are others who opt for a society that is not homogeneous and authoritarian, like the members of various ecologically minded organizations.

AB: Will ecology play an important role in the future of the planet?

MN: I wouldn't put it like that, because then we'd be putting ourselves in the civilization of literacy. We live locally and we will save locally. Today's great prophets want to save the planet on a global scale, but it won't work, because the answer is always local. You may say that smoke produced in Ohio does not remain local, but travels to places far away. But the answer to controlling that type of pollution rests with the local population where the pollution originates.

AB: What role do politicians play in contemporary society?

MN: They are mere loudspeakers for the civilization that is on the way out because they embody inefficiency and accept hierarchical modes of procedure. In the civilization of illiteracy, hierarchy is meaningless. Even today, the role of president in the USA is merely symbolic.

AB: What type of politics would you choose?

MN: I believe in self-government on community levels that are more and more local. You and I could decide to belong to a virtual community that corresponds to our personal expectations and requirements for effectiveness, and for a short time or a longer time. I have no problem in attaching myself to an anarchistic utopia because it anticipated the future. True liberty cannot be taught in books, it can only be practiced.

Ich Bin Ein Illiteratus: An Interview with Mihai Nadin

Interview in Technos, by Thom Gillespie, Maître d' Igital

THE DIGITAL AGE: NO BOOKS, NO CHILDREN, NO LITERACY, NO COMPUTERS...

In *The Civilization of Illiteracy*, Nadin describes a fundamental transition that shakes the foundations of the world as we have known it. If the Industrial Age, the apogee of the civilization of literacy, was the culmination of the neolithic period, since it implied tools that were the extension of the body, the digital revolution that we are going through implies the extension of the mind. Until now, humankind's most important revolution was the acquisition of language, especially written language, which was placed on a par with God. Language gave rise to important human societies and enabled these to transmit their experience. Efficient means of production led to surplus and commerce, to centralized modes of living in cities with leaders who protected them and the people in them. Commerce led to recordkeeping and notation, and thus began the civilization of literacy, as manifested through the Hebrews, the Greeks, the Romans, the centers of power rising from the ruins of the Roman Empire, the Islamic movement. The Renaissance reinstated the world of commerce and arts that culminated in the Industrial Revolution and the World Wars deriving from it.

Through the tool of literacy, the old world gave us philosophy, religion, and human rights. The civilization of literacy represented a progression, which today is being overturned by new realities, and has as its characteristics centrality, hierarchy, sequentiality, and linearity, among others. According to Nadin, the technological revolution implies new languages

that are more precise than natural language and mediations that are much more rapid than natural language can provide for. These arise from the human requirement of efficiency in practical activity, especially in scientific and technological development and in science. Literate language is too slow and ambiguous for the cognitive aspects required in present and future activity.

The digital revolution implies, in addition, a new form of energy that does not rely on coal or oil, but on the mind. It entails new forms of human relations that will change traditional human institutions. The traditional family, for example, was a product of the civilization of literacy, displaying the characteristics of hierarchy, centrality, linear progression, etc. Children were economically necessary for agriculture and industry and for the survival of the clan and the human species.

Today, they are not necessary for any of these purposes. Another aspect of the civilization of illiteracy is that the library and the book – the latter being an example par excellence of linearity – will disappear in their current forms. We are experiencing a transition towards a civilization whose characteristics are non-hierarchy, distributed and parallel processing, high degrees of mediation, and multiple languages in which no one in particular dominates. It is at the same time a civilization of liberty.

The original impetus for this article came when a 19-year-old student walked into my office and told me his goal was to work for Dreamworks or ILM as an animator. This student is very smart, talented, and imaginative; a person who in hours can master any piece of software known to humankind. What he hasn't mastered is paper and pencil – he can't draw. It suddenly dawned on me that this young man is going to be afflicted for the rest of his life by the fact that he can't draw well enough to be the animator he wants to be. His education has essentially rendered him visually illiterate.

At the same time, I had been looking at Alan Kay's Squeak project, imagining a world where Squeak was the pencil children used, starting in kindergarten. I was imagining a learning environment where even kindergartners were expected to draw, write, animate, program, and make music as matter of fact. I was imagining an education which could have helped my 19-year-old student get where he wanted to go.

I had no idea how to write this article, so I asked a bunch of people what "a new literacy for new media" might be like. I asked all sorts of folks, until someone finally suggested that I track down either Mihai Nadin or his book, *The Civilization of Illiteracy*. I had a little trouble finding both: Mihai's book was not in my university library; Amazon.com and Abebooks.com showed it to be out-of-print or offered only used copies. I eventually found Mihai through his email address at Computational Design, but the return email said he was away from the University of Wuppertal, Germany, where he works. Lucky for me that Mihai's bounce-back message announced that he was a visiting scholar at the University of Cali-

fornia Berkeley for the 2002 spring term – because, as luck would have it, I received the message just before flying to San Jose to the Game Developer's Conference. I was able to make arrangements to rent a car and drive up to Berkeley to talk to this odd character. In Mihai, I found a man who has been thinking about my 19-year-old student for 20 years. The following is my interview with him. Included in the box on page 7 is publication information about two of his books. I heartily recommend reading his *Civilization of Illiteracy* – all 800 pages of it (used, if necessary).

The Interview

Mihai, your book proclaims the end of literacy, but in book form. Isn't this a bit of an oxymoron?

Oxymoron? In the sense that I wrote about the end of something that has to do with writing? Actually, I say that this book should not exist and that this is the last book of the civilization of literacy. It is an oxymoron in the sense that we scholars are still analyzing a development to which we belong using the most convenient analytical means we have, that is, through language. But as I state at the book's beginning, I could have conceived of a multimedia publication for presenting my arguments. It is a possibility, but it would have been very difficult because we believe that the new media, the new forms of expression, are easier to master than correct language usage in speaking and writing. At this moment they are not easier. Access to the expression of multimedia communication is easy, but the expression of multimedia is very difficult. We are going through a very interesting moment. There is a whole body of knowledge, well established and more or less accepted, and which is represented by various technologies related to how people write, read, and understand what they read and write. We don't have the equivalents in multimedia.

Humankind is entering an era in the pragmatic progress of its activity and is discovering that language, the so-called natural language we use to speak and write, cannot function as efficiently as it did before this period. The overhead represented by everything involved in the use of one dominant language is such that it negatively affects human efficiency.

So you are right in remarking that I wrote quite a large book in order to maintain that writing is no longer the medium through which we most effectively acquire and disseminate knowledge. But at the same time, I state that there are difficulties with technology that render it less efficient than traditional literacy in disseminating knowledge. So, using writing to report this change was a necessity.

I noticed when I downloaded your book in PDF format that a hypertext format would have made more sense. Your limitation in this instance is that you are a literate person?

Absolutely. In the book, I introduce myself as the product of the civilization of literacy. I am captive to this civilization, and the struggle between what I belong to and what challenges me is not easy.

When you talk about literacy, you often refer to “efficiency” and suggest that literacy was once more efficient than it is now.

Correct. Efficiency is the standard by which we human beings measure the output of whatever we put time, effort, and material into – in carrying on a dialog, in gardening or farming, in manufacturing computers. At this time, and due to the so-called digital means, our level of efficiency is no longer comparable to anything we know from human history. The level of efficiency reached during the Industrial Age was a perfect reflection of the efficiency of literacy. That potential is now exhausted.

Give me an example.

Today, knowledge acquisition from grade school to university is no longer best mediated through literacy but through other means that can now educate more effectively than lectures and texts. When they come home from school, children acquire their knowledge through multimedia, with a strong visual component that is seconded by sound.

To use the Internet today, you have to read its content. So, don't you consider the Internet a literary experience?

No, not when you look at the type of language used on the Internet. It is a meta-language, a mere three to four to five hundred words, that does not qualify as literate. Most people are merely functionally acceptable in that universe. Once you come to a word you do not know, you click and you expect the Internet to explain the word to you. You do not bring your knowledge to the Internet; you expect to get your knowledge from it.

Keep in mind that the Internet that has yet to find its “voice.” The most interesting applications of the Internet no longer have anything to do with words. Collaborative work on the Internet, cycles of production driven by the Internet, and even the new forms of commerce driven by the Internet are no longer literacy based. Language usage is rudimen-

tary. It pains me to view news from the best sites on the Internet. If such texts were presented in a traditional classroom, they would be rated a failure.

The New York Times is currently selling a premium service which allegedly completely duplicates the traditional paper. What would you expect to happen to this service?

It will die, and relatively fast, as many have died before. Very, very good writers have tried their luck on the Internet and have failed. The Internet is not a medium for literacy. The newspapers still don't get it.

What informed your original interest in illiteracy?

Twenty years ago I arrived in the United States and went to teach my first class at the Rhode Island School of Design (RISD). That school claims to be the Harvard of the arts schools and probably is. In the middle of the class I had a crisis. I said to myself: "I will never be able to teach in the United States!" In my lecture I was referring to things that were well known in the environment from which I came, the European environment. It was taken for granted that all university students know these things. I was referring to poets and philosophers and writers you don't need a degree to know about – people like Walt Whitman. But the RISD students kept looking at me and asking, "Who's that?"

At the same time, I noticed that those kids were tremendously successful in whatever they attempted. They were functioning in their society at a level I could not imagine. Even at that early stage of their lives, they had imprinted upon them the ability to cope with a tremendous amount of change. But they could not cope with anything of a permanent nature. That was my crisis. I asked myself: "What is happening here? Am I failing? Do I bring with me something that simply does not belong here? Am I witnessing the emergence of something new?"

What were you teaching?

I was teaching two disciplines: philosophy and semiotics. Slowly, after two semesters, I began introducing computers into my course offerings. And then I worked with Brown University students and with MIT students. They started coming to my classes because we were combining these various forms of expressions, these various literacies, as they have come to be called.

Are you a visual person?

“Visual,” meaning what?

If I asked you, “Can you draw?” what would you answer?

I would say I can draw, but that I am not an artist. Am I a designer? No, I am not. What does this mean? I design things in my life, but they do not qualify as design. But I teach design. I teach visual literacy. In 1994, I invented a new program called Computational Design. But in this program, students learn foundational matter, not how to draw with a computer.

When you first went to RISD, did you move to the students’ point of view, or did they have to move to yours?

We each moved toward the other, and that was a wonderful thing. Such give-and-take would have been much more difficult in a European country. The process took time. There was no love lost on either side, but the students and I slowly gained momentum. Three years after I had begun this process at RISD, Ohio State University approached me regarding an endowed chair in what they called Art and Design Technology.

Okay, so you taught in Europe and you came to the United States to RISD, and you had a different kind of student?

A different type of student, yes, but it was more than that. The big thing was that the environment was different. It was an environment of innovation, an environment that facilitated change in a way that stopped long ago in Europe. Dealing with change is one of the major problems in Europe, if not the major one.

What makes change so possible here when it isn’t possible in Europe?

America does not have the literate history Europe has. It does not have a history that it deems preserving to the extent of holding back progress. It does not have a cultural history that is hard to say “good-bye” to.

In your book you wrote that certain nations have a vested interest in maintaining literacy. What nations are you talking about?

Germany has a vested interest in its own literacy, its own culture; France likewise. Now both of these countries are being challenged within the European Community. Countries such as Holland and Ireland display a more American dynamic.

Do you think it is more American because Holland is more of a mixed country, like the United States, than Germany and France are?

That is one explanation but definitely not the only one. There are countries such as Sweden, Denmark, and Norway that are less captive to literacy than Germany is but still less American than Holland.

You seem to be suggesting that illiteracy is an advantage?

I'm not saying that; I'm saying something else.

But in your book you describe illiteracy as an opportunity.

Advantage and opportunity are two different things. Illiteracy as opportunity means the following: There are certain characteristics of literacy that currently are not an advantage. For example, literacy is not transparent. It keeps people from having access to all that we are entitled to in a democratic society. Literacy is hierarchical and centralized. These and other aspects impact the types of practical activities in which people are involved. Overcoming the limitations of literacy is where the opportunities of illiteracy come in. How do you overcome these limitations? I don't know; but some students, workers, inventors, and entrepreneurs are doing a good job of it.

I am not proclaiming that tomorrow language skills should no longer be taught. My major message is to teach together: traditional literacy, visual literacy, multimedia literacy, literacy in areas where hearing, taste, touch, and smell play a role. Let's give every individual the possibility to unfold according to his or her abilities. Some people are not, due to individual tendencies, inclined toward a literate mode of expression. Others are more inclined. If you start working toward a multitude of expressive forms, you will make it possible for each individual to reach his or her potential. That is something that literacy never allowed. Literacy is a very powerful instrument that demands that the whole society fit into a single model, a single mold—the literate mold. It cannot be done. It never has been done. And although much effort and money are dedicated to that goal, it never will be achieved. Nor should it be. There are many people who will never be able to write correctly. Yet educators

keep telling them they have to. Why not give them something that corresponds to their cognitive disposition? This is what I meant by opportunity: multiple literacies.

Have you ever seen students who you think are visually illiterate or musically illiterate because of cognitive reasons or because of the structure of education?

Such individuals are illiterate because they are not being taught. People take it for granted that since everyone has eyes and everyone sees that everyone can deal with the visual. That is not true. The best example is the computer industry, where engineers with eyes assume they can design interfaces without additional training. This is why there are such awful interfaces. We have a huge amount of visual information which is actually misinformation. The technicians are very, very bad at communicating visually, so bad that there is a huge difference between the intended content and that which arrives on the monitor you use for the Internet or for your software programs. Four years ago, I tried to make a difference. Together with a group of good friends, some of them designers, some of them working in the computer industry, I approached Stanford University and asked if it was possible to offer a course or program in visual literacy open to the entire campus. Whatever people study – language, theology, physics, music, education, whatever – let's give them visual culture. They looked at me as if I had landed from another planet.

But you're a professor. I teach also, and if I get students in college who can't write, they are never going to be able to really write other than just a little bit. Their writing is going to be bad because they haven't had the preparation. So, big deal that Stanford institutes a visual literacy program in the freshman year! Is this the place to start visual literacy, in freshman year? You'll have kids coming to campus who have spent 18 years not being visually literate. How can they possibly become visually literate as freshmen?

You are asking some important questions. At what age or cognitive level do we start to form personality? At which level do we start to form various cognitive types that reflect the gamut of human potential? Obviously, not at the college level. If I were offered the chance to do the same at the grade-school level, I would start with the first day of first grade. You'd be surprised how much better students would understand mathematics, because the major problem kids have in mathematics is that it is taught the wrong way, in the literate way. Mathematics and literacy conflict, but there is a relationship between the visual and mathematics. Mathematics has its own language with its own symbolism, its own literacy.

We are talking about the visual – but where does music fit into the scheme?

It has to have its own place in education. Sound, tone, melody, harmony, and tempo are characteristics of human cognition. Rhythm, a sense of time and sequence, and a sense of space, which is a combination of rhythm and time and the visual – music has all of this, along with the “literacy” of notation.

*Now, I know you titled your book *The Civilization of Illiteracy* to make it provocative, but in reality you are talking about a *Civilization of Many Literacies*, as you say later in the book. On a practical level, how would this sort of approach to a *Civilization of Many Literacies* work in school systems which already have teachers and librarians? You also suggest that networked learning is a critical aspect of this new model of teaching and learning. Where do the teachers and librarians fit into this model?*

I talk about teachers in the sense of change in the condition and function of teaching. It is not enough to say that frontal teaching will disappear. So, what if you teach in the middle of the classroom? Teaching isn't just about topology. I think that the function of the teacher must change fundamentally. In this day and age of change, teachers are still in the position of knowing more than anyone in the room, especially in grade school, so they attempt to pour knowledge into the students' heads. They still follow the factory canning model in the hope of turning out a uniform product. And then they test students to see if they remember what was told. This is all that testing in our day amounts to. In the future, the role of the teacher will be to interface in a process in which there is no longer a homogenous class based upon age group, but rather based upon similar content interests, similar directions. Classes will be constituted on a dynamic level, mainly project-oriented. Learning will be affected by the teacher but not controlled by the teacher. In such a structure, the teacher will not always know more than the students.

Do you grade your students?

No longer. I practice a form I call self-grading, which means the student gives me his or her evaluation along with the exam or project. I do not automatically accept this evaluation. For me, the most interesting aspect of self-grading is whether the student understands what he has done and what he has learned or not learned, whether the student evaluates his own performance along with the subject matter area he has studied.

When you are doing this, is the final outcome an A, a B, or a C?

This is something I cannot avoid because German law does not allow me to give a pass or fail grade. Otherwise, I would automatically use a pass/fail system. German law is so strict that it also tells me exactly how many minutes I can examine a student. You have nothing like this in the United States.

When I came to Berkeley to study, it was the first place I had ever studied that had such an extensive system of pass/fail classes. I took just pass/fail classes for a year and a half at Berkeley. It allowed me to learn what interested me, not just study what a professor wanted me to know. For me it was wonderful.

For me, that is also the beauty of Berkeley. In Germany, a student has almost no choice in what he or she studies. At Berkeley, a student can study what he or she believes is important. This is what education must become.

Toward the end of your book, you talk about the development of a global education network. What do you mean by that?

Much knowledge pertains to repetitive actions. How do you drive a car? How do you fix a bathtub? These are repetitive. We can create a repository of that kind of knowledge—whatever you need whenever you need it. In respect to dynamic knowledge, we need a system that allows for access, learning, and sharing as knowledge unfolds in its many forms all over the world. This is what I mean by a global learning network.

Are you describing online education as it is practiced today, or is this different?

Online education as it is practiced today is an exercise in perversity. Almost nothing on the Internet displays a direction to pursue. I am talking about a hybrid combination between personal networks. For example, assume you and I and seven other people are interested in trout. There is another network interested in health. There is yet another personal network interested in rivers. Our interest in trout can lead to learning based on a project we develop; and we accumulate more knowledge. Now we realize that it is not enough to know just about trout. Trout live in rivers and lakes. There are health issues involved. So our local network—which isn't really local because I live in Germany and you live in Indiana and someone else lives in Japan—this local, personal network starts to interact with other personal networks involved with rivers and lakes and health. New knowledge is being created, accu-

culated, and shared. This is how I envision such a model. This is the brain's model. Knowledge is constantly being associated and connected over and over in our minds. It works in our minds, and it should work in our networks of learning.

Do you think there are any glimmers of what this might become?

Yes I do. The real leaders are people involved in music. Learning in terms of music is happening on the Web. You can see how the dynamics of these groups works on the Web. They share. Another example is the way design discussions work on the Internet. I am following two discussions at the moment.

Do you think Usenet was an early example of this sort of personal network of information?

Very much so.

I never realized that the noise on Usenet would drive out the usefulness.

Noise isn't an issue. It happens all the time in the university of bricks and mortarboards. And it is always overcome.

Suppose someone is interested in education for multiple literacies and global learning networks-how do they prepare themselves for this eventuality or prepare themselves to cause this eventuality? Would you advise them to march down to Tolman Hall at Berkeley and get into a school of education?

I would not. I would rather they forget studying education as it is taught in universities today. Education is part of the system of the institution, and every institution is focused on its own survival. I have never heard of an institution which decided to close its own doors. An Ed school is not going to hand over the keys tomorrow at 12 and say, "let's do something else." So, I think I would rather encourage the formation of an alternative form of education. I made a group of important guys in Germany dedicated to issues of education very angry when I quoted a metaphor from Thomas Mann. He said the only important issue for humankind is how the cocoon becomes a butterfly. This means that you have to free yourself from one condition before you can reach a new one, a better one. So, my message was, let's blow up the university. The students applauded to the skies; the administrators wanted to lynch me. I received messages from other academics who said that if I worked

for a corporation, I would have been fired; you don't say things like that. Yes, we need to get rid of the old institutions.

I don't think a company would fire you. I think they would give you the money to go try something new on the chance that it would possibly succeed.

I would hope so; but I tried to answer about 100 to 150 emails until I noticed a pattern. The professors who wrote them kept mentioning the retirement benefits they would lose under a new system, so they would never give up the status quo, even if what they were doing was not in the students' best interests.

My claim is that the institution of education as we know it is an extension of industrial society. Its necessity today is no longer even being questioned. Everyone recognizes that there are problems with the schools. But just look at all the suggestions made: Schools need more continuity. Let's build on what we have. More of the same will improve education. No one is willing to say that there is a need for a totally different form of human interaction that will, in turn, be reflected in a different way of disseminating the knowledge society needs. When educators realize that there are 10,000 empty seats in a university, filling them will make the situation better. That is not what education is about. Giving someone a piece of paper as proof that he studied something at some time? The media proclaim that people, even children get involved in certain activities – in certain practical experiences, as I prefer to call them – at a much younger age, but educators act as if nothing has changed. People involve themselves in practical experiences completely independent of what they learn in schools. No wonder they ask themselves, "Why waste my time in school? I won't do anything with what they're teaching me." Educators, and not only educators, who are honest about the state of affairs have no choice but to look for alternatives. What should the alternatives be? We are experiencing a situation in which the efficiency of the university lags behind the rest of society. Instead of promoting progress, the university blocks it, especially in teaching.

What hope do you have?

Being the most optimistic person you have ever met, I have the hope that those who need education will start to take their education into their own hands. The new generation has tremendous energy. Every student I meet displays a determination to make a living, because this is so difficult. To be young today is very challenging. Change is so fast that you have to ask why you need to be educated. Today's students need something more.

So, what is it they need? Is the need just personal?

I think the greatest challenge we face today is that each of us be treated as an individual, not as something that we are expected to be. In other words, each of us has a potential, and it is the first time in the history of humankind that that potential can be brought to fruition.

Do you think this is the real measure of education in the 21st century: How far it can go to meet this individual potential of each and every student?

Definitely. I know of no other way to measure success. Standardized tests are a joke. They are only a means through which inert bureaucracies and bureaucrats – in education and in politics – justify themselves.

He was never only what he seemed to be

Solomon Marcus

He pioneered the new field of computational semiotics and, in this respect, he coined the syntagm “semiotic machine.”

BORN IN ROMANIA, just when fascist dictatorship replaced incipient democracy, Mihai Nadin spent his childhood in a terrible Romania, as World War II took so many victims. Afterwards, in a dull and tragic Romania, under the Soviet occupation, he became a student in electro-technical engineering at the Polytechnic Institute of Bucharest. This was a period of heavy-handed totalitarian communism (1950-1960). Nevertheless, he showed from the beginning that he was not meant to be the usual engineer. In 1960, he began to show signs of a literary gift. Perhaps his family and his teachers had seen the future writer in him. Among his early writings are the plays *Meeting at Midnight* (Intalnire de la miezul noptii, 1962) and *Carnival of the Animals* (Carnavalul animalelor, 1963). I found this information in the *Dictionary of Contemporary Romanian Literature* (by Marian Popa), which also informs us that, in 1971, Nadin was the author of a novel entitled ...*If You Could NOT Succeed* (O zi pentru podoabe).

After receiving a Master of Science degree in engineering (with honors), he seemed to change course and studied philosophy, receiving a Ph.D. in 1971 based on his work in aesthetics. The new era of computation, which was emerging just during that period, stimulated Nadin, the young intellectual, to bridge the scientific-technological and artistic worlds. That was when we became acquainted. He had a strong interest in information aesthetics,

perhaps influenced by Max Bense and his school, on the one hand, and Abraham Moles, on the other. As an editor and writer of a cultural weekly in his home city of Brasov, he seemed to tend towards the analysis and critique of playwriting and theatrical performance. His name was frequently seen in Romanian cultural magazines as author of essays concerning theater and contemporary drama. The books he wrote in the late sixties and seventies reveal this interest: *To Live Art* (1972), *Nessus' Shirt* (1972), *Return to Zero* (1973).

Careful reading of Nadin's essays shows that, in contrast to most of his colleagues in literary criticism, he had a deep interest in theoretical issues, for instance, in the semiotic and the information aspects of theater. A chapter in *Return to Zero* is entitled "The semiotics of theater." The future semiotician was already showing his face. Among his studies devoted to theater, "Text and Character" deserves mention. Here, he shows how a model (extensional aspect) and an interpretation (intensional aspect) can be attached to every theatrical text, the performance itself being both an act of communication and an act of signification. Surprisingly, Nadin developed a seminal analogy between a play and a fuzzy abstract automaton. This analogy, applied to Shakespeare's *Hamlet*, proves to have a strong explanatory capability. It also reveals the deepness of Nadin's thought as a semiotician, as a computer scientist, and as a writer and scholar of art and literature. That same year, he published his referential study "Sign and fuzzy automata." The analogy between a theatrical performance and an abstract fuzzy automaton is further developed in "A semiotic procedural approach to dramatic literature" (1981) and in "The Functioning of Words" (1984).

My representation of Nadin as a writer and a scholar seemed to need nothing more. But again Nadin proved to be much more than I and his other colleagues believed. After leaving communist Romania for the Western world, his creativity was truly unleashed. If his written works ("Sign and aesthetical systems," 1979; Sign and Value, 1981; The Art of Art, 1991) fit within our expectations, as a continuation of his previous works, with force and amplitude, Nadin's later publications revealed new faces of his personality. His articles in *Semiosis*, in *Kodikas/Code*, and in *Semiotica* show Nadin to be an important semiotician and one of the leading specialists in C. S. Peirce's semiotics. This dimension of Nadin's intellect is also visible in "The logic of vagueness and the category of synechism" (1980). But Nadin at his most original was yet to come.

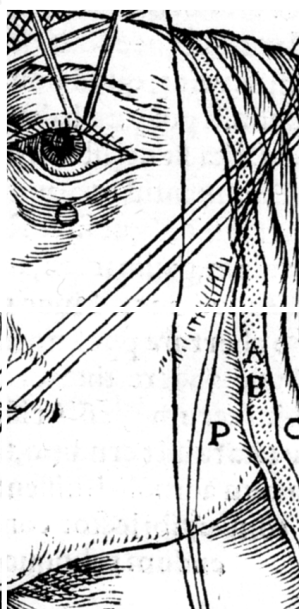
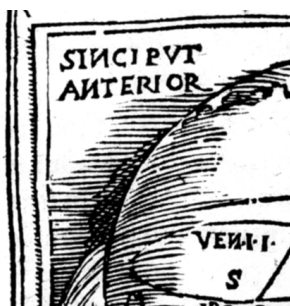
If someone were to ask me to describe Nadin in two words, I would have to respond by relating him to the field he "fathered," Computational Design, to be extended with the notion of the Semiotics of Computational Design. Through his university positions in the USA and Germany, he proved himself to be a master of, and excellent teacher in, this field. Some years ago, I had the chance to see him in action at the University of Wuppertal. The USA brought him back to technology through the introduction of the computer, especially the personal computer. But instead of glorifying its technical capabilities, Nadin gave the

industry sobering critiques and let them know what digital technology should aim at. His articles – “The Aesthetics of Computer Graphics” (1985), “Intelligent Computer-Aided Design: an outline for a Computational Design Theory” (1987), “Interface Design: a Semiotic Paradigm” (1988), and “SOPHIA: Digital Dissemination of Knowledge” (1995) deserve mention here.

But we are still far from the end of Nadin’s intellectual itinerary. He proved himself to be the pioneer of the semiotics of the visual, while most of his colleagues in semiotics were devoting their attention to verbal language. In 1982, Nadin succeeded in animating colleagues at the Rhode Island School of Design and Brown University to join him in publishing their works in a special issue of *Semiotica*, the leading publication in the field of semiotics. His study in this volume, “On the meaning of the visual: defining the field,” deserves to be considered as a classic.

But, again, Nadin is not only this, and maybe he is not mainly this. I have in front of me his monumental volumes *Mind – Anticipation and Chaos* (1991) and *The Civilization of Illiteracy* (1997). With the excitement of a young researcher, I took notes. In a certain sense, these books incorporate Nadin’s previous work; but at the same time they open new roads for discovery and they raise so many fascinating questions. They make me feel that the best thing I could do is to stop and let the future decide what Mihai Nadin is first and foremost.

Only a few months ago, he challenged me with a new project he had launched and I was afraid to even start thinking about it!



Chapter

Imprints of Knowledge

// The History of the Future

// The Message is the Medium

// The Architecture of Thought

// History and Awareness of the Future

// Anticipation – A Spooky Computation

// Aesthetics

// Art history and criticism

The History of the Future

THE OBJECT OF HISTORY is the future. The past, to which history is usually associated, makes sense only to the extent it has anything to do with what follows. Life itself progresses along the time vector of procreation – birth – growth – death, although the future, as well as the past, drives life. History is a two-way path: experiences that were and experiences that will be. As abstract as these assertions might still sound, they are constitutive of the process of self-evaluation I am undertaking in this essay. That the time arrow of life accepts both directions – from past to future and from future to past – will be documented in this text more than once.

Prompted by the decision of *Anthropos* to dedicate an issue to my work, this self-evaluation can be compared to using a GPS device (Global Positioning System) to define coordinates as the journey continues. You, the readers, are my GPS device! I owe it to the readers to tell them who I am and why they should concern themselves with my ideas. As I try to accomplish this task, I am faced with my own instinctual inclination: Let my works speak for themselves! My interpretations are irrelevant. Yours, respected readers, are the only ones that matter. Accordingly, I should stop here. But this would only mean that my work is finished. I realize that my motive for spending time and energy to make this issue of *Anthropos* possible can only be egotism. I believe in sowing my seeds so that they will eventually become the new living ideas of everyone who interacts through this publication. I am selfish for your feedback. I need your opinions.

What you will find assembled in this issue is a sampling of my life's work so far: poetry, some written well over 30 years ago, some more recently; short stories; a play; essays; excerpts from novels, technical articles and scientific writings; images associated with my work with computers (some of these are among the first ever generated by a computer program). They form a

mosaic. How do these pieces of work fit together? And if they do, what does the whole say? What kinds of questions does it stimulate? My desire is to let you find out how and what I think, but above all why I have pursued the themes that have become the subject of my life's work: the human being's unfolding, which I believe to be a dynamic configuration of practical experiences in the process of every individual's continuous self-constitution.

The art of the mosaic

Over 5000 years ago, Sumerians drove colored clay cones into the walls of their dwellings. Color and sense of volume gave rhythm and depth to the flat vertical constructs. These colored clay cones served the very practical purposes of protecting the wall; they also gave a sense of height and a suggestion of depth. Even before this, various roads were paved with materials that promised to make them as stable and permanent as possible. They were mosaics made out of slabs of stone, tree trunks, marble, and volcanic material. The book of Exodus twice mentions "work of sapphire stones" as a pavement; and the book of Esther refers to the road of Ahasuerus at Susa, "paved with porphyry and white marble." The preciousness of the pavement acquired a symbolic quality. Later, the Greeks (third century BCE) used uncut pebbles of distinct colors for decorative and figurative purposes. The Romans followed suit. Their mosaics – the roads and aqueducts of the Empire almost always had a mosaic component – are rich testimony to their life, beliefs, and morals. They speak of their views about animals and plants, as well as about their relation to the many varieties of people in the world they conquered.

Mosaics are the result of the practical experience of fighting decay. Whether marble slabs, pebbles, precious stones, mother-of-pearl, and later terra cotta (baked earth), glass (melted silica), or enamels—all of these have been used due to their resistance to the tooth of time. These tesserae, or tessellae, (small cubes or cones or prisms) are embedded in a material (plaster, cement, putty) that holds them together in some desired shape or image. While cave paintings are instructions for the people sharing a cave, mosaics are evidence of a particular practical experience—unsettled life. The world was experienced, so to say, through the feet. The world was experienced as a changing landscape: geography, weather, plants, animals, other human beings (to be resisted or to be accepted) with different rituals and languages. This is why, even as the mosaic is tamed, even as it turns from a means to

an end and into an end itself, it invites us to discover it by stepping on it. The mosaic thus entails its primeval function as a road.

With these limited archaeological, historic, and aesthetic details in mind, I propose that the mosaic starts as a road to be explored, and refers back to this initial condition even in its later manifestations. Its first appearance corresponds to the nomadic state of human beings. What nomads leave behind in their never-ending migrations are paths. Once a relation to other people moving from one place to another is established (that is, a sense of belonging, expressed through fighting or solidarity), paths are shared, to be followed by others. The practical experience of moving from one place to another becomes part of a language of cooperation. Before experiences are shared in images or language, they are embodied in the action itself and in all the elements involved in it: “Caminante, no hay camino. Se hace camino al andar,” (“Traveler, there is no path. Paths are made by walking,” Antonio Machado, the famous Andaluz poet).

The mosaic as a road, that is, the practical experience of sharing the migratory path by reinforcing it with materials to endow it with relative permanence, is probably rudimentary upon first consideration. It is not comparable to the exquisite remnants near Uruk, Eridu, or the biblical Erech, all dated from the fifth to fourth centuries BCE. When settlements are formed, the obsession with the road and its permanence starts to take on other practical meanings: the roads of warriors, of land explorers, of merchants, of religious peregrination. Roads also embody hierarchy: tribal, communal, urban, regional, national. Royal roads, as we know them from archaeological evidence in Asia, Europe, and South America, display richer mosaic qualities. Roads end at – or better yet, continue in – walls. The horizontal aspect associated with movement in space becomes the vertical of a wall, a road leading to the sky. There is no ceiling. The vertical constructs of Mesopotamia, not unlike the Greek temples and various Roman constructions are pavements. In other words, they are an expression of a natural instinct of migration expressed in the road, in conflict with the pragmatics of settled life expressed through the dwelling. Two pragmatic horizons are expressed in this conflict – one associated with migration; the other, with permanence, settlement.

Have no fear – I am not writing a history of mosaics; rather, I am indulging in an interpretation that suits my line of thought as I write my own mosaic (hi)story. But beware – I share almost without reservation Niels

Bohr's statement: "Physics [and science in general, M.N.] concerns what we can say about nature." This means that in the experience of understanding and interpreting the world, we project, through what we say, our own rationality upon it. My understanding and interpretation of the mosaic exemplifies my rationality and expresses a hope of objectivity. Indeed, this is all we do when we take our particular yardstick, that is, a ratio, and apply it to whatever we want to measure, i.e., describe through measurement. It should come as no surprise that each of us, shaped by his own experience, has his own rationality, and that eventually one rationality – let's say embodied in a theory, a science, a religion, or an aesthetic experience – appears more convincing than another. Or it is accepted after having succeeded over others either through "Darwinian selection" (it is better adapted), through the politics of science, or even by accident. The theory of fractals, for instance, demonstrates that the shorter the stick used in measuring a coastline – meter versus kilometer – the longer that coastline will seem to be because the coastline is measured in more detail. We humans define our yardstick based on what we do. The coastline details are relevant to fishermen, but not to landscape painters! Fractality – i.e., the sameness that appears in phenomena regardless of the stick used to measure things – is intrinsic in our appropriation of the world. Scientific theories are quite similar, just as the best stories written, the jokes told among friends, and the music performed before audiences tend to be similar, yet still different.

The cause lies in the future

The mosaic composing my work to date – partially illustrated by the selection in this issue of *Anthropos* – is a testimony to the many paths I pursued (and still pursue) in my attempt to deal with the question, "Why?" This question relates to the universe of my existence, to other persons, to art and science, to love, to politics, to the economy – you name it. While others are dedicated to the "What?" of things and phenomena (What is matter? What is art? What is thinking?), my obsession is with the "Why?" and sometimes the "How?" of these. It might well be – I say this almost with pleasure – that my childhood never ended, since the "Why?" that all parents experience resonates in everything I do. The mosaic composing my work is also an image of my way of thinking. I am a contrarian. The French "Je suis contre," in conjunction with "Vive la différence!" probably describes my outlook. Subject to rotten indoctrination in a view of the world primitively described as

** Marx himself was animated by a particular form of anticipation – the messianic. Although he divorced himself, through conversion, from Judaism, he carried with him, in the atheistic world he conceived, the messianic spirit, manifested in the communist promise: “From each according to his ability, to each according to his needs.”*

historic materialism (the only philosophy accepted in the communist society I grew up in), I ended up, according to Marx’s favorite maxim (Dubito, ergo sum), doubting it. Indeed, in the world represented by the mosaic of my work, you will see (or should see, if I am at least marginally successful) the world from a perspective that reverses the dominant view taught today in schools and shared by scientists and philosophers. According to this dominant rationality – which even the harshest critics of Marx* adopted – it is acceptable to infer from the past to present and, furthermore, to the future. But it is at least suspicious to question causality and apparent determinism. And it perhaps borders on fantasy to suggest that in addition to the common-sense cause-and-effect sequence, one should acknowledge a sequence of anticipation, and a non-deterministic view.

Allow me to explain this point by asking you, my readers, some questions. Is a finished mosaic a puzzle, pieces of a broken image reassembled by the artist? Or is it one of the many possible images made with a very limited number of elements, some kind of permutational art (computer-based or not)? Or is it a future – the ideal form never reached – crawling into the present of its making and existence, determined to testify to a journey of many compromises and even more limitations? Or – to return to my understanding of the mosaic as a road – is it something that takes us from where we are (let’s say Wuppertal, where I happen to live and work during part of the year) to some place we would like to be (Barcelona, where I found good friends)? Or is it, vice versa, a goal requesting means, a future defining a need for current action? As misconceived as it was, Columbus’s voyage, for example, was driven by a model. “America” existed in the minds of those who were involved in the model long before it existed in their reality. Their actions – their practical experience of financing a voyage, of actually sailing the ships – that is, their pragmatics, was defined by a future state – a land rich in resources – that eventually became their discovery. Discoveries are not experiences of action-reaction; they are driven by a pro-active, anticipatory energy. Let’s take another example: Einstein’s theory determining the speed of light (the famous 300,000 kilometers per second). It is not the result of measuring the speed of a sunray, but rather the projection of an understanding of the physical world in ways that contradicted the common-sense perception of time. Almost 250 years after Newton’s treatise on gravitation, Einstein tried to get to the Why of attributing it to the curvature of space-time. This is what gives Einstein credibility in his epochal

assertion, “No problem can be solved from the same consciousness that created it.” To repeat, Einstein (although he would not easily admit it) made possible a pragmatics driven by a future state, not a pragmatics arising from a past state.

From within the consciousness of the science of Newtonian mechanics (which allows us to calculate the trajectories of stars and of those man-made objects launched into space within the cosmic exploration program) or Cartesian rationality, we will never understand why life is not reducible to physics. Moreover, we will continue to miss access to probably the most intriguing aspects of our existence, in particular human intelligence and our striving to know. The fractality of knowledge is beautifully illustrated in the wealth of detail that knowledge has gained as we humans freed ourselves from the constraints of mechanics, from aether, and from particle-based theories of light; and as we further free ourselves from a determinism that does not allow for non-determinism, and from an understanding of causality that eliminates anticipation.

The means used to represent knowledge along the past-to-present time sequence changed dramatically. And so did knowledge itself, which is never independent of how and why it is represented. The underlying reality of all our knowledge is its expression – to be used for oneself or for others. The words, images, formulae, or other means used to express knowledge are all substitutes for what they refer to. Our means of expression, communication, and interpretation are not passive receptacles of what we know. They are constitutive of our knowledge – just as the road is constitutive of what we know or anticipate about where we intend to arrive and how we move along the road. To know is nothing more than to practice that knowledge. To know is to constitute ourselves in the practical experience made possible by our knowledge. The illusion that to know means that this is how things really are and not merely what we understand them to be places the human being in a peculiar condition: There is something independent of us (objective, according to jargon) to which we can have access in virtue of a special condition made possible either by divine power, or by the disguised “divinity” of Darwinian selection, or by mere accident. That things are the other way around – we discover divinity, Darwinism, or randomness through what we do – is rarely, if at all considered. My position is that our access to the world is no more than an expression of our own biophysical existence in relation to the world in which we make ourselves what we are. This

simple fact escapes scientists and philosophers because, in its simplicity, it does not carry the romantic aura of the untiring explorer, as some scientists and philosophers are sure they are.

Truth is not like a continent discovered by explorers. Neither is it the gold that miners dig out or that panners find in riverbeds. It is not what results after intense thinking (as wonderful as Rodin's statue is, it is misleading) or mathematical calculations. Truth is only a path between one practical experience and the ones that follow or take place in parallel. It is a relation between us, bound to change as we continuously constitute ourselves. To search for truth – be it logical, ethical, political, literary, or scientific truth – as permanence – and furthermore, as a reference – is to reduce life to a record of events, knowing well that there is much more to life. It might be true that Einstein was born in 1879; but it is not relevant truth when we try to understand the type of pragmatic experiences his theory made possible.

In the world of clear-cut cause-and-effect, all that needs to be done is to measure, to quantify what we perceive to be causes and effects, and to eventually establish correlations. This is what the world does today to an extent difficult to characterize. Quantity has become an obsession to the detriment of quality. Measure the brain potential of epileptics, measure tectonic activity, measure genetic characteristics (the vast genome project), measure formal characteristics of famous poetry and music, and so on, all in the hope of finding a cure to epilepsy, a method to predict earthquakes, or a device to generate music and poetry, and so on. Moreover, many people shape the world as a result of calculations only in order to find out that their deterministic optimism is not justified by consequences that are beyond the scope of mere quantifying. The ecological mess of our world was in all reality produced by a quantitative deterministic view extremist in its assumptions. Without regaining the territory of anticipation, long ago abandoned on the basis of scientific assumptions proven to be at least disputable, none of our current fears of biological disaster, social decay, economic inequity – among so many others – could be addressed, not to say allayed.

We are what we do

The lines written above speak of my thinking. What I do is intimately related to what and how I think. This applies to my teaching, writing, working with music and images, exploring the world, making things, experiencing

love (and pain), and conceiving programs (some for computers) But this is already too personal. The word “we” in the subtitle given to this section means all those caught up in the network of ever – changing interrelations usually called society. And here comes the surprise of a realization that goes back to our natural condition. Indeed, the living, as a dynamic system, displays an intrinsic, extremely subtle order.

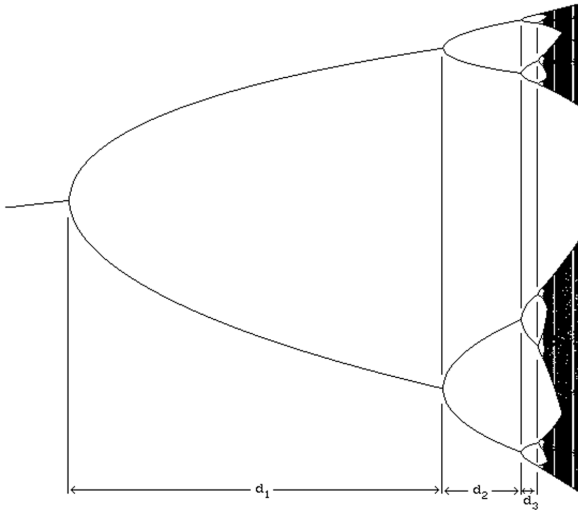
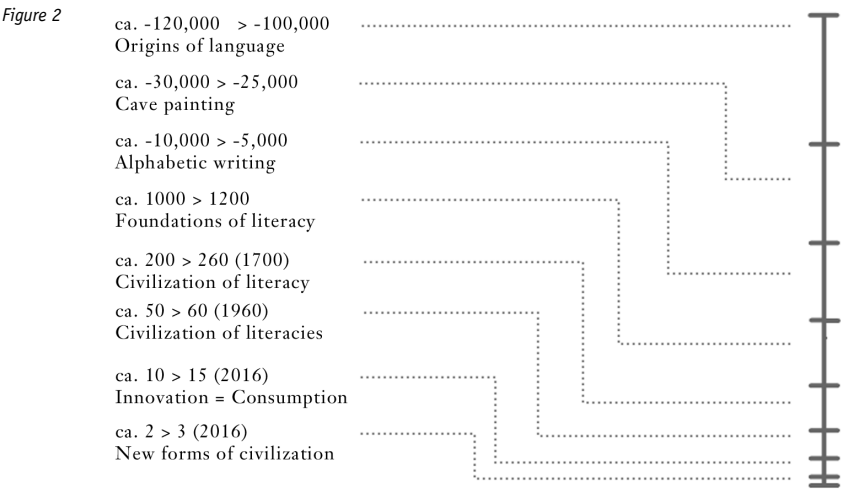


Figure 1

$d[i]/d[i+1]$ equal to 4,6692016091029906718532038

The closest I have come to realizing it was through the Feigenbaum number. The bifurcations, easy to notice not only on the fig tree (Feigenbaum, the name of the mathematician who discovered the universal number, is German for fig tree) show how dynamic processes evolve. What this image says is simple: Dynamic processes are not reducible to a linear path; they can be represented by successive bifurcations. There is a continuum of possible values within which life unfolds. Moreover, determinism (e.g., a plant lacking conditions for its survival will die before the next branching) and non-determinism (represented by the continuum of values that the branched twigs can take) are at work simultaneously! Until Feigenbaum and his colleagues in the so-called Chaos Theory, mathematicians expected the equations describing bifurcations to have one value. Now all the values between the bifurcations must be considered. The description is obviously much richer in detail.

Some years ago, I took a look at the documented history of humankind and took note of an observation that many others have made in respect to our time: Historical cycles are getting shorter. Moreover, the speed of life in our time has increased. Here is the diagram that visualizes the hypothesis I submit to you:



Keep this in mind: The various historic phases (hunting and gathering, agriculture, pre-industrial, industrial, etc.) succeed each other in shorter intervals. My hypothesis is that the hidden order of this succession can be qualitatively described in a manner similar to the bifurcations apparent in living systems. All I say here is that a descriptor like Feigenbaum's (maybe more than one) probably quantifies the dynamic of successive historical cycles. Past bifurcations are easy to understand. Even the bifurcation leading to our post-industrial age is self-explanatory. If we take Feigenbaum's number and apply it in the spirit described above, we come to the discovery that the next bifurcation will probably be around the year 2016, to be followed by another in 2018. So, the future – let's say, some state corresponding to a dynamic that can no longer be sustained – determines a current state.

The attentive reader will already have noticed that, after criticizing the obsession with numbers and data, to the detriment of attention to qualities, I apply here a mathematical description that is driven by data. Allow me to explain: This is not an attempt to calculate history or to give it a fatalistic twist. It is rather a suggestion, qualitative in nature, a description of

extremely sophisticated processes. Here, the human being is simultaneously observer and observed, influencing and being influenced by events. The parameters of the whole development are not independent – everything we do influences other actions. To a certain extent, these parameters, expressing human control of their own destiny, are more important than the outcome. This is why I look at what it means to be simultaneously part of a system and able to affect its functioning to some degree; furthermore, while being aware of this, using this awareness to influence social, political, economic, scientific, and aesthetic processes.

The current view of history is that the past determines the future. Boil water and as more energy is used, the state of the water changes into a new state (heating water leads to evaporation, to the state of steam). Similar descriptions apply to how physical objects move (a past position and speed determines a future position) or how chemical reactions take place. While there is no denying that, at the physical level, the past affects the future in many ways, it is also true that in the realm of living systems, there is also a different type of causality extending from future to present. The dynamics of social unfolding is in some ways analog to the dynamics of the unfolding of nature: we know where the next branching will take place. The future state corresponds to a new scale of human activity. Scale is representative not only of the number of people (population), but especially of the qualitative relations among them. In the historic sequence depicted in figure 2, bifurcations always correspond to a new scale. The year 2016 (or thereabout) corresponds to a new scale, as does the year 2018 (or thereabout). From that possible future – of new qualitative aspects – a time vector runs not from past to present to future, but in the opposite direction!

Moreover, these bifurcations (future states) soon run into a “wall,” a “final value.” For me, such a “wall” suggests a possible new cycle, a resetting of the “civilization clock.” Indeed, the equation of what is, what might be, and what is necessary is very complicated – the interaction of quantity and quality – but by no means conducive to fatalism. The current scene often looks threatening. Resources are being used up, human population keeps growing, the nature and richness of human interactions change. There is an apparent decline in human values as the obsession with higher expectations drives new practical experiences. But No, a very loud “No!” – I do not prophesy the end of the world by sin or degeneration. Neither do I paint a scenario for a catastrophe. The description I chose might suggest

the end of the world as we know it, but not its end, period. Many more, and more interesting, things are yet to happen. (Recall the Chinese curse: “May you live in interesting times.”) What we perceive as the law of increased acceleration (quantitative aspect) only tells us that time periods shorten between succeeding phases characteristic of our continuous unfolding as a species. Yes, we individually have a life-span much longer than it was only decades ago. But time-spans between birth, adolescence, and maturity get shorter. We literally choke at the rhythm of change experienced in the world today. The quality of our lives has changed.

Some see this acceleration of history as an expression of our abilities (qualitative aspects); others, as an expression of failure. All kinds of neo-Nazis, neo-nationalists, neo-communists, and neo-epigones of times gone by are fighting, from their own perspectives and with their own goals in mind, to stop the clock and oppose an integrated world (also called global). That globality implies risks and opportunities, and, moreover, cannot be avoided – regardless of how we perceive it – escapes their understanding. What they do not realize is that forces, of a nature different from what they are familiar with, are at work. These forces, overwhelming in their depth and breadth, correspond to a new scale of human experience. The extreme differences in the standard of living experienced by individuals born only miles apart – think about Gibraltar and North Africa – correspond to discrepancies that are not inherent in globality, but rather express our inability to cope with it. In the years to come, as we free ourselves from models based on industrial processes, these discrepancies will have to be addressed, or else the destiny of the human species will be irrevocably endangered. Chances and risks are of a similar magnitude! That between now and the suggested year 2016 or 2018 we will face increased instability at all levels of our existence is a prediction about which I have little reason to worry that I might be wrong. Only observe today’s stock markets, with their breathtaking ups and downs; political events rooted in a past we are not yet willing to give up (the national elections in the USA in 2000 were only a comical reminder); the increase in extremely destructive regional conflict, disease, and political instability, and you will discover with me what this prediction means. The instability of political institutions, of the family, of belief systems, of knowledge are no cause for worry if we realize that creativity is more likely to come about in a framework of instability than in one of excessive regulation (bound to fail in the end)!

Creativity and knowledge

Creativity is not usually associated with knowledge. Some artists, as well as philosophers and scientists, suggest that knowledge stands in the way of creativity. Be this as it may, ever since the early day of my career, I have been seduced by the many questions surrounding creativity. Even a succinct description of the various phases on my research into creativity would burden the reader with details far less interesting than the broader image. With the emergence of computers, I was among many who asked whether these machines could be creative, or be used in creative ways. The question goes back many centuries, but was never so critical as in the age of digital technology. In line with many colleagues, but totally isolated from them in communist Romania, I questioned the nature of art. I wanted to know why people become artists and writers, and how the practical experience of writing and making art, and of perceiving the results, shapes us. If I could write an algorithm that could generate all objects of a class (let's say tangos or sonnets) through combinatorial rules, it should be possible to find among those objects (images, musical compositions, poems, stories, etc.) some that might qualify as art. Some researchers considered random number generators that would apply to a given set of signs (shapes, colors, words, sentences, musical notes, etc.), and thus over time would generate artifacts that qualify as art. Years later I learned that Sir Arthur Eddington came up with what was known as the Infinite Monkey Theory: "If you put an infinite number of monkeys at typewriters, eventually one will bash out the script for Hamlet." Today we learn that to make money in the stock market, another monkey theory applies: Give a monkey a set of darts, and it will hit the names of stocks that together will make money.

However, the cases I mentioned (literature, art, stock markets) pose different questions. From among all the artifacts produced, would my algorithm recognize one that qualifies as art? Would the random number generator stop the series once a work of art was generated? Would monkeys stop when Hamlet had been written? Would monkeys indicate when to sell a stock that they literally hit upon? And, referring back to the mosaic, how does the mosaic artisan define the combination of tessellae that lends an aesthetic condition to the practical purpose?

In asking all these questions, I realized that generating artifacts without our being aware of their condition in society is merely a technological feat. Performance disconnected from awareness is delusive. In order for an activ-

ity to qualify as a creative act, this activity has to be carried out with awareness to its consequences. Practical human experiences, whether spontaneous (unreflected) or methodic, are inseparable from awareness because this is how our identity is continuously constituted. Human creativity is expressed in a variety of ways: through artifacts we produce, through interactions we initiate or take part in, through explorations of all kind (from trivial daily chores to discovery of new territories, inventions, and theories). But each of our creative acts takes place with the understanding – not necessarily a full understanding – of consequences, or with the realization that a gap remains between what we intend and what we accomplish. In making ourselves through what we do, we become more aware of ourselves and of others. Or, to use a loaded expression – hence subject to misinterpretation – we become more conscious (of our limitations and possibilities, of our impact on others and the world).

Awareness is, however, based on anticipation. What will be (the possible consequence of our self-constitution) impacts upon what is. In order to qualify as creative, a machine (no matter what kind) will have to be anticipatory. Of course, the question remains open: Is such an anticipatory performance possible outside the living? In respect to computers, the question is: Can we compute anticipatory systems? But to answer this question will take us along another path. We know, however, that experiences from the past could be imitated; and in our days of fast digital processing, this can be accomplished more successfully than ever before. Every artist can be reconstituted in digital format. But could the machines initiate new aesthetic experiences? Could innovation emerge in a world of algorithmic or even non-algorithmic computation? This is as far as I came with my questions.

The experience of art is constitutive of the person producing artifacts with aesthetic characteristics. It is also characteristic of those who will eventually interact with them, the so-called public. What connects artists and the public is not different from what connects scientists and people subjected to it in one form or another; from what connects religious leaders to their communities; or political leaders and the people touched by politics. As is true of any form of work, products connect us. In each of the cases just mentioned, there is an underlying story, a narration on whose basis agreements among us are based or questioned. Let me give some examples in order to clarify this statement.

Story vs. history

The entire phenomenon of tonal music evolves around a narration that maintains that the universe has a center (and for millennia, our planet was considered the center). The story of tonal music is the story of freeing ourselves from one center and establishing another. In a concert of tonal music, the performers embody the fight that leads to this shift from one center to another. The story behind Bach's canons is a combination: It is a form of counterpoint in which once voice imitates the rhythm and interval content of another voice. But it is also an attempt to differentiate within this rule, to create variations. What holds the story together is its coherence; what makes the story infinitely attractive are the differences, that is, the liberties that Bach took in composing. There is in his oeuvre, all a story, canons at the unison (the follower performs exactly the same melody as the leader); canons at intervals other than the octave (the Goldberg variations, where the follower alters the intervals); Cancrizans (or retrograde canon) in which the melody is played forward and backward at the same time; mirror canons; Canons in augmentation or diminution, and so on. Listeners might not be aware of such categories, as they might not be aware of the Latin riddles presented together with the music. But they accept the story, as the interpreters also accept it, each in turn trying to work out more variations, to anticipate more subtle differences.

The story called Christianity (to which the examples given above are related) can be subjected to the same strict examination. The core, the so-called Old Testament (the Torah, chronicles, and prophecies of the Jews), projects a sense of coherence. The variations (differences) extend not only into new scriptures, but also in many "protestant" alternatives, some still generated today. That the Torah-based celebration of the Hebrews' Exodus from Egypt (the Seder itself being a story within a story) eventually became the Christian Last Supper and Holy Communion only illustrates the intricate nature of the process of maintaining coherence against the pressure of new differentiations.

The story called classical physics, or the story called democracy, not unlike the story called genetics, is identifiable in the conflict, in the narrative line, in the resolution. The story called mass production (a story of the industrial society), not unlike the story called television (one source, many receivers), is another powerful example.

From among the many questions that can be posed, here are a few: Which stories succeed? What makes one story more attractive than another? Are stories reflective of something (reality, existence, identity) or constitutive of new practical experiences? Let's start with what makes a story succeed. The answer is contained in the model I advance: Since stories are expressions of practical experiences (of human pragmatics, in other words), they succeed to the extent that they support such experiences. Indeed, alchemy, the beautiful story of the secret ways of turning base metals into gold, failed not because of its practitioners' ignorance of logic or science – the Mendeleev Table shows that element mutation is possible – but on its pragmatic merits (or lack thereof). Alchemists never delivered! Newtonian mechanics delivered; so did Einstein's theories; so do information theory, computer science, and genetics in our days; and so, we hope, will quantum mechanics. In literature, the arts, and architecture, as in mathematics, logic, and engineering, the successful story is the one that facilitates experiences of self-constitution that are also of a new nature.

Hamlet is thus part of the pragmatics of doubt that obsessed generations from Shakespeare's time until today. But a new Hamlet is at least as impossible as a new theory of gravity, because circumstances have changed so dramatically over the centuries. Moreover, the stories of today, whether scientific, technological, literary, political, economic, etc. are short-lived and will continue to have shorter cycles of significance. This is a structural characteristic of the pragmatic framework of our age. Between the last successful movie, song, dance, or fashion trend and the next, there is probably as short a time as between the equivalent scientific, political, or economic story. An article published today in *Nature* will have as much permanence as the new novel of a John Updike, Gabriel García Márquez, or Günther Grass. The half-life of knowledge in physics, so physicists tell us, is four years.

Interestingness

The second question concerns the attractiveness of a story. My answer is almost trivial. Pragmatic relevance goes hand-in-hand with expressive power. I call this power interestingness (and will return to it soon). In their unity, pragmatic relevance and interestingness define both levels of every story: a story describes and reflects; a story makes up, invents, constitutes new experiences. Again, this applies to Shakespeare, Cervantes, Goya, Beethoven,

Newton, and Descartes, or, to extend the framework, to Gandhi, the Beatles, Arnold Schönberg, Niels Bohr, and Picasso. None could be suspected of transcribing a story from his reality – his own story, that of a contemporary, one he adopted, or the like. None invented his story from nothing. Even the most abstract mathematics, music, or painting bears the testimony of the experience through which it was created. At the same time, each artist, scientist, writer, economist, or politician, etc. molds a new reality and invites others to experience it. One day I will probably expand these considerations. My own storytelling experience taught me some things. The stories associated with others – Leibniz, Peirce, Kant, to name some of my models – subjected me to very telling experiences.

Allow me to return, as I promised, to interestingness, the expressive power of stories. What is interesting? First, a warning: The question “How do you like this (painting, poem, economic thesis, political platform, scientific experiment, etc.)?” can be answered in many ways. From all possible answers, “Interesting” can be the most disappointing. It seems that this adjective is used when we cannot think of anything more appropriate to say. But it does not have to be so if we define interestingness in ways that give meaning to our “interest in” something.

Human beings constitute themselves in practical experiences of survival. Once they reach higher levels of efficiency, the experience evolves into satisfying ever higher expectations. Among these expectations are even more abundance of products, more intricate narrations, and more exciting stories – more to interest them. Sure, we have to be careful with this description if we want it to make sense. These stories are not arbitrary. It is not that each one of us randomly or haphazardly makes up a story and everyone accepts it. The story called gravity was recounted many times as nothing more than Newton watching apples fall from trees and deriving his knowledge from this experience. But apples fell from trees long before Newton came on the scene. On the other hand, in a satellite orbiting the globe, apples would float, but never fall. This example should warn us that stories are expressions of experiences that become significant at a certain moment in time. They are circumstantial because circumstances make us experience them. Obviously, many people (some more intelligent than others) saw apples falling from trees. What Newton expressed in his description of gravity is a practical experience that eventually helped humans to launch objects into space. And there, paradoxically, humans experience weight loss, i.e.,

the compensation of gravity: things do not fall down (which down?). They float. It follows that these stories have a very strict condition, and that none is universal. They participate in our self-constitution, anticipating new experiences. A musical composition, a poem, a novel, a play, a DNA sequence, a computer program, etc. are expressions of stories that tell a lot about how we become who we are in the process of making (music, poetry, prose, theater, genetics, programs, etc.), and thus making ourselves.

Each story, in the sense I described above, is a collection of facts associated in a pattern: Boy meets girl; or sound variations around a tonal center and switch to another tonal center; color schemes in permutation; volume contrasts. The stories we call scientific theories (in physics, chemistry, biology, etc.); or politics (from the beautiful Republic of the ancient philosophers to the post-national models); or religion (all of them plus those to come); or philosophy and ethics, not to mention the stories of history, are all reducible to patterns and are all associated with a threshold beyond which new stories are made up. These patterns can be described in our language or through mathematical formalisms, or through visualization. Obviously, what we call a pattern is always more limited than the set of all facts that make up scientific theories, religions, or political systems. Patterns have a certain degree of probability: in a poem with a rhyme scheme, we can easily see what words can be used given the expectation of rhyming and the rhythm of the poem. The same applies to the colors that the Impressionists used, as well as to the narrative paintings of Goya, to Marx's and Engels' *Communist Manifesto*, to quantum theory, to genetics, to Buddhism, and to Scientology.

For something to be interesting, it has to result from elements that we recognize (materials, shapes, color, etc.). It has to provide a pattern (of action). It has to rely on a distribution of its elements that is possibilistic – we always want to be part of the conflict, of the game; we always want to take sides. It has to express a desire to communication (information aspects); it has to suggest further practical experiences (i.e., invite us to continue either by making similar artifacts or by interpreting them). And, finally, it has to result in a choice – like it, dislike it – regardless how subjective. These six elements together, in a relatively tight connection, make up the degree of a story's interestingness. But what most attracts humans to a story (a surrealist painting, atonal music, free verse, Einstein's relativity, or Weber's view of history) is not the probability of a distribution, but

rather the novelty, and, moreover, even in the case of very complex forms of expression, simplicity.

That's right, no story ever succeeded if it was not attractive through its simplicity. We cannot handle complexity above and beyond a threshold of complexity. This applies, I repeat, to science as it applies to religion, history, and politics; and, not last of all to art and literature. Threshold defines the level of a story at which it is interesting enough to be acknowledged. But threshold also defines the level at which a story can be "too interesting," that is, too complex for humans to accept. For example: In a context of conflicting religious stories (Catholic Church vs. Protestant movements), Galileo Galilei produced a model of the universe much simpler than the one resulting from Ptolemy's astronomy (based on Catholic doctrine) and the model that Copernicus advanced (contradicting Church doctrine). But Galileo's story, which eventually brought the weight of the Inquisition to bear down on him, suggested a coherence different from the one that the Pope and the leaders of the Protestant movement (who criticized the Church for being unfaithful to Scripture) could accept. In *The Revolution of Celestial Orbs* (*De Revolutionibus Orbium Celestium*), Copernicus stated, well before Galileo, that the earth is not the center of the universe. The church accepted his story because Copernicus kept it separate from the religious story. Differentiation of arguments arising from further observation of the stars and planets made possible the Newtonian view of the universe. Its threshold was such that, in contrast to Galileo's experience, its road to acceptance was much smoother.

Here is a good place for inserting some observations on how the life of stories unfolds. Stories are anticipations. They are about the future and they result in the interaction of human minds. Stories are not independent of each other. For example, the notion of a center of the universe, conveniently associated with the presence of human beings on earth (geocentrism), resulted in the story of Earth's immovability (as religious leaders claimed to have discovered in Scripture, i.e., the religious story). The Aristotelian model of the universe continued into Christian theology through St. Augustine and Thomas Aquinas. But this story was no longer tenable after various astronomers started observing the sky through stronger telescopes. Copernicus' book advanced a different image of the universe, which was indeed accepted by other, though not all, scientists of his time. The bigger story, implicit in Christian theology (itself based on writings derived from the

foundation of religious beliefs), conflicted with the more limited story invented by an astronomer.

Stories can either continue each other (the meliorist model, in which stories are refined, tuned to reflect new experiences) or come into conflict.** Each story contains its own future schisms – whether in science, art, or religion – as it contains the arguments leading to its self-destruction. That the battle among stories can be cruel was documented again and again. In universities, as well as in political systems, economic confrontations, and opposing aesthetic values, the conflict of stories becomes a conflict of persons and institutions. Those involved can become aggressive to an extent not usually associated with the stories themselves. Moreover, stories are carried by the energy of self-confirmation. In each story, the pattern of self-reinforcement closes the cybernetic loop. We see what we predicate and look for more of the same. We measure what we state. Stories are at the same time revealing – of a new perspective – and self-deceptive-one ends up believing (religiously, I would say) his or her own story to the detriment of others. The threshold of each story corresponds to this dual condition (the novelty and the self-deception of the story) on the individual and collective levels of self-constitution.

In our days, the conflict of stories and their interestingness display new characteristics corresponding to the dynamics of our pragmatic framework. Stories have a shorter half-life. Their connectedness is weaker. They emerge and disappear in the context of mediocrity characteristic of commercial democracy (i.e., equal access to consumption). Again, examples will help illustrate what I ascertain. As interesting (and pragmatically relevant) the notion of a united Europe – a story in the making – it is also subject to a threshold corresponding to the revelation of new possibilities, but also of the self-fulfilling prophecy of the predicament. There is a lot to this united Europe that goes well beyond the ability of its citizens' ability to understand: in particular the national structures reconstructed at the level of the Community. It unfolds in an environment of globality which already has Europeans fearing for their work and way of life. Therefore, the story is not always motivating enough to attract people who actually constitute themselves through a national identity (French, German, Spanish, etc.), but who must do so in an entity supposed to overcome national borders. The vicious circle of the equivocal argument for the story can be expressed as follows: A united Europe will be more competitive in the global economy, but in

** Please refer to the article entitled "...That Old Sire," in which the conflict of two stories (the pre-Christian story of myth and ritual and the Christian story of Christmas) is described.

order to be competitive in the global economy, Europe should unite. I mention the story United Europe because in the pragmatic framework of our age, it exemplifies what can go wrong if we do not understand the characteristics of practical experiences in the world today. In order to achieve levels of efficiency corresponding to humankind's new scale of activity, centralism has to be overcome; distribution of tasks and parallelism have to be achieved; a network of effective procedures has to be developed. The processes should not imitate the hierarchic and centralized political structures of industrial society-structures that slow economic progress in practically every European land. They must engage everyone involved in the processes through facilitating self-organization. The Brussels bureaucracy, no less than the various national manifestations of the same, and the nostalgia regarding past (and probably future) dominance are part of the very old Europe story.

So what is interesting?

Let us take only one more contemporary story: the age of computation. The same dynamics applies here as it applied in the case of scientific theories, art, literature, political systems, and so on. Knowledge is expressed more and more through computational, or digital, means. Like many stories, the story of digital technology and the computer became accepted as its interestingness grew and became compatible with commercial democracy. Those rooms full of tubes and tape drives, those office systems that required punchcards and low-paid operators to feed them had no direct impact on people going about their daily activities. The invention of the chip was heralded, but hardly understood (threshold of complexity). Even the first appearance of the Apple computer, with all its user-friendliness advertised in big print, with risks printed fine, was rather a matter of academics. More was going on in universities and laboratories than in offices. "Home office" was hardly a term to be taken seriously. Probably unnoticed at first, personal computers started appearing on desks, first in offices, then in a few homes. By 1984, the rush for home computers – whose low memory capacity, slow speed, and rudimentary interface are laughable by today's standards – was on. With the release of the Internet to the general public after 1985, a new age began. But this story also met resistance before its interestingness captured the public. Writers decried "word-processing" as detrimental to creativity. Most educators condemned the visual aspect of computer games and even educational software, claiming that the com-

puter, along with television, would be harmful to schooling. Even designers, who work in the field of the visual, and especially people who taught design, did not see the computer as a machine to aid their creativity, or that of their students, through the elimination, at least, of repetitive tasks. For them, pencil, eraser, ink, ruler, Hasselblad, paint, paper, stencils, etc. were superior to the computer, which most of them hardly cared to touch. Those who were involved in the development and introduction of computers can only smile when thinking back to those times. Today, digital technology is more accepted and used than understood. The story has been accepted. Yet few users, even few experts in computer technology, realize that the digital age is still in its primitive stages, its infancy. Its story is just begun. They only know that advances are made faster than they can keep up with them, and not only in computers, by which they mean the whole of digital technology. And this brings me back to my own mosaic.

When I arrived in my new homeland, the USA, fresh from the cultural bulwark of Europe, I could not help notice the differences between the two continents, in mentality first of all. However, in 1980, it was a time of ferment in the USA. The Sloan Foundation was inquiring into the state of education in the USA and what comprised a good education for the society of that time and the future. Steve Jobs was going around to universities trying to “sell his Apples.” In general, educators, politicians, and the public were wondering what was happening to education, religion, morals, and every aspect of life contained in the term “traditional values.” After a period of adjustment in which I, too, decried the lack of culture and the general lack of interest in culture, some of the other aspects I had noticed started to fall into focus. Although the American nation had little use for the cultural values I had grown up with and which were still cultivated in Europe, there was a vitality and sense of technological optimism that seemed to drive it. I was fortunate enough to land in a situation that became my laboratory. I taught liberal arts at a school of art and design, but I was also involved in the visual, tactile, auditory, and even olfactory experiences of the creative arts. Because the Rhode Island School of Design was considered “the Harvard of the arts schools,” it attracted students with talent and intellectual curiosity. Across the street, at Brown University, the Computer Science Department was experimenting in various applications of digital technology, in particular, the electronic book. An engineer by training, I contacted the department and became involved in some of the work going on there.

Without my noticing it, the tessellae of my life's mosaic began taking a new form: Training in electronics and computer science, early experiments in programming, my inquiry into creativity through philosophers ranging from the classical Plato to the European Leibniz and Kant to the American Charles Peirce assumed a new form.

To this last philosopher – whose life story seems an abject example of failure – I owed the discovery of the pragmatic dimension of activity and knowledge. Through it, the seemingly disparate elements that comprised the angst of the USA achieved a coherence. I named this space-time relation in societal development “the civilization of illiteracy,” that is, a civilization whose well-being and progress were not dominated by the characteristics of the literate experience. By 1982 – still some years before the story of computers became interesting – a few lectures describing this civilization were presented and articles were published. And I got down to work on the book that would be my magnum opus. It took about ten years of writing, research, observation, and rewriting before a manuscript was ready to present for publication. In the meantime, change was taking place at the speed we are now familiar with. But I discovered, to my dismay, that persons vital to the success of my ideas – publishers and literary agents – were not keeping up with change. Even the literary agent (*nomina odiosa est*) today known for coining the term Third Wave of Culture could not understand, in 1991, the change human society was going through. Change was not a matter of symptoms – that is, the technical and moral manifestations that society blamed as the causes of confusion and discontinuity – but of characteristics deeply ingrained in the human species: the pragmatic, heuristic, and even aesthetic dimensions. We are what we do and how we do it.

Well, the book was finally published. Since 1997, terms such as post-literate, decentralization, non-hierarchic, non-linearity, digital paradigm, and others that my book discusses have become commonplace in the digital society. More than a decade after I introduced and described the new civilization, writers, who include Manuel Castells, Michael Epstein, the self-styled digerati, Third Wavers, and writers for WIRED magazine are attempting to explain the story bit by bit to the rest of the world. They still do not understand the premise on which the whole story is based. If all the computers in the world were to fail, this would hinder, but not stop the process continuing at each new scale of human development. The same digerati and netizens who, for instance, praised Bill Clinton,

president of the USA while the digital evolution became a perceived revolution, as being responsible for the national well-being that this phenomena brought about, can not perceive that everything a president stands for was negated by what I call the new pragmatics of human self-constitution. A president stands for centrality, hierarchy, continuity, and linearity (terms defined in my book and which Professor Frederic Chordá is introducing to readers of Spanish). More than any president before him, Clinton – distracted from exercising presidential duties through the scandals he brought upon himself – demonstrated one of my book's theses: how well an economy can run without a centralized authority, such as a president, presiding over it. “Il faut laisser-faire les hommes” was a statement regarding pragmatics made in the 17th century. It became the motto of the epitome of the civilization of illiteracy even before July 4, 1776. We prove its validity today. As former governor of Texas, President George W. Bush (for whom I would not have voted) is well versed in the notion of non-centrality and distribution of power. He practices (for whatever reason, or lack thereof) a pragmatics more in line with the successful stories of decentralization begun in 1980 in the USA and Britain and continued in Germany and Spain. This is more in keeping with our time than anything that the highly literate Bill Clinton (a Rhodes Scholar, after all, and perhaps the future Chancellor of Oxford University) did as he consolidated power in Washington, DC. And should the USA economy falter after ten years of stellar, but deceptive, performance, this will only correspond to the instability that precedes the coming bifurcation. Such an economic downturn should be regarded as nothing more than what it really is: bumps in the never-ending road of the story that is the most interesting to each of us – human self-constitution.

In writing about the characteristics of interestingness, I realized why my own story of the new civilization did not catch the attention of the representatives of commercial democracies to the extent of making it a bestseller. Nevertheless, I am an optimist. Like the story of humankind, continuously constituting itself through activities and ideas, my story is not finished. Even as I write these lines, new tessellae are being added to the mosaic that is my own self-constitution. Whether the story or the image of this life will attract your interest and influence your own self-constitution is something that you, respected reader, will decide.

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The Message is the Medium

DEAR MARSHALL MCLUHAN:

Even your most faithful followers have a problem with the statement that made you famous. What does it mean that “The medium is the message” (or was it “massage”)? In the global village of our age, people write less to each other but speak more on the telephone or send video-messages to relatives and friends. Probably a letter, as an embodiment of communication in the medium of writing, bears the message that there are still people who write. But that is an incidental message, a sign that literacy is still with us, but not a measure of how effective written communication is today. What matters is that one human being gets together with another by a means other than that of speaking, characteristic of co-presence. Talking into a telephone is something different.

Why do people want to get together? (Getting together is, as you know, the definition of communication, after all.) Well, for many possible reasons! But as different as they can be, the common denominator is pragmatic: People constitute their own identity through what they do. Yes, as I communicate with my readers, incidentally in this magazine through the medium of print, I constitute myself as an author who would like to share his ideas with others. This is my existence, as yours, dear Reader, is to make an effort to comprehend. In other situations, a professor constitutes himself or herself in the practical act of teaching, as students constitute their identity in the act of comprehending and eventually accepting or rejecting what they are taught. Workers constitute themselves through their activity. They communicate insofar as they bring together their abilities, expressed in what they make, with the people who need what they produce. This is what communication is all about. Based on this comprehension, and sometimes miscomprehension, communication continues. It arches over generations and is significant for the conflict between them as well as for what we perceive as historic continuity.

So, dear Marshall McLuhan, how can you state, and how can so many people who came after you repeat, that the medium is the message? Sure, I realize that you wanted to address communication aspects in the age of television. After remaining glued to the TV screen almost 50% of one's active life (some people even sleep with the TV on) and adding up what that person gained through televiewing, the sum is surprisingly small. Very little sticks; messages vanish in the feeling of telepresence. Everything becomes the instant. After all is said and done, what remains is the statement "I watched TV," along with the reality that in the meanwhile, we gave our precious limited time away to the goddess of the glass screen. Terminal culture, as the expression goes. O.J. Simpson's trial, a veritable orgy of images from Los Angeles, the battle for Grozny, the most recent celebration of Karl Lagerfeld, a new perfume, the earthquake in Kobe, a concert, all mixed together as they succeed each other or live in parallel on 20, 30, 40 or more channels. Up to 500, mind you. Still, the message is not the TV, since the television medium can be so powerful in conveying data in education and training, in political activism. There is no political movement today that does not look for the video camera. The stage is the world, either for candidates for the presidency, candidates for the electric chair, terrorists, and fighters for a better world. The message is the medium, pervasive, omnipresent, manipulative. As I write these lines to you, my computer keeps beeping to notify me that more messages are arriving from all over the world at my e-mail address. And I know that the computer is not the message. The opposite is true: the message becomes the computer as this collects in-coming e-mail messages or embodies information in images, sounds, or combinations thereof. The message is the multimedia.

Assuming that I am right – the message is the medium – what are the pragmatic consequences of such a predicament? Let me try to articulate my argument through a succession of theses:

1. The continuous multiplication of media corresponds to our need and, indeed, to our ability to individualize communication. Some people read and write, some know how to draw, some understand images, some understand sounds better. The tactile element is important to many people, smell and taste to others. We are at a momentous juncture in human life in which instead of one dominant medium geared towards mass communication (one message for all), we have many still unfolding media geared towards individual, personalized communication. The change is of historic significance. It reconfirms the individualistic spirit of the times, as good or as bad as this can be. This multiplication of media also provides the possibility of better defining the goal of communication. Yesterday, in the village, everyone knew each other. In the age of mass media, we know of each other, but we know each other less and less. Do we need to know each

other? The village instinct we carry with us makes us say “Yes!” But let’s think about it. In the village, survival was a matter of cooperation. In the global village, the issue is not survival, but efficiency. In the information age, we know each other through what we exchange.

2. Shorter cycles of human activity result in patterns of fleeting communication. As we replace natural rhythms (of the succession of day and night, of seasons, of biological growth and degradation, etc.) with the artificial beats of chemical and biological synthesis or chip clocks, our natural desire for togetherness is replaced by the attraction towards faster change. Fashion, family commitments, political allegiances, and eating habits change as fast as scientific theories or the design of our watches and cars. The age of memoirs and letter writing is overtaken by the time of log-in records and filtered e-mail messages. We want from more people the little that each can give us, instead of from one or two or three the much they were supposed to offer. Communication in the fast lane changes church, school, community life, love, and even the relation between parents and children. But the result is our ability to handle change instead of opposing it. Faster and more differentiated communication frees us from the control of censors. (Unfortunately it does not yet free us from superstition and prejudice, much of which is transmitted via the information highway.)
3. The dynamics of communication is expressed in the dynamics of new media. Scary, really scary, dear Marshall McLuhan, how inefficiently we communicate today. But not because of the means we use. Sometimes less than 1% of what is communicated makes it to the intended audience. We print enormous billboards, spend fortunes on TV advertisement, and make a weekend newspaper weigh as much as the bread we eat in a whole week in order to achieve a laughable efficiency. How come? The overhead of our literacy-based communication is so heavy that it literally chokes the medium—be it print or video. Too bad you cannot join me in the many experiences of new media! The experience of a virtual reality application, let’s say the docking of molecules, makes the message of the experience identical to the medium. It is here that knowledge turns into experience. The dynamics it reports about is the dynamics of the means through which the report comes together. No, I am not naive. I know, dear Marshall McLuhan, that such powerful communication tools can be terribly misused. Extremist forces are quite swift to adopt electronic billboards and the photonic information highways. The paradox is that progressive thinking people still debate how good or bad the new communication is, while neo-Nazis, for instance, make effective use of it. The military as innovative force—think of this and realize how dangerous it could be if your formula “The medium is the message” were true. I am sure you would feel relieved to find that this is not the case.

Well, more, much more can be said. More theses can be formulated. And more of what you so daringly anticipated as the new Information Age unfolded can be challenged. I would feel that I betrayed you and the spirit of your work if I were not to end by pointing out that my own thoughts could not have been possible without you. What you wrote was a major challenge to communication theories originating from a practical context dominated by literacy-based values. What we can do is to adopt your attitude. Challenging your ideas is only the normal consequence. As communication literally becomes the dominant activity of our time, and the fastest growing business in the world, the message is the medium, actually the media, and more so multimedia. Never before has plurality been more celebrated...and abused!

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The Architecture of Thought

THE UNIVERSITY IS DYING. No, this is not a case of “The university is dead. Long live the university,” because in no way is the new university a continuation of the old model with a new face. What is happening in the university, and with learning in general, represents a discontinuity similar to a revolution. It is high time to understand the new aspects of knowledge



The School of Athens, as depicted by Raphael on a fresco in the Stanza della Segnatura of the Vatican, serves as the archetype of the Academy. The Socratic dialog is represented in the center.

*The Tower of Knowledge. A student is brought to the “Tower of Wisdom” in which the teachers are seated. The architectural structuring depicts the boundaries of the various faculties. Theology sits above them all. (Source: R.A. Müller, *The History of the University*)*

dissemination, as well as to develop and implement them. That’s why a new architecture is important in the first place. But first the classical notion of a university has to be demolished. The following paragraphs will explain why.

The academy, based on the School of Athens, served as the archetype for learning. There, Socratic dialog – the encounter of individuals on equal footing – was the basis of all education. The structure of the university stands in contrast to this model. When constituting the university, medieval western culture applied a structure that through its architecture embodied the cognitive aspects that contributed to the very establishment of the university. Since the 12th century, the same syllabi – courses in the seven fine arts, philosophy, and theology – have been taught throughout the West-

ern world. If any modification was made, this was applied to subject matter, but not the structure itself. Today's university still bears the stamp of hierarchy and centralism. It passively assumes the attitude that all knowledge is permanent and can be transmitted to posterity in a sequential and linear fashion. At the same time, the university renounced the characteristics that mark the eternal struggle for truth: interactivity, empiricism, individuality, pragmatism, rationality, openness.

In the light of new exigencies and new ways of meeting them, these attitudes no longer serve the university or society. Today's knowledge bears the mark of a new and different dynamics. Centrality (of power, thought, or science) is replaced by dynamically distributed nodes of interaction. The verticality of hierarchy gives way more and more to horizontal, reciprocal human interaction. Determinism, which consisted of a clear relation between cause (e.g., better instruction) and effect (e.g., the student's future effectiveness) lost its predictive ability long ago. Each day, people become aware of non-deterministic processes. We live with non-linearity. We discover that chaos is necessary for creativity. We know that knowledge is relative, that eternity is becoming shorter and shorter, that instruction must provide for feedback and review, and that we will have to study all our lives.

Where is the university that displays any awareness of this state of affairs? Where is the university that replaces the industrial model of education with the active collaboration of students and teachers? Where is the university that reflects the fact that today knowledge is more "computational"? Architects have not yet drawn up blueprints for this university. Neither have education experts or policy-makers given it any thought.

Information matrix

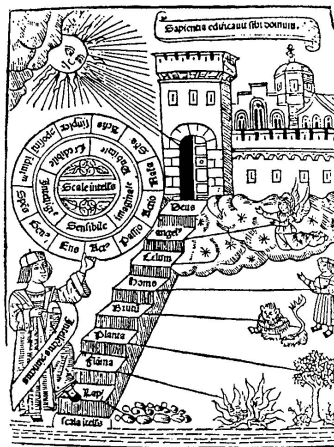
People live more and more in an information matrix, in which they are able both to work and to study. Fast networks, centers of multimedia input and distribution of knowledge, improved interfaces, and, above all, more possibilities to carry on and optimize human interaction should go into the blueprints for the new architecture. The Socratic ideal of one-to-one dialog is probably easier to attain today than during any other time – not by erecting walls and other architectural elements, but by investigating the architecture of the human mind and its potentiality.

Just as distributed forms of praxis increasingly affect our lives, the new architecture should assure that in the future, each person will have the oppor-

tunity to study throughout his/her life. In view of this, it becomes incumbent upon educators to complement centralized places of learning with an appropriate space for learning in our living and working places. In addition to abandoning old structures, the new university must have an architecture that is transparent. This means that individuals will be able to know what lies behind their learning, the sources of all information that reaches them. It must be dynamically guided by the needs and characteristics of the studying individual. It must be open to interaction and reflect the global condition of human existence. These are the characteristics going into the research project entitled SOPHIA-Digital Dissemination of Knowledge, which is being carried on within the framework of the Computational Design Program at the University of Wuppertal.

Formative structures

Social formative forces are not abstract. Religious dogma, scientific information (data), social expectations – these and more are expressed in the



The University as Learning Factory: fortress, barracks, and chapel areas. This layout for the University Wuppertal was made in 1972. Even afterwards, schools were not built differently.

Lullus' staircase.
Raimundus Lullus: Liber de ascensu et descensu.
An example of the hierarchic structuring of life and learning. Gothic wisdom dwells in a fortress. (Source: Francis A. Yates, Thought and Memory.)

architecture of their structures, through which they make a visible impression. If architecture can be considered a medium, it can also be considered as formative. The correspondence between built architecture and idea is alluded to in the metaphor “Buildings for Thought” (*Gedankengebäude*).

Whoever prefers to continue along the line of the medieval university, now or in the future, has yet to find a valid model for doing so. Medieval and populist metaphors still determine the physical architecture of colleges, as well as the structure of the administration, and, to all appearance, the

notion of knowledge dissemination in general. Is this the way to go?

The disciplines making up today's science, technology, and humanities seem incapable of presenting society with an image of their mission. Architects, artists, and designers, who are among the people able to visualize ideas and who belong to professions with some scientific elements, can make their specific contribution to the new forms that education and learning are taking. There are cases in which information cannot be expressed through the spoken and printed word. Visualization through images or symbols is more reliable. Context is the decisive arbiter in such cases.

Context

In a cathedral, the constructed context gives the word weight and meaning. People experience the constructed space in which they move. The acoustics of a cathedral has more resonance and heightens and expands the experience. The images in cathedral windows are lit from without and impress the viewer with their lessons. The odor of cool, moist air, the direct corporeal effect of incense, the patina of old pews and steps, of cold stone, warm wood, and the shine of gold – this ensemble of synaesthetic impressions link abstract content with concrete impressions that enhance one another.

The example of the cathedral is not accidental here. The outdated architecture of the university is in many ways an extension of the monolithic church. People now need synaesthesia more than ever, but one that is different from the architecture that isolated clerics and medieval university students from the real world. Even scholars and professionals in the arts used the metaphor of the cathedral when referring to the developing industrial culture. "Back to the building!" That's what Gropius sought in his Bauhaus Manifesto of 1919 during a time of unprecedented dynamic unfolding of productive power. As "mother" of all arts and crafts, architecture should be the power behind new developments. However, social relations are less and less determined by buildings or constructions and more and more by new phenomena, such as energy infrastructure, transportation of people and merchandise, transmission of news through wires and satellites.

As things stand

No one will deny that today's university is in bad shape. No one would even care to defend its new architecture of box-like structures with bare concrete

walls erected to resemble a maze. The best one can say about them all is that they reflect a lack of imagination: they reveal that university administrators, boards of directors and educators themselves have no concept of what contemporary education and science is all about. Learning is carried on as the production of added value in the hope that the university remain an economically viable institution. Those responsible do not perceive education as arising from an impulse towards knowledge, but from a need to maintain their positions of authority. Success is viewed in relation to the number of certificates, diplomas, and titles conferred. The situation of students is comparable to hens in those egg-laying factories where the biological rhythm of hens is controlled in order to exact the maximum from them. No one has a desire to correct the unecological and anti-ecological effects that thousands of students suffer as they assemble in a large room, where professors mechanically give them the same material, and in laboratories, where reality is chopped into small pieces and fed to them.

As beautiful as some university campuses may be, theirs is the beauty of the cathedral, cloister, and castle of the Middle Ages. The architecture of the university buildings of Paris, Bologna, Oxford, Cambridge, Krakow, Heidelberg, and Salamanca are the expression of a particular spiritual perspective. But they are also examples of an attitude towards education. This attitude, once divorced from its architecture, is not appropriate to today's quest for learning.

A new architecture for a new way of learning

A novel dynamics of learning is in the process of invalidating the rigid structure of learning that university architecture exemplifies. Learning is becoming more flexible and decentralized as access to information and knowledge is made available at a faster rate and through interactive media. Universities should respond to these changing conditions by becoming more flexible themselves, by breaking down the barriers to learning: the towers in which educators seclude themselves from the outside world; the walls erected between disciplines; the large auditoriums in which information is delivered, but not exchanged; laboratories in which equipment quickly becomes outdated. Universities must become areas of interaction and interdisciplinarity. They must learn to interact with worldly demands in a proactive way. Just as society has become ecologically conscientious – more due to reasons of survival than to a romantic notion of living on the land – so must

educators explore the alternatives to the factory that the university system has become. (Unfortunately, not even the architecture of Le Corbusier is up to this task.)

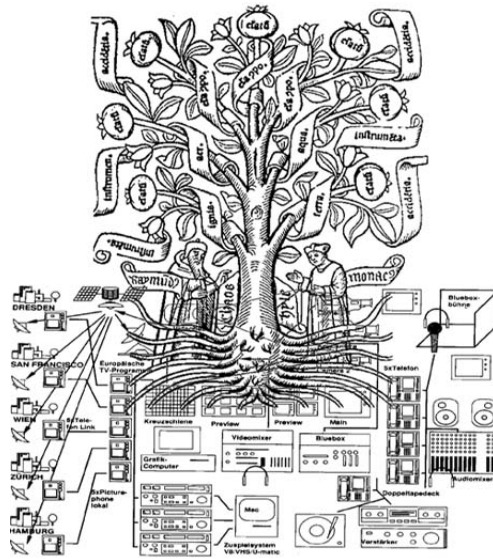
The image of dynamic structures in architecture was developed in the 1960s through the work of Superstudio and Archigram. This was as much of a political necessity as was the opening of education itself to more people. In *Learning from Las Vegas*, architecture was viewed from the perspective of driving by in an automobile: dynamic, 2-dimensional, and impressive. Today, in the age of electronic communication, network architectures will be the formative power behind society. How will acceptance be determined? Who will be able to do what with whom? And the central questions for architecture will be: How will the connection between physical presence and body-less thinking be made? Where will learning, as a social process, find its appropriate environment? When I need direct contact with a colleague, will teleconnection be good enough? How can I access information that is not best mediated through visualization and simulation? What effect will new technology have on urban and open-space planning?

Technology is made available faster than it can be applied. The collective consciousness, however, has not yet grown sufficiently to respond to the potential presented by technology and the changes it will bring to our architecture of thought. Models still have to be developed. How should the

Superstudio. Free individuals who can spontaneously move about in an information matrix. This Utopia was visualized on posters and in film in 1972 by the Italian architectural firm Superstudio. (Source: Museum of Modern Art, Italy, The new domestic landscape, New York, 1972.)



The Gnoseological Platform. Interactive, multimedial, and connected media support knowledge generation and dissemination. The network architecture allows for varied and individual access. (Source: Digital collage by the author taken from Raimundus Lullus, Arbor scientiae, Lyon, 1515 and a diagram for a multimedia station). This gnoseological platform is representative for the understanding of knowledge dissemination according the computational design conception of learning in the digital age.



This gnoseological platform is representative for the understanding of knowledge dissemination according the computational design conception of learning in the digital age.

The new university must be more than an alternative to the outdated monolithic structure of education. It must exemplify a new architecture that functions at a new level. The question is not “How do we construct the next graduate processing plant?” but “How do we create a space for human interaction that corresponds to a reality in which knowledge is generated and regenerated in ever shorter cycles; in which new domains of knowledge are established; and in which the highest form of democracy is reflected – one that is not based on equal access to mediocrity, but to the development of free individuals through free access to learning?”

History and Awareness of the Future

LET US FACE IT: As science, especially in its computational forms, assumes the leading role in the fundamental transition from industrial to post-literate pragmatics, it has appropriated the human mind as its most important subject. Indeed, as long as psychology delved into the depths of how we understand each other and the world, the humanities (the Germans call the domain *Geistwissenschaften*, the French, *sciences humaines et sociales* [conferring the title Maitre ès lettres], the Spaniards, *humanidades*) had a strong hold on the mind. Cogito, i.e., thinking, which entails mind processes, defines the species, and hence the humanities. Eventually, scholars and researchers in the humanities imported the specialized vocabulary of physics, mathematics, chemistry, and biology in order to describe the relation between brain and mind. They also accepted the input of medical research, although the brain remained more the subject of superficial measurements, such as weight, size, and the like that are connected to an infantile fascination with genius and to the concern for cerebral malfunction. Anthropology and, to a lesser extent, history had a firm claim to the question: How did the human mind evolve? They tried to discover the answer by analyzing the variety of ways in which the mind left its imprint on what people do, on how people constitute themselves through practical activities. (Self-constitution is a term I introduced in *The Civilization of Illiteracy*, also presented in this issue.) Hunting, foraging, farming, trading, governing, working in a factory, are a few of the examples of self-constitution amply studied by anthropologists and historians. In each act of self-constitution the human mind in interaction with other minds is the driving force. Hence, to study the past of the human being is to study how people, hence minds, interact.

But things change as we enter the age of a pragmatic framework whose underlying structure is the paradigm of information processing, networking, decentralization, heterogeneity, task distribution, and non-determinism, to name a few of its characteristics. The computer, in its many possible forms (from the dominant one-step-at-a-time von Neumann machine to massively parallel machines, neural networks, optical computers, signal processing, biocomputing, and soon quantum computation) embodies part of the new age. Genetics, as a qualitatively different information-based model, is yet another manifestation of this age. Networking – from the now trivial Internet and distributed World-Wide Web to the fast emerging continuum of wireless ubiquitous computing – is yet another expression of this

age. But foremost, this new age is marked by the solid expropriation of the mind by the sciences – cognitive science, artificial intelligence, artificial life, neurocomputation, brain mapping, and others. While anthropologists and historians grabbed the chance to integrate data processing in their endeavors, becoming mainly the “accountants” of the past, or a new kind of “storyteller” who derives narrations from records, the sciences took over the mind.

Scientists promised – and how much ignorance and impertinence the promise contains is not for me to judge – to decipher its mysteries. In 1970, Marvin Minsky, a prominent researcher in artificial intelligence claimed:

In from three to eight years, we will have a machine with the general intelligence of an average human being. I mean a machine that will be able to read Shakespeare, grease a car, play office politics, tell a joke, have a fight. At that point, the machine will begin to educate itself with fantastic speed. In a few months, it will be at genius level, and a few months after that, its power will be incalculable, (cf. *The Virtual Duck and the Endangered Nightingale*, *Digital Media*, June 5 1995, pp. 68-74).

Minsky was serious, as serious as researchers who today hook the brains of mice to a computer in order to see how learning affects brain growth, not understanding that learning is mind interaction, not the electric stimulation of the brain. Since these scientists maintain to know a lot about hardware, programming, sectioning brains, and describing – mathematically, logically, or computationally – how humans think about things (common sense as a subject for computer scientists!), this machine-based knowledge formed the basis for their fatuous optimism.

In going over these lines, written for readers of a journal that addresses history and anthropology by a person who belongs to the scientific community, one could justifiably ask whether I am not an irresponsible crewman hastening to flee a superb Titanic, replete with all the marvelous technology available today, that hits an iceberg and slowly sinks. No, I do not predict the demise of computational science. In every new gadget, I see the promise of an exciting future. Moreover, I am enthusiastic about the next phase of computation. Once digital technology grows out of its current infancy, humankind will experience a real transformation that will affect it even more deeply than digital technology does today. The most amazing result will be the confirmation of the dominant role of human minds in action. That is, human knowledge will play a greater role than it ever has in its history. My lines here are a way of explaining why, and arguing for, the re-appropriation of the mind by anthropology, history, and other humanistic endeavors.

Indeed, I am happy that my text, *Mind – Anticipation and Chaos* – originally published in English and German in a prestigious series whose list of authors included Nobel Prize

winners – is now available in Spanish, and that readers of this journal will be the first to see it. The reason for my happiness is neither pride nor ego, but the hope that you will give life to the notions I advance in the book. A theory is not worth the ink it takes to put on paper if it does not affect practical experiences.

Minds exist only in the plural. You will read this statement in the text. I repeat it here because in the constitution of human minds today, we interact with minds that were – your subject of choice and passion – and minds that will be – the real subject of history, in my opinion. Dialog is only one form through which this interaction takes place.

Anthropology and history have, at worst, to account for the change in the dynamics of mind interaction over time, in the many forms of dialog in which it was expressed. At best, the account must testify to the anticipatory nature of mind processes. If the dominant model of today's (i.e., the physical determinism of Descartes and Newton) were to remain the implicit "ideology," the backbone of anthropology and history, we will only find out what happened when and be led to interpretations easy to manipulate. Fascism and communism took their chances at manipulating history; the new commercial democracy of the so-called free market economy and the new world order are actively at work raping history before our eyes, and sometimes with our own participation. The mind's anticipatory characteristic is important to you because it opens a door to Why? Without this question, I personally see no justification for either anthropology or history, or any other human endeavor towards research and development. When I claim that the subject of history is the future, not the past, I do so in full awareness of the provocative nature of the statement, but also with a sense of responsibility. As the experiences of the past for all purposes ceased to confirm Santayana's noble adage, "Those who fail to learn from the mistakes of the past are condemned to repeat them," we are faced with the expectation that historians address the future via the path of anticipation that connects experiences human self-constitution through answers to the question Why? After all, human beings always constitute themselves in anticipation of something: a better life, love, social order, political goals, performance in sports, artistic or literary recognition, improved communication. This future state, sometimes expressed in Utopian documents or even in utopian practical experiences, affect their current state. The future affects the present, and thus history.

As I write these thoughts, a very important scientific observations reached me from a congress in which natural historians (geologists, paleontologists, biologists, etc.) participated. I quote from a paper on mammalian evolution:

Typically, there is greater turnover millions of years before and after the time of climactic change than during the climactic event itself. This pattern suggests that the climactic control on mammalian evolution is much more complex than previously

supposed, that intrinsic biotic controls may be more important than extrinsic environmental controls,(cf. Does climactic change drive mammalian evolution? in *GSA Today*, vol. 9, no. 9, Sept. 1999, pp. 1-7).

You, as historians, will immediately recognize here how the future drives the present – and this holds true for revolutions, social institutions, the evolution of power structures, among other things. Concretely, history could, and should, focus on correlations – a difficult task for those who until now have considered that the arrow of time can move only from the past through the present towards the future. There is more and better history on the opposite path. Take your time. The human mind operates quite naturally in both directions.

Let techno-freaks and immature scientists continue with their spectacular obsession with How? The world can only rejoice that this obsession results in technological progress. But do not give up, anthropologists, historians, and humanists of all stripe! Indeed, restate your claim to the mind and make it your central purpose. Because if no one does it, we might end up enjoying the most amazing of all worlds, but in a state of melancholy of a no less amazing scale. Short of asking and finding out Why? we do what we do – work, love, eat, argue, participate in sports, dress in the latest fashion, build cities, go to war, and so much more – we are cursed to a depression that might eradicate our species before any physical catastrophe, including the human-made variety, could.

Introduction to the Spanish-language edition of *Mind – Anticipation and Chaos*

Anticipation – A Spooky Computation

ROBERT ROSEN, IN MEMORIAM

Abstract

As the subject of anticipation claims its legitimate place in current scientific and technological inquiry, researchers from various disciplines (e.g., computation, artificial intelligence, biology, logic, art theory) make headway in a territory of unusual aspects of knowledge and epistemology. Under the heading anticipation, we encounter subjects such as robotics, advanced research in biology (defining the living) and medicine (especially genetically transmitted disease), along with fascinating studies in art (music, in particular). These make up a broad variety of fundamental and applied research focused on a controversial concept. Inspired by none other than Einstein – he referred to spooky actions at distance, i.e., what became known as quantum non-locality – the title of the paper is meant to submit my hypothesis that such processes are related to quantum non-locality. The second goal of this paper is to offer a cognitive framework – based on my early work on mind processes (1988) – within which the variety of anticipatory horizons invoked today finds a grounding that is both scientifically relevant and epistemologically coherent. The third goal of this paper is to identify the broad conceptual categories under which we can identify progress made so far and possible directions to follow. The fourth and final goal is to submit a co-relation view of anticipation and to integrate the inclusive recursion in a logic of relations that handles co-relations.

Introduction

Anticipation could become the new frontier in science. Frontiers mark stark discontinuities that ascertain fundamentally new knowledge horizons. Einstein stated, “No problem can be solved from the same consciousness that created it. We must learn to see the world anew.” It is in this respect that I find it extremely important to begin by putting the entire effort into a broad perspective.

The Philosophic Foundation of Anticipation is not Trivial

Robert Rosen (1985), who is one of the first to address the subject of anticipation, quoted David Hawkins, “Philosophy may be ignored but not escaped.”

Anticipation bears a heavy burden of interpretations. To recover the concept, after it became associated with metaphysics and pseudo-science, and to give it a scientific foundation is a difficult task. We face here the dominant deterministic view inspired by a model of the universe in which a net distinction between cause and effect can be made. We also face a reductionist understanding of the world, which claims that physics is paradigmatic for everything else. Moreover, we are captive to an understanding of time and space that corresponds to the mathematical descriptions of the physical world. (Time is uniquely defined along the arrow from past to future; space is homogeneous.) Finally, we are given to the hope that science leads to laws on whose basis we might make accurate predictions. Once we accept these laws, anticipation can at best be accepted as one of these predictions, but not as a legitimate scientific endeavor.

A clear image of the difficulties in establishing a foundation for anticipation results from revisiting Rosen’s work on anticipatory systems, above all his fundamental work, *Life Itself* (1991). Indeed, his rigorous argumentation, based on solid mathematical work and on a grounding in biology second to none among his peers, makes sense only against the background of the philosophic considerations set forth in his writings. It might not matter to a computer programmer whether Aristotle’s *causa finalis* or efficient cause can be ascertained or justified, or deemed as *passé* and unacceptable. A programmer’s philosophy does not directly affect lines of code; neither do disputes among those partial to a certain view of the world. What is affected is the general perspective, the understanding of the meaning of a program. If the program displays characteristics of anticipation, the philosophic grounding might affect the realization that within a given condition – such as the one embodied in a machine – the simulation of anticipatory features should not be construed as anticipation *per se*.

The philosophic foundation is also a prerequisite for defining how far the field can be extended without ending up in a different cognitive realm. From my own perspective – based on pragmatics, which means grounding in the practical experience through which humans become what they are – anticipation corresponds to a characteristic of live beings as they attain the condition at which they constitute their own nature. At this level, predictive models of themselves become possible, and progressively necessary. The thematization of anticipation, which as far as we know is a human being’s expression of self-awareness and connectedness, is only one aspect of this stage in the unfolding of our species. According to the premise of this perspective, pragmatics – expressed in what we do and how and why we do what we do – is where our understanding of anticipation originates. This is

also where it returns, in the form of optimizing our actions, including those of defining what these actions should be, what sequence they follow, and how we evaluate them. All these are projections against a future towards which each of us is moving, all tainted by some form of finality (telos), or at least by its less disputed relative called intentionality. The generic why of our existence is embedded in this intentionality. The source of this finality are the others, those we interact with either in cooperating or in competing, or in a sense of belonging, which over time allowed for the constitution of the identity called humanness. Gordon Pask, the almost legendary cybernetician, called such an entity a cognitive system.

Self-entailment and anticipation

In a dialog on entailment – a fundamental concept in Rosen’s explanation of anticipation – a line originating with François Jacob was dropped: “Theories come and go, the frog stays.” (Incidentally, Jacob is the author of *The Logic of Life*, Princeton University Press, 1993). This brings us back to a question formulated above: Does it matter to a programmer (the reader may substitute his/her profession for the word programmer) that anticipation is based on the self-entailment characteristic of the living? Or that evolution is the source of entailment? If we compare the various types of computation acknowledged since people started building computers and writing software programs, we find that during the syntactically driven initial phases, such considerations actually could not affect the pragmatics of programming. Only relatively recently has a rudimentary semantic dimension been added to computation. In the final analysis, it does not matter which microelectronics, which computer architecture, what kinds of programming languages and operating systems, what kinds of networks and communication protocols are used. For all practical purposes, what matters is that between the world and the computation pertinent to some aspects of this world, the relations are still extremely limited. If the programmer is not only in the business of writing lines of code for a specific application, then it matters that there is something like self-entailment. It matters, too, that the notion of self-entailment supports more adequate explanations of biological processes than any other concept of physics, chemistry, and other physical sciences.

However, once the pragmatic level is reached (we are still far from this), understanding the philosophic implications of the nature and condition of anticipation becomes crucial. The reason for this is that it is not at all clear that characteristics of the living – self-repair, metabolism, or anticipation – can be effectively embodied in machines. This is why the notion of frontier science was mentioned in the Introduction. The frontier is that of conceiving and implementing life-like systems. Whether Rosen’s (M, R)-model, defined by metabolism and repair, or others, such as those advanced in neural networks, evolutionary computation, or what has become known as ALife (the field of inquiry into artificial life)

will qualify as necessary and sufficient for making anticipation possible outside the realm of the living remains to be seen. I (Nadin, 1988, 1991) argue for computers with a variable configuration based on anticipatory procedures. This model is inspired by the dynamics of the constitution and interaction of minds, but does not suggest an imitation of such processes. The issue is not, however, reducible to means (digital computation, algorithmic, non-algorithmic, or heterogeneous processing, signal processing, quantum computation, etc.), but to the encompassing goal.

Specializations

To nobody's surprise, anticipation, in some form or another, is part of the research program of the mathematics of dynamic systems, of logic, of cognitive science, of computer science, of robotics, of networking, of molecular biology, of genetics, of medicine, of art and design, of nanotechnology, and of ALife. Anticipation involves semiotic notions, as it involves a deep understanding of complexity, or, better yet, of an improved complex of complexity that integrates quantitative and qualitative aspects.

It is not at all clear that full-fledged anticipation, in the form of machine-supported anticipatory functioning, is a goal within the reach of the species through whose cognitive characteristics it came into being and who became aware of it. Machines, or computations, for those who focus on the various data processing machines, able to anticipate earthquakes, hurricanes, aesthetic satisfaction, disease, financial market performance, lottery drawings, military actions, scientific breakthroughs, social unrest, irrational human behavior, etc., could well claim total control of our universe of existence. Indeed, to correctly anticipate is to be in control. This rather simplistic image of machines or computations able to anticipate cannot be disregarded or relegated to science fiction. Cloning is here to stay; so are many techniques embodying the once disreputed *causa finalis*. Each time a writer works on a poem or a novel, on a drama or a film script, a final result – the poem, the finished novel, the play, the future movie – a potential future influences the present. Indeed, there is a final cause in every literary work, as there is a final cause in architectural works, inventions of all kinds – not to mention the final cause implicit in loving. Extremely sophisticated research shows that beauty is a factor in the survival of the species. That is, the beauty implicit in the pairing of birds is in anticipation of their fecundity, that is, their survival in the final analysis.

A philosophic foundation of anticipation has to entertain the many questions and aspects that pertain to the basic assertion according to which anticipation reflects part of our cognitive make-up, moreover, constitutes its foundation. Even if Kuhn's model of scientific paradigm change had not been abused to the extent of its trivialization, I would avoid the suggestion that anticipation is a new paradigm. Rather, as a frontier in science, it transcends

its many specializations as it establishes the requirement for a different way of thinking, a fundamentally different epistemological foundation.

• • •

A new way of thinking

An anticipatory system is one whose current state is dependent, not upon a previous state, but upon a future state. We know that the migrations of birds and fish, the behavior of the human immune system, moreover our understanding of language, display anticipatory features. Migrating birds do not have any notion or experience of winter; still, the coming winter (a future state) affects their collective behavior along a time vector working from future to present. We know that when humans speak to each other, we anticipate words to come and their meanings before such words are uttered or before the sentence had the time to convey any coherent idea. And we know that, in some cases, such as gambling, scientific research (discoveries, for instance), or aesthetic production, anticipation is part of the process through which current results are obtained. Human interaction is anticipatory in nature. We like or dislike one another not on the basis of previous experience, but on the evaluation of future experiences (the famous first 20 seconds of an interview).

Nevertheless, we are so captive to the dominant deterministic model that we refuse to realize the different quality of anticipatory processes. Accordingly, we are madly in love with and obsessed by measuring everything. Consequently, humans generate data *ad infinitum*, from which a small part will prove of any significance. An anticipatory perspective could free us from the never-ending infatuation with data, i.e., quantitative perception of the world, and guide us in the world of qualitative distinctions. For this to happen, a new way of thinking is a necessary premise.

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Aesthetics

The Aesthetic Compass

Art and Technology

Science and Beauty

Negotiating the World of Make-Believe: The Aesthetic Compass (excerpt)

ONE OF THE THESES of this article is that in the virtual reality (VR) domain, as in any other form of human activity, the efficiency of the activity depends upon its underlying aesthetics. The degree of acceptance of new scientific and technological means, methods, and perspectives reflects expectations of human practice more than anything else. The aesthetic component, as difficult to formalize and encode as it is, affects the legitimacy of innovative endeavors, which VR definitely is, by ultimately affecting its efficiency. Hype and hope mix easily in reality, but even more in the realm of the virtual. The expectation of a strict definition of VR might seem an issue of academic interest only. But once we address the encompassing aspect of effectiveness in this field – effectiveness being its *raison d'être* – we rapidly understand that specificity, i.e., precise scientific and epistemological identity, is reflected in design expectations and requirements for VR applications. These can be seen as instantiations of aesthetic exigencies.

That this critical point is not obvious or, if accepted, not appropriately understood by all concerned, became clear in the process of having this article judiciously reviewed for publication. One of the reviewers noted that, according to his or her observations, professionals in the field are “deeply concerned with what the author refers to as aesthetics.” The reviewer further states that, “all developers and requirements-setters in the VR field with whom I am familiar bemoan the lack of 1000MHz RISC processors; weak operating systems; slow low bandwidth I/O [input/output]. They want more computational power so that they can create a truly engaging immersive VR experience, i.e., one with appropriate aesthetics.” It is fair to state at this point that, in the critical remark just quoted, the reviewer provided a focus point. After I reworked the article, its subject can be summarized in the following questions: Given the progress in real-time computation against the background of which VR became possible, is it enough to increase performance (of chips and of I/O processes, for instance) and robustness of operating systems in order to achieve goals of

increased efficiency? Or are they aspects above and beyond, in a realm defined as aesthetics, to be considered and embodied in this particular form of computation? If such aspects can be identified, how does one proceed with practical solutions that translate into better products and improved concepts?

To address these related questions, I shall provide a sequence of arguments originating from aesthetics, semiotics, cognitive science, and computer science. The sequence goes like this:

1. Define the art, science, and technology of VR (short historic and methodic perspective) as a new pragmatic endeavor; explain the aesthetic as formative mold and perceptual filter.
2. Discuss the para-real, i.e., the world of human ideas and dynamic representations; deal with make-believe as an aesthetic problem translated into real-time computational performance.
3. Approach the aesthetic as a frame for integration (how to substitute, how to complement, how to augment).
4. Conclude with the constitution of the meta-symbolic artifact.

For the science and technology of real-time systems, in particular those defined as VR, the benefit of these arguments should be found in concrete suggestions. These suggestions regard the sui generis trade-off between increasingly available means and never decreasing aesthetic expectations, as these become critical for the efficiency of the application (regardless of its nature). In the suggestions submitted, the role and nature of representations will be specifically addressed, as will be the broader issue of integration of multi-sensory data. The general conclusion towards which the arguments tend is that to advance the state of practice in real-time systems, and by association in virtual reality, we would need, if not as much progress in science and technology, than actually more in our awareness of the cognitive processes pertinent to the generation of an effective underlying aesthetics appropriate to the particular VR application. In the absence of such an underlying aesthetics, the interactive quality of the immersive experience is not possible, or, more precisely, it is only as successful as its underlying aesthetics.

A world of ideas

As a non-command type of computation, VR generates families of possibilities around an abstract model of the human being. What is returned in VR is not one of the values stored in the cubicles of a database, but a virtual object and its “rules” for functioning. The abstract human being of the model is instantiated by the real user. Accordingly, what in the seman-

tic realm prior to VR was the fundamental focus on encoding aesthetic rules in programs and decoding the meaning of graphics, animation, synthesized sound sequences or combinations thereof, becomes in VR the need to aesthetically and functionally make believe. In fact, VR is a world of ideas, digitally driven, animated by the individual or individuals entering it.

The problem of effective make-believe is not trivial because as things stand, VR is not only an oxymoron as an expression, but also as a construct: how to override the user's "natural" senses while interfacing them to VR through sensory I/O devices. In a way, theater, and moreover the experiences of cinematography and television, attempted the same. No surprise, then, that some of the most successful ideas regarding how to make good VR applications come from either people who know something about theater or from people who revisited film theories. So, can we look for answers to the very complex questions of VR in the aesthetic theories or practice of theater, film, or television?

As attractive as ideas coming from theater, film, and video can be in helping those who design VR applications to understand the relation between computation and underlying aesthetics, they actually are no more than sensitizers. Actors and playwrights do it for theater; actors with very different skills and scriptwriters do it for film and television. In VR, we expect this to happen as the immersed individual "writes" a script and "interprets" it at the same time. This is a medium of almost endless choice and unpredictable results. In the play, Romeo and Juliet eventually die. VR is open-ended, even though it is based on a limited number of constitutive elements ("alphabet"). As a matter of fact, the rules for generating the virtual world remind us of generative grammars, and I believe that these will be eventually applied in this field as means for handling dynamics. With all this in mind, we have here at least three different issues to address:

1. how to establish a convention for representation;
2. how to support open-ended interactions;
3. how to allow for the suspension of the game.

The VR convention

Experience shows that in generating virtual worlds, designers and engineers have to quantify how much realism is necessary in order to make the experience possible. Some applications require no more than cues; others are based on detailed maps; and yet others on various kinds of materials, identified as soft, homogenous or not, buffering or amplifying sound at impact, modifying the Newtonian laws while in free-fall, and so on. This translates into visual requirements of field of view, resolution, of rendering speed, perceptual lag, or in requirements for sound, haptic, and other characteristics. In order to satisfy such

requirements within a well-chosen type of representation (or synaesthetic combination of different representations), compromises will be made. A higher resolution (for instance, for detail relevant to a surgeon) might be chosen over a broader field of view. If compromises are aesthetically balanced, the builders of VR applications will find out that what they need is not a 1000 MHz clock chip and faster buses, but rather a design that combines visual, aural, and tactile representations achieving their optimum through their harmonious integration.

The make believe component of establishing the VR convention is not reducible to the physical characteristics of the display technology, the sound system, the data glove, or of the integrated suit. In an experiment occasioned by the design of an environment for learning and playing dedicated to children (Arketek Ludens, designed by myself and Giuseppe Trogu), we came to the realization that the synergy of various sense data compensates for the extreme requirements of realism.

The procedure applied was inspired by research in experimental psychology and aesthetics. It consisted of reducing the amount of visual data while simultaneously introducing sound, haptic, or kinetic elements. If children are immersed in the experience, the reduction of visual “realism” (e.g., in showing birds, cars, airplanes) in parallel to the increase of associated sound (bird songs, sounds of cars and airplanes) maintains the integrity of the action. The curves resulting from the observations made are rather a qualitative expression of the concern for complementarity of VR representations. This is necessary because to give in to simulation, to become part of it, is cognitively far more challenging than to enter a physical world situation. The metaphor is an aesthetic carrier from one realm to another.

While everything we do in the physical world entails our system of conventions (the symbols of science theories, of designs, of social and political activity), in the virtual world our senses put us in contact with an all encompassing meta-symbol, i.e., dynamic symbol of symbols. Inside this reality, objects are tools that change the world. At the intersection of the physical world and the limitless imagination of individuals immersed in the virtual reality, a subjective threshold is established. To make things up beyond the threshold is more a matter of imagination than labor. The entrance to the new world is guarded by its aesthetic characteristics, cues to the understanding of what is possible in the computational fiction. The convention of VR is ultimately that of the sensory synergy: How do all the expressive cues make up the new world? In other words, how are the various sensory components involved in constituting the parameters of experience in the new space and time it continuously generates? The perceptual system and the locomotor system are connected as new sensations, transmitted to effectors, trigger action in the VR environment. Yes, this virtual world is modeled, rendered, animated, musically composed, textured, and danced as behav-

ior is simulated. Accordingly, all of VR is an aesthetic artifact unfolding the many possibilities of the convention or conventions established through the purpose of the application.

There is no doubt that the dominant component of any current VR application is the visual. It does not have to be this way, or at least not for all applications. Knowledge of other sensory channels and the ability to process data pertinent to such channels lead to understanding their aesthetic inter-influence. Their integration is essential for improving the effectiveness of VR applications. It should be noted that the disparity between the immense amount of data than a human being can distinguish (ca. 1040 bits/s) and the relatively limited conscious output (ca. 50 bits/s) is in itself significant of the cognitive effort. Aesthetic factors (such as order, symmetry, accent, surprise) allow for the processing of relatively smaller data units with the same result.

The ability and indeed the need to integrate sensory representations other than those characteristic of the visual (sound, haptic, tactile) deserves to be mentioned here again exactly because a proper underlying aesthetics results from the interplay of sensory data. While the core requirement of a VR system is a high performance 3D image generation capability associated with a complex tracking mechanism and effective simulation programs, processing of sound, tactile, kinetic, and other sensory data can prove as important. The graphic engine might be pushed to the extremes of its capabilities by, let's say, "reproducing" a bird in a virtual landscape. Appropriate sound processing will not only ease the job of the visual generator, but introduce the additional information of distance, direction of movement, and even context. As it is already known, the difference in the arrival time and in the intensity of sound to both ears complements 3D visual information. Moreover, shadowing effects (sound traveling around an object) or reflection and absorption effects allow the human being to infer from aural data to spatial configurations. Many times in "real reality" sensory data complement each other. The aesthetics of VR can only profit from the attempt to transfer this knowledge into the new worlds computationally synthesized. Where field of view, for instance, or the ability to surround the subject, conflict with requirements of visual acuity, the designer should look for complementary sensory data.

Aesthetic considerations turn into an added constraint (computational overhead) only to the extent that they become a goal in themselves, not the underlying unifying element they are supposed to be. A good example along this line is Rita Addison's *Detour: Brain Deconstruction Ahead*, a VR system of interaction between imaging science and imaging art presented in the Audio-Visual Experience Environment known as CAVE at SIGGRAPH 94. The environment's immersive and interactive qualities allowed for both a very personal testimony of a photographer's struggle with brain injury after a car accident and for possible therapeutic uses.

The fundamental aspect that such an example makes clear is that through VR applications in which the underlying aesthetic is properly considered, knowledge can be turned into new experiences.

Still, the solution is not in such performance, which we of the pioneering age of computer graphics could not even dream of, but in a better understanding of the task at hand. Appropriate coordination of sensory data and especially a good semiotic strategy of substitution, insertion, and omission change the image quite radically. Complexity can be kept lower by substituting image with sound, tactile, haptic, or kinetic information. In many cases, the insertion of indirectly related data, such as direction of movement, allows for lower expectations of detail (fast moving objects blur). Complementing sensory channels usually relieves between 30 to 40 percent of the computational effort. No doubt, it introduces the need for alternate input mechanisms and makes the task of integration more difficult. Even more interesting is the optimization through omission: what and under which circumstances can something be left out without affecting the integrity of the VR experience? There are no standard answers, but there is a lot that can be done in this direction.

It is still much too early to speak about maturity, even if many VR applications are deployed in science, presentations, entertainment, and education. Those building them are happy when applications are stable. They all wish for even more CPU cycles, for better I/O and other technical advances in both architecture and programming, especially in real-time operating systems. But what is most important is that together, we all learn that we need to know more about the human being, especially about its cognitive condition, in order to facilitate VR experiences. We know quite well, for instance, that the interplay of combined sensorial perceptions is of critical importance. But does it suffice to provide an optimum on each communication channel? How relevant are the characteristics of visual monocular or stereoscopic communication (bandwidth, dynamic range, transmission or delay, signal-noise ratio, resolution)? How relevant are the characteristics of the haptic or audio channels? Isn't it true that the interplay of data is almost insignificant? The 90-95 percent resolution of vocal/synthetic speech, i.e., recognition in a 50,000-word vocabulary is probably correct if we deal only with the synthetic sound. But if, by design, we combine synthetic speech and tactile information, or images, the number will decrease. Exactly in this area, of providing a precise but expressive interplay are aesthetic considerations determinative. The power of association, of suggestion, the power of syncretism – all of aesthetic condition – makes the difference. Various experts will always argue from an insular perspective. Aesthetic integration transcends specialized insularity.

Art and Technology

NO MATTER what acceptance is given to the term technology, its association with practicality is generally unavoidable. And again, no matter what the acceptance given to the term art, its association with the practical is the least necessary idea. This double equation can be expressed in logical Aristotelian terms by

$$T \cap P, \text{ but } A \cup P$$

that is, technology and practicality (conjunction) in the first case; but, art or practicality (disjunction) in the second. The result is, from Aristotle's philosophical and esthetical perspective, the difficulty of joining technology and art. Of course, neither the principle of mimesis nor that of catharsis has anything in common with the objective reality presented by technology.

But while parallels do not meet in Euclid's geometry, in the geometry of Lobacevski or Bolyai and in Riemann's representations parallels are the reality of a premise that leads to the basis of several new spaces. Likewise, if in Aristotle's logic art and technology have no common ground, in an improved logic, they can be superimposed on one another to constitute a new expressive reality. This type of logic – which I propose and to which I refer – goes beyond the classical axiom, that is: $p \rightarrow q$ (p implies q or p is q), on which is constructed the entire syllogism:

$$\begin{array}{c} p \rightarrow q \\ q \rightarrow r \\ \hline p \rightarrow r \end{array}$$

This as an elementary example that transcends the representation of the world through propositions about it. It is based on the reality of the world. The verb is no longer used in only one of its predicative modes, but also as infinitive, participle, or gerund. The question is no longer to say "The sky is blue," a trivial proposition established as predicative, on which the construction of the metaphor is based, exactly as in syllogistics – that is: Blue is the ocean (and several other blue things), the result being a very wide gamut of so-called poetic images. Neither is it a matter of the of representation of the whole (life, love, nature, work, etc.) through its parts (an aspect of life, an aspect of love, an aspect of nature, an aspect of work, etc.) – that is, symbolism. Also, metaphoric and symbolic systems correspond to the same

premise and practically cannot leave the domain of the principles of mimesis and catharsis (though artists using these means of expression have attempted such a liberation).

At the moment when, instead of talking about things, nature, or other people, the human subject enters into relationship with them – i.e., he is an effective existence, the consciousness of his own existence – he establishes the nonpredicative logic of this existence. He thereby brings about liberation from the paradigm of to say (or to design, to compose, to model) how reality is, that is, to represent it and to consider the value of these representations in relation to their degree of resemblance to the aspect retained (the law of mimesis). One of the ways this liberation is possible is also through the implication of technology in art. In the new perspective that I propose, technology and art are no longer disjunctive. This is of interest not only as a theoretical relationship, but especially as a significant feature of another type of artistic expression.

Here, no type of mimetic principle any longer functions; the world no longer is, no longer can be, and no longer needs to be imitated. This artistic expression is constructed according to laws that it follows – in essence, the principle of practicality – but on which laws it impresses a certain gratuitousness, which derives from art's timeless condition. The ludic component, which technology makes possible, is in consensus with the spirit of the technological age. Art based on technology, in the highest sense of the term, is to a great measure revelation – a concept so important in Heidegger's vision (*aletheia*). This quality pertains to the creative act, often an inventive act in which technical-scientific support is not purely and simply taken over from other projects, to the communicative act, and to the receptive act in equal measure. Through technology, the inexhaustibility of an artwork is made apparent through the inexhaustibility of the interpretation of a work (an often speculative interpretation). The simplest example is *cynetic art*, which has revolutionized sculpture and painting, conferring upon them the dimension of time, which was not initially implicit in their structures (e.g., *Les Mobiles* by Calder, as well as what became known as *Op-Art*). With the advent of computers, this will continue to expand from the machine metaphor to virtual machines.

Neither can catharsis, in the Aristotelian sense, any longer be associated with this type of art. Affective participation is replaced by a new qualitative relationship, which is a part of ergonomics (the theory of optimal relationship between man and machine). But since the implication of technology in art changes the concept of the work, proposing a series in place of the unit, environment in the place of the privileged relationship between work and owner, there is no longer an individual relationship with art, but a social (or group) relationship. Moreover, environment is constructed (or adapted, perfected) nature in which human beings live out their existence. The art determining this environment meets its subject in relationship with society (or the group) of which it is a part. A programmed envi-

ronment – e.g., one that pursues stimuli with affective value for influencing human work or leisure – already represents the model of that art through which, due to technology, the term practicality (or efficiency) insinuates itself. Artists, of course, remain responsible for the durative effect of the environmental program. They must realize that the art of stimulating humans can turn into the art of attitudinal inhibition, spiritual laziness, or complacency. It is similar to the movies, performing arts, literary works that promote violence, and propaganda in general. Through the technology used by art, the artist makes such possible consequences part of the aesthetic experience. The artist's social and moral responsibility ought to be defined in relation to these consequences.

Of course, as with the reality of art (as with that of human thought), the predicative and the nonpredicative meet. After all, the first known performances in ancient Greece presented the double nature of work and action: *του* (being) is an essential participle, a linguistic form with the dual nature of noun and verb. Technology is being (a machine, a complex of machines) that must optimally achieve a certain proposed goal. But the technological object itself has a certain aesthetic value (projected by industrial design); hence the discovery that the opposition included in the participle *πολεμοξ* is reproduced by the technical object, and then by all objects it produces. A permutational artwork, such as computer-generated art, recalls to debate the theory of context-free language as well as the unity and contradiction of humans (represented by their programs) and machine (or device). Vasarely forms the algorithm of a universal folklore (in fact, a work of optical effect with great permutational opening), while the Monte Carlo-type programs extend the gamut of possible associations in music and literature (more precisely, poetry). The work of the Center for Advanced Visual Studies at the Massachusetts Institute of Technology focuses on contemporary creation on the environmental scale. It has opened a relatively unexpected field of common artistic and technological applications.

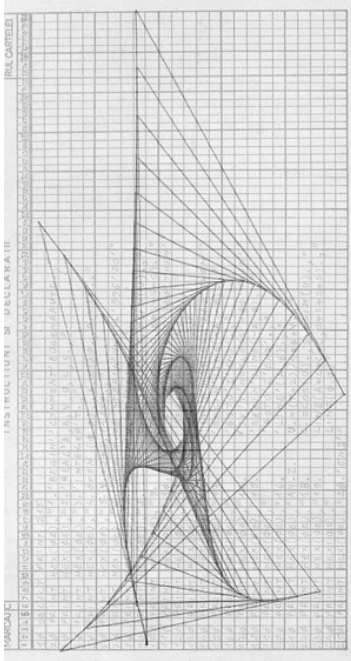
One of the more promising mathematical avenues for describing the new art stimulated by technological innovation is represented by game theory. Not that the interaction between artist and the public is a zero-sum game (i.e., what one gains is what the other loses). Rather, it is the understanding of conflicting interests of artists and the public involved in an aesthetically framed competition. There is a prize to be awarded (the “stake”), and thus the time evolution of the artwork is nothing but the same as the game's unfolding. Public participation replaces contemplation. Happenings are always unique and repetitive. Technology-based art constructs (installations) are nothing other than a context of happenings with interactive features. Nothing is said about the world (nothing predicated); the world is experienced. What results is another world, something more virtual than real.

Cybernetics opened the aesthetic realm of feedback. Cybernetic art requires self-regulation, the feeding back of emotions. Projects such as those of Nicholas Schöffer's projects are

good examples. My own work, entitled *The Public Clock*, set and reset by those who want to make their own time the time of others, is based on such feedback mechanisms. Cybernetics has shown us the virtues of feedback; and game theory breaks the chain barring entrance and exit to a feedback process in order to admit what is essential for art: a certain free option. Only at its infancy, the new technology that facilitates new forms of art can prove its worth in a domain from which, when it tried to take over the artist's role, it was once excluded.

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Science and Beauty: Aesthetic Structuring of Knowledge



*Visualization of a
geometric space
(parabolic) plotted on
data card (1962)*

ABSTRACT: Human activity, art-oriented or not, implies an aesthetic component. Intelligence participates by helping to define goals in knowledge-based selection from among many options, while the aesthetic component structures outcomes, endows them with expressive power, and facilitates communication. Artifacts qualifying as works of art embody human intelligence and sensibility, as well as the experience of technology aesthetically applied. Imitation of previous artistic paradigms, even when new technologies (computer-based or not) are used, precludes the discovery of new sources of beauty and thus precludes originality. The expansion and redefinition of the artistic universe that new science and technology make possible have already resulted in a broader notion of art and in new forms of artistic activity. Consequently, our concept of beauty is enlarged to include the beauty of scientific theories, some requiring visual means of expression that only new technology makes available.

The painter who draws by practice and judgment of the eye without the use of reason is like the mirror that reproduces within itself all the objects which are set opposite to it, without knowledge of the same," (Leonardo da Vinci).

The rise and fall of the concept of beauty has come about against the background of a rationalistic approach in aesthetics. Max Bense, whose foundational work in information aesthetics (1965) is still relatively ignored outside Germany, made the distinction between Hegelian aesthetics (speculative) and Galileian (descriptive). His work, inspired not so much by the attempt to mathematically model works of art but primarily by the rational component of the artist's work, inaugurated the age of rationalistic explanation in aesthetics. There is no doubt that our attempt to use technology for generating images, musical works, texts, sculpture, film, installations, video compositions, etc. was encouraged by the Galileian approach. It made us more aware of what *techne* – more than craftsmanship, but including it – is in relation to art and among its various implications: how and why artists choose materials and then apply processing techniques that can be aesthetically relevant in themselves.

Medium as constraint

Today we know that it is indeed naive to think of the medium as only the material means of embodying the work of art. Actually, in the process of making the work, the artist does not simply accommodate an idea or an emotion into some material, be it the medium of painting, ceramics, laser beam, or synthesizer. Each medium is a constraint for the artist. How to transcend the limitations of the medium is the aesthetic challenge. In accepting the challenge, the artist enrolls the support of technology. Thus the work is the triumph of intelligence and sensitivity over matter, and of technology aesthetically applied.

We also better understand that all art conventions – especially the basic conventions identified as realism (figurative or not), abstractionism, primitivism – express not only the attitude of the artist toward his/her environment, but also the involvement of technology in the realization of the work. Rhythm and drums (in their various forms) are a direct example of this relation. Harmony and proportion on strings or on surfaces are a more sophisticated example embodied in the Fibonacci series or in the golden section.

The building of temples and monuments and housing projects involve technology as much as they involve sophisticated models of visual thinking. The artist's intelligence allows the artist to come up with artistic concepts and to choose the appropriate technology, even to invent it. Such discovery and invention have frequently occurred.

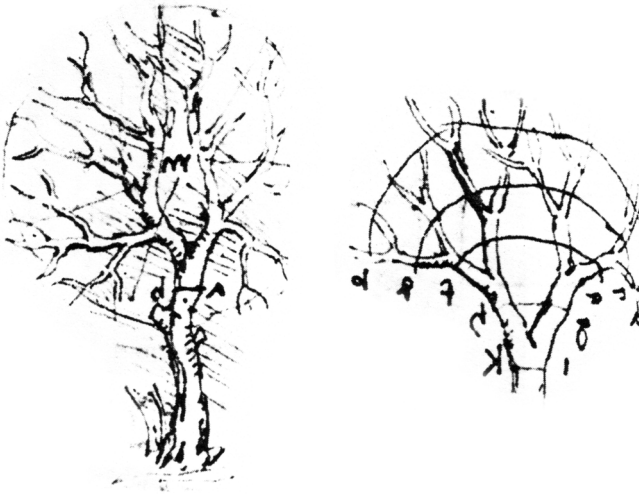


Fig. 1. Leonardo da Vinci, Codex vaticanus urbinus (1270), Bibliothèque de l'Institut de France, Paris, ms. M, fol. 7850).

It is no accident that Leonardo da Vinci – who is probably the guiding spirit of those trying to understand the fusion of science, technology, and art – is credited with so many inventions that are actually technological advances brought about by art and then applied to science and engineering. But Leonardo, like his Renaissance friends and foes, was not the first or the last in this tradition. He is, however, due to the extent of his endeavors, one of the first to anticipate the switch from hard tools to soft tools. He formed descriptive theories of how the artist should represent leaves on trees (Fig. 1) or distinguish proximities among objects (cf. Gombrich).

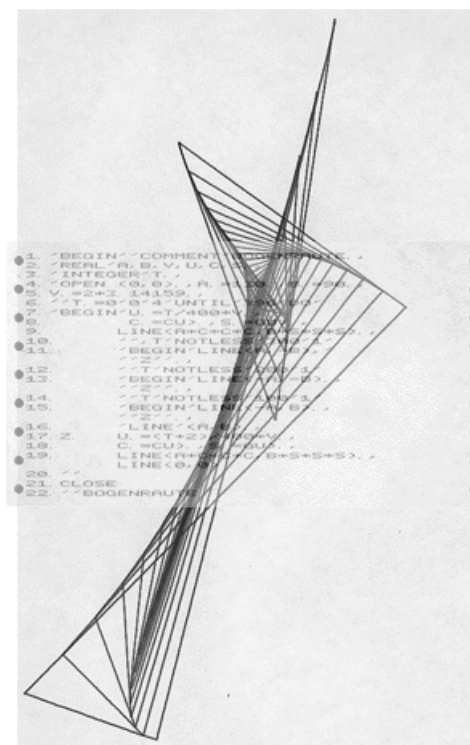
He also gave representations of his aesthetic algorithms through what computer scientists would today call “pseudocode.” Probably only Leibniz (1968) was the other genius who anticipated our algorithmic age. (Although he was by not an artist, the aesthetic quality of his theories might well be comparable to Leonardo's art.)

Less scientific examples of creating art also exist. In 1770, Mozart (1793) used dice to model the aleatoric component for the medium of music. Lejaren Hiller (1959) used a random number generator to do the same. These programs accomplish two functions. 1) They describe a given aesthetic reality; and as descriptions of it, they represent aesthetic knowledge expressed in a logical language. 2) They can drive a machine in order to generate objects similar to those described; and as generative devices, they support the production of art imitation artifacts. Since the time we started creating such tools, we have gained a better understanding of the aesthetics of the past, as well as a propensity to opening new aesthetic horizons. New developments computer programming, extended to cognitive aspects of artificial intelligence, bring up issues of aesthetic consciousness: What does it take to become aware of some qualities that qualify an artifact or event as a work of art?

Art-intended use of computer technology as imitation of previous forms of art was a necessary preliminary stage. Many so-called computer artists (some of them acknowledged as pioneers) have never grown out of this stage. The interesting phase is just starting, though, and can be qualified as one of discovering new sources of beauty and new artistic expression. In order to help the reader understand the expansion of the artistic universe and the new concept of the beauty of scientific theories, I shall refer to several examples. This is not a convenient way to extrapolate a notion so anchored in the realm of sensorial perception that almost no one associates it with science. Our time of fast scientific and technological change is also one of the expansion of the sensorial realm. We are able to “touch,” “hear,” and generally “sense” things that until now lay outside our universe of existence. In addition, the realm of virtual reality has been opened to us. Our explanations of the unknown and unexplained, while probably based on more data than any previous theory was built on, integrate not only the logic of our thinking, but also the logic of our feeling, our emotions (cf. Baumgarten, 1973). There is more intuition in science because we came to understand that what is mediated by precision mechanisms (mathematical, chemical, biological, etc.), as well as what is afforded through direct relations to our environment, participates in our scientific models. We have also reached the point where we understand that aesthetic mechanisms (of ordering, sequencing, harmony, rhythm, and symmetry, to name a few) are

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3-D Model (Program is
collaged onto the image).
(1964)

the explosion that took place a millennium ago. Were it not for intelligence, the huge telescopes, with their huge white dishes would have to be placed in space stations in order to avoid interference with the signals, a feat requiring more propulsion power than our world currently offers. The intelligence embodied in sophisticated programs requiring the power and memory of a supercomputer helps to correct, for example, the “twinkling” of radio sources that occurs when messages enter the earth’s atmosphere. Once the data are received, intelligent processing prepares it for generating images of the phenomena observed. The relationship of the form of the arrays of radio-telescopes, of the various functions, and of the theoretical underpinnings represent the first level of aesthetic relevance. The second level is that of the actual output, initially an array of data and in the end families of images. Such images testify not only to physical phenomena relevant to science, but also to a reality with a distinct beauty that impresses through its unusual scale, distance, and dynamics. It is more than the seduction of the crepuscular, or the spectacular cosmic landscape brought under our wondering eyes, even more than an unusual playback never before possible. The apparently abstract picture that results is actually a “realistic” representation with aesthetic characteristics that can identify it as a work of art. It also opens an entire artistic horizon by suggesting new expressive qualities both in terms of formal relations and color interaction. The intelligent observatory (“observatory on the chip”) contains fast computer graphics workstations using artistic knowledge available today. Such an “observatory on the chip” becomes a camera open to the extremes of our planetary system capturing knowledge about it as well as its beauty.

At the opposite end of the scientific spectrum, the intelligent microscope probes, for example, interproton space, proton fluctuations, folding at the level of molecular dynamics, and so many other aspects of the microstructure of matter (where the ironclad distinction between life and non-life is quite vague). The intelligent microscope is a machine that targets its object not through a lens (or a battery of lenses), but through the intelligence of symbolic processing. Searching into the depths of matter inaccessible through any other way meant that scientists had to change their thinking about how to express problems. Once again, intelligence not only helped in extracting new data, important for a better understanding of the processes taking place in the micro-universe, but also opened a new aes-

thetic realm. And aesthetic experience helped in presenting the new knowledge.

Intelligence and aesthetics are related in the sense that our ability to understand (which is the initial meaning of intelligence) and to perform successful actions based on this understanding is not independent of our aesthetic sense. We project into all our actions experiences filtered through an aesthetic matrix, i.e., organized according to patterns of harmony, rhythm, symmetry, and other patterns, such as self-similarity (captured in the scientific concept of fractals), dynamics, and openness (cf. Nadin, 1991). The interrelation between intelligence and the aesthetic characteristics of our activity is usually associated with art. Nonetheless, this interrelation is at least as relevant in scientific theories or technological accomplishments. Progress in what some people already define as the algorithmic age makes our understanding of the relation between intelligence and aesthetic factors more and more possible exactly because we dispose of new means for capturing various aspects of this relation.

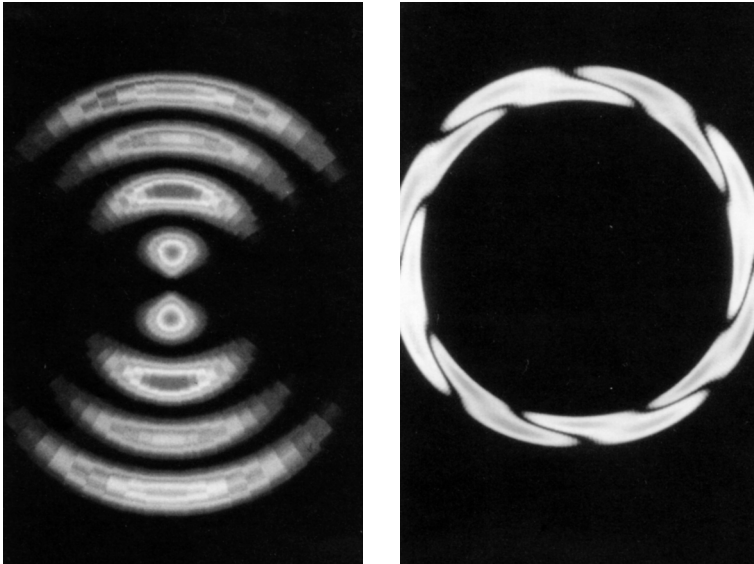


Fig. 2. Visualization of complex physical subjects. 2a: Black hole rings; 2b: Neutron star emission. Note the aesthetic quality of these images, examples of an expanded notion of the aesthetic.

Art as anticipation

During the aesthetic revolution of abstract art, some people decried the “disappearance of reality,” and even a betrayal of “nature as art” celebrated in the Romantic age of art. Nature seemed indeed abandoned as a source

of beauty; forms seemed to take the place of figure. Some of the most prominent artists of the abstract revolution accepted the spirit of the time and looked beyond the immediate, the appearance of nature, and the phenomenal skin of matter. Their vision quite often anticipated scientific discoveries or celebrated them. Kandinsky visualized the unseeable ocean floor. The red and pink firola-shaped nematode and swaying fish and seaweed were integrated in that chef d'oeuvre of abstract painting, *Dominant Violet*. Complicated relationships of the biological world constituted one of the references of his celebrated work entitled *Relations*.

Paul Klee (1979) gave classes at the Bauhaus in which physics, chemistry, and biology were the sources of his visual vocabulary. Mixed Weather is one example of the integration of scientific knowledge into means of expression uniting diagrammatic conventions, geometric configurations, and the Descartes almost 100 years later (cf. 1967), that the scientist's intelligence is aided by aesthetic sensibility. Beauty in the precise formulation of theories and attention to rationality and sensibility facilitative a better understanding of nature and reality.

Intelligent machines bring out the beauty of that part of nature and matter which is beyond our direct touch, sight, smell, and hearing, but no less relevant to our understanding and appreciation of reality. Artists can also use them to expand their aesthetic universe. As we have in the meanwhile found out, there are several forms of intelligence. The intelligence of the mathematician, which often drives the "engine" of the intelligent machine, does not preclude beauty in the precise foundation of new theories. Researching deep into the structure of matter, thought, movement, and discovering there relations never unveiled before not only inspires artists, but also uncovers a source of aesthetically relevant images and sounds. The old Romantic paradigm of the beauty of nature is extended to the "new" nature: new materials, new structures, and the unprecedented dynamics of new tools.

Thus the culture of the era of intelligent machines and of people using them for scientific and artistic purposes is shaped. In this culture, the visual plays an increasingly important role. The need to deal with complexity in processing a vast amount of data necessitates, even more than good written descriptions constituting what we call theories, adequate visual representations that are not only illustrations of such theories but an integral part of them. Scientists already recognized the need to express part of their

theories in formulas that were not only precise, but also aesthetically pleasing (cf. Curtin, 1982). Now this need applies to formulations in which word and image complement each other, to images representing new explanations for which we do not yet dispose of concepts, to the articulation of hypotheses, and of theories.

Interactive computer graphic representations support visual thinking especially when we move from the traditional models of linear representation to non-linearity. Von Neumann (1960), the visionary of the computer era, anticipated that high-speed processors and artificial intelligence would help us tackle nonlinear problems in general geometries. That is, they would transcend the limitations of linear differential equations and special geometries. Scientists using them in visualizing the black hole and phenomena related to the black hole noticed that the complexity arising from the progress of theory makes a coexistent aesthetics necessary, as well as possible. Static equilibrium is coexistent with an ideal of static beauty. Dynamic equilibrium necessitates an expression with a new aesthetic condition.

Scientists agree that under the influence of the beauty that they discover in these explorations, their own theories are shaped in ways unprecedented in the history of science. The beauty of the ever-changing three-dimensional structure of clouds is analogous to the beauty of a perfect crystal. The interaction of two molecules of water is a subject never before approached because scientists did not have a laboratory in which it could be observed or measured. This interaction has also an aesthetic dimension quite different from the aesthetic dimension noticed when the Magdeburg spheres were demonstrated within the framework of Newtonian mechanics. Scientists, such as Enrico Clementi and his colleagues at IBM's Data Systems Division (1987), working on such problems agree that representations of the molecular interaction seem more appropriate when they are simultaneously aesthetically more relevant. Theories often prove wrong when, despite all attempts scientists make, they cannot be expressed in an elegant, beautiful form. Of course, the artificial intelligence used in capturing images from the distance and sounds from the deep injects into the representation our own set of requirements, orders that are culturally hard-wired in our ways of thinking, perceiving, and understanding.

Capturing the essence of a physical, biological or chemical phenomenon seems to imply capturing the beauty of that very complex reality. Behind this new model is Ivan Sutherland's approach of viewing data displayed on

a computer monitor as a window into a virtual world (1965). The captivating aesthetic potential of virtual reality, as well as computational chemistry, silicon biology, and other such new intelligent disciplines confirm this. The art of virtual reality opens a window to the exploration of virtual space and time. Extended to the haptic, the visualization of scientific data opens avenues of dramatic interactions.

Coping with intelligence

There is an interaction between what is unveiled and our ability to cope with discovery in forms that are not aesthetically relevant. By no accident, art, which held nature as a primary referent and expressed in sensible ways what we knew about it or what we wanted to find out, fell in love with intelligent machines quite early in their development and turned the issue of realism into a challenge to technology. The images of the unknown, which made old concepts such as DNA, quanta, and black holes finally a lot more understandable, has already extended to the art of this age and marked it as a testimony to this process. Thirty-six years ago, I succeeded in plotting a realistic perspective (Fig. 3).

My purpose was to understand and to know how to do it. Unknown to me at the time, Frieder Nake, Georg Nees, A. Michael Noll, all of whom I later met, were making similar attempts. None of us believed that we were producing computer art, but we understood a little more about art by emulating it. Indeed, the knowledge of art and the understanding of the influence of aesthetics and science on each other formed the substance of the very first attempts to write design programs.

Today, various sophisticated functions – reflection, refraction, shading, 3-D mapping, and many others – are part and parcel of software for art and design applications. Unfortunately, the aesthetic component is often considered insignificant or purposeless by scientists and technicians who tend to rely on more bytes and bandwidth (cf. Nadin, 1995). It is up to a new breed of artist to push digital technology to its artistic limits in order to extend those limits and find solutions for their art. Harold Cohen programmed his computer Aaron to create work autonomously (cf. McCorduck, 1991), work that is much more interesting than that produced by Vasarely. Corinne Whitaker (www.giraffe.com) struggles with her computer to produce aesthetic objects peculiar to digital technology. Their accom-

plishments have come about more easily than the changes in some of people's ideas about the role of art, artists, and aesthetics.

While some people are still suspicious of the use of intelligent machines for art purposes, the same machines unveil resources of beauty impossible to ignore. Such machines are even helping us understand that there is no intelligence without an aesthetic component which makes it not only easier to communicate, but also adds expressive power to balance the precision sought. A world totally precise is as unbearable as one totally beautiful. Intelligence, whether natural or artificial, finds the balance.

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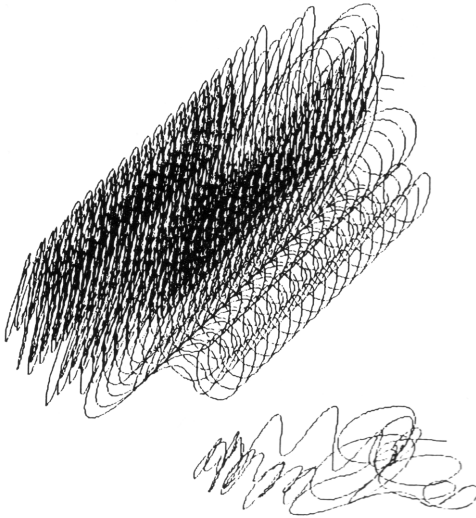


Fig. 3. Free-form construction through iteration.

References and Notes

- Baumgarten, A.G. (1750). Cf. H. R. Schweizer, *Ästhetik als Philosophie der sinnlichen Erkenntnis*. Basle: Schwabe, 1973. Aesthetics is defined as the science of sensory knowledge.
- Bense, Max (1965). *Aesthetica*. Baden-Baden: Agis Verlag.
- Clementi, Enrico, et al (1987). *Molecular Dynamics Models in Fluid Dynamics*. Chaire Francqui Lecture Series, Part 7. Kingston: IBM Data Systems Division.
- Curtin, Dea W., ed. (1982). *The Aesthetic Dimension of Science: The Sixteenth Nobel Conference*. New York: Philosophical Library.
- Descartes, Rene (1628). *Rules for the Direction of the Understanding*. Rules 14-15, in E.S. Haldane and G.R.T. Ross, trans., *The Philosophical Works of Descartes*, 1. London: Cambridge University Press, 1967.
- Gombrich, E. H. (1986). *New Light on Old Masters*. Chicago: University of Chicago Press.
- Hiller, Lejaren (1959, 1966). *Experimental Music*. New York: McGraw Hill. Hiller and the mathematician Leonard Isaacson developed a new technique of musical composition. In association with Robert Baker, Hiller elaborated programs supporting logical choices characteristic of music.
- Klee, Paul (1979). *Beiträge zur bildnerischen Formlehre*. Faksimilierte Ausgabe des Originalmanuskripts von Paul Klees erstem Vortragszyklus am Staatlichen Bauhaus, 1921-22. Basle: Schwabe.
- Leibniz, G.W. (1968). *Lettre sur la philosophie chinoise a Nicolas de Redmond*, in *Zwei Briefe über das binäre Zahlen System und die chinesische Philosophie*. Stuttgart: Belser Presse.
- McCorduck, P. (1991). *Aaron's Code*. New York: W.H. Freeman.
- Mozart, W. A. (1793). *Guide to the Composition of Waltzes with the Aid of Two Dice without any Knowledge of Music or Composing*. Similar works were written by William Hayes (1751), *The Art of Composing Music by a Method Entirely New*, and Johann Kirnberger (1757), *Die Kunst des reinen Satzes in Musik*.
- Nadin, Mihai (1991). *MIND – Anticipation and Chaos*. Stuttgart: Belser Presse.
- (1995). *Negotiating the World of Make-Believe: The Aesthetic Compass*, in *Real-Time Imaging*, 1. London: Academic Press.
- von Neumann, John (1987). *Papers of John von Neumann on Computing and Computer Theory*, W. Asprey and A. Burks, eds. Cambridge MA: MIT Press.
- (1960). *Continuous Geometry*. Princeton: Princeton University Press.
- Pedretti, Carlo (1964). *Leonardo da Vinci on Painting. A Lost Book*. Berkeley: University of California Press.
- Sutherland, Ivan (1965). *The Ultimate Display: Information Processing*, in *Proceedings of the IFIP Congress 65*.

Art history and criticism

...That Old Sire

(...cel unches batrin)

SHORT EXPLANATION: This article, presented here in abridged form, was published in *Tribuna* (Cluj, Romania) in 1976. In writing it, I realized that in order to understand the various forms of human expression (language, music, painting, ritual, myth, etc.), I had to focus on the elements leading to a particular pragmatic experience. This realization became possible through a specific work, Bela Bartók's *Cantata Profana*, and through the anonymous authors of a piece of poetry that originated in a pre-Christian context. Two disconnected forms of practical experience meet: the archaic (probably the 3rd to the 10th centuries) and aesthetic modernism. Not unlike the meeting between Impressionist painters at the end of the 19th to the beginning of the 20th centuries, and the primitive art of Africa, *Cantata Profana* is a testimony to the relation between language and the practical experience in which the poetry emerged (as an oral manifestation).

The authentic strives towards universality. But the means through which this comes about are difficult to predict. In respect to bringing timeless value to light, people around the world owe a debt of gratitude to Bela Bartók – not only for *Songs from Bihor*, *Romanian Folksongs of Maramures*, and *Melodies of Romanian Carols* (to mention only three of his collections), but in particular for *The Carol of the Hunters Become Deer* (Colinda vinatorilor metamorfozati in cerbi). All of these works result from years of research in Romanian villages. The music he wrote gained much from this research, as he himself admitted. The relation between the music of *Cantata Profana* and the Romanian text thus acquires an extraordinary significance. Bartók biographer Halsey Stevens places the former work at the same level as the *Twelve Hungarian Folk Dances* (cf. *The Life and Music of Bela Bartók*, Oxford University Press, 1964.) Nevertheless – and through no fault of Bartók, a great admirer of Romanian folklore – the original poem that eventually became a carol has unfortunately been ignored.

The documented relation between the *Cantata Profana* and the *Carol* raises two problems: placing the text in time and decoding the allegory on which it is based. While archae-

ologists unearth material proof of culture and ethnographers discover cultural-spiritual forms of expression, linguists reconstitute the process by which the Romanian language became what it is. Word and expressions acquired in a language entail expectations of stability, even though they are subject to change. Continuity (of an activity) presupposes means of communication; and it is a necessary condition for communication. This continuity should not only be discovered, but also interpreted at culture's fundamental level. The exceptional condition of Romanians in their geographic context is expressed from the level of their vocabulary – the words they use – to that of their *Weltausschauung* (i.e., how they perceive the world). An acquaintance with the myths of one's culture becomes a way to learn about oneself.

Taking *The Carol of the Hunters Become Deer* as an example, we cannot help but notice the elementary fact that, in contrast to all other cases in which Bartók availed himself of Romanian folklore, he neither limits himself to the music, nor does he use it only as a motif. He allows himself to be seduced by folk poetry, more precisely, by the text he as he discovered it. He realized that it held a meaning that transcended time. So he did not simply want to make a Hungarian version of it – or a version in any other language, for that matter. Initially, he wanted a translation and entrusted this mission to Jozsef Erdelyi, whose good translation appeared in a journal (*Nyugat*, Nr. 1, XXIII, 2 January 1930, pp. 60–61). Bartók did not like the translation and retained only verses 5–8, 19, 71, and 74, which he later translated into German. Bartók, still unsure whether the original should be kept or replaced by a simili, insisted on the need to maintain the original sense (“*ursprünglichen Wortsinnes*”) of the verses. The work he created is the unity between an archaic text and his modern music.

The two versions of the poem that Bartók collected – at *Urisiul de Sus* and *Idicel* – belong to the archaic level of folklore. The data provided by the text show that the plot unfolds during a time of confrontation between pre-agricultural forms of economy (especially hunting) and new practical experiences associated with farming and simple manufacture. The poetry is an expression of the conflict. The pragmatic framework, as well as the allegorical aspect, does not, however, explain the *Carol* in its entirety. It places the text in a given timeframe, but removes it from the spiritual context in which the text should be placed and to which it should be related. Nevertheless, the framework does make a connection to the universe of myth possible.

The versions Bartók collected in April 1914 already had a long history attached to them. We could not even approximately appreciate this history if we did not have the other four versions that had been previously collected (by Romanian folklorists Ioan R. Nicola and Il. Cocisu), as well as the versions provided by the simili (made in April, 1963) of the folksong that Bartók discovered. Comparative studies reveal the *Carol's* meaning to be the evolution from archaic-profane representations to naive-Christian representations. As time

went by, localized versions developed, as with the inscription of songs occasioned by winter celebrations in the narrative scheme. We suspect that the meaning mentioned above was understood even before 1914. Proceeding inversely, we can eventually arrive at the period of confrontation going back to the time of the cycle of the Roman winter celebrations (Brumalia, Saturnalia, Larentalia, and the Calends of January), which focused on natural cycles as well as on myths, and to Christian holidays, before the Trullan Synod (ca. 692, the Quinisext Synod convened in Trullo as a follow-up to the VI Ecumenical Council of 680) condemned pagan celebrations in canon LXII. This time placement is justified primarily through the narrative: The moment in which “the old sire” starts out in search of the sons become deer is the period of reconciliation, that is, around the time when Saturnalia was celebrated. (Martial recalls Saturnalia as a time when even the whips for beating slaves were locked away).

The evolution of the pragmatic framework is clearly marked. It is further supported by the decrease in the number of mytho-magical elements and by the change in the relation between sire and sons. Bartók’s version surprises through its unusual relation between the hunter/sire and his sons:

Ca noi te-om lua	We will take you
in cornile noaste	in our horns
si noi te-om tipa	and we will throw you down
Tot din munte’n munte	from mountain to mountain.
Si noi te-om trinti	And we will slam you
Pe piatra mustioasa	against the mossy rocks
De tot tîr’te-oi face.	crushing you to pieces.

The threat of death imbues the *Carol* with drama; it is not only a poetic means but also the expression of a relation that goes beyond what came to be considered normal family relations. The drama was progressively attenuated: in newer variations, divine punishment replaces human violence, which was not the *Carol*’s initial intent. This attenuation corresponds to evolution from the natural scale, and the corresponding family relations, to the model of Christian thought, and later to legal principles.

Vocabulary further supports placement in time. Analysis reveals it to be expressive, full of archaic expressions, and rich in references to the practical experiences of the period in which the *Carol* came to be. For example: the transition from hunting with bow and arrow to the use of traps (even firearms, in some late variations); the rhyme scheme with its rigorously alternating use of trope and iambic, sometimes obsessive, which diminishes also

over time, as do the archaic expressions. How and why this happened is a matter for linguistics to shed light on. But the “nine young sons” who were

Din cas’i-o tipatu	Thrown out of the home
Si s-au neftinat	and become deer

That is, they were transformed, a metamorphosis that serves as the *Carol’s* theme. The connotations of the verb a neftina (to evaporate, to evanesce) are decisive for understanding the cause of the metamorphosis.

On a larger scale, we can opt for a symbol of freedom, even a philosophy of life, to explain the new condition of the nine sons, as some commentators have stated (I.R. Nicola, K. Kereny, G. Kroo). But in the *Carol’s* details, where the nature of the options are defined, determinant is not the symbolism on the large scale, but the mechanism through which it is realized. We are clearly far from those speculations (some based on errors) that led to Rousseauisms avant la lettre. For example, P’unde [Pe unde, where], which became Punte [bridge] in the texts that Bartók collected and then translated. The latter was taken to the extreme of being interpreted as Trajan’s bridge and thus as the legend describing the origin of the Romanian people (as Kerenyi suggests in *Über Bela Bartóks Cantana Profana*, Schweizerische Musikzeitung, Zürich, 9/1946). Several details mark the element through which a sui generis nonconformist attitude becomes possible:

Piciorale noastre	Our hooves
Nu calca’n cenusa	do not trample on ashes
Far’numai prin frunza...	but only on leaves...
Buzutile noastre	Our lips
Ca-si beu din izvoare	drink from the springs

But the decisive argument regarding the condition described is artistically expressed through the verses:

Coarnele noastre	Our horns
Nu intra pe usa	cannot pass through portals
Far’numai prin munte	but only through the mountains

The cup and the ashes of the hearth mentioned in the *Carol* are references to the practical experience of the time. The horns, however, keep us on the reference level of the mythomagic, that is, the image on which the conflict is based. Options are defined not by new

customs, but by the existential condition and the resistance of the sons become deer, that is, the ideal image towards which they tended and with which they identify.

Joining the two series of loci in time – one referring to the conflict of rituals and the other expressed in the *Carol's* verses – we arrive at the meaning: the refusal of any compromise. The *Carol's* conciseness derives from the compact and univocal nature of the ideal. Generations in evolution are overcome through moments of definition and assumption of a path. A means for options is suggested and the consequences of each are emphatically set forth. And this is done on the basis of the confrontation between the ideal of profane rituals, and the one imposed by the new religion, that is, a generic confrontation between belief and dogma. The *Carol* does not belong to the domain in which myths fall, but it is the very expression of an act of recognition and self-recognition raised to the level of myth.

To find the key that decodes the *Carol* is no light task. The encoding scheme is rather complex. Nevertheless, it is clear that this is not a carol that was recited or occasionally sung at a gathering of hunters, as has long been maintained. The *Carol* is definitely an allegory, which explains the economy of the poetic figures. The element of violence confirms placing the *Carol* in the space of a confrontation of ideals, not of reality. Within the space of reality, breaking the customs of family relations within a village is equivalent to “the end of the world”:

Cind o bate fiu pe taica/Fica-sa pe maica-sa/.../Atunci capu vacului/Sfirsitul pam-
intului. (When son beats father/ and daughter strikes mother/...Then the end of
time/ The end of the world.)

Sequence of generations, sequence of convictions, sequence of resistance – this is what the allegory reveals. Over time, the original meaning was weakened, collateral meanings appeared, the entropy of the poetic discourse increased.

The buck appears as a character in other examples of Romanian folklore, but not in the same form as in this *Carol*. The mask of the buck is used in folkloric celebrations; the buck is represented on Romanian blankets and rugs; its form is inlaid in wooden furniture. There is no need to dwell on these examples. However, it is worth mentioning that non-semantic forms of communication are not independent of semantic forms. Costumes of goats or bucks were commonly used for the celebrations of the Calends of January. And in Romanian tradition, caroling also pertains to this celebration. (The Romanian word for carol – *colinda* – derives from the Latin *calendae*.) Thus it appears that this *Carol* on one hand contains the embodiment of an ideal, as mentioned above, and of the real confrontation between the traditions of the Roman cycle and the new customs imposed by Christianity.

Reading with this “key” in mind, we see how the relation between mytho-magical elements and Christian elements plays an essential role.

Bartók surmised that the basic level, buried beneath the layers of variations of the carol he discovered, is the profane. The musical composition presents clear evidence of this. The multitude of interpretations that the *Cantata Profana* itself gave rise to can be explained as an outright prophetic song of the exodus imposed on the composer just before World War II. According to some musical critics and historians, the allegory could refer to the nature of art itself. The departure (of the sons after the buck) and the metamorphosis represent the tendency towards an ideal, as well as spiritual limitation and resistance based on convictions. The comparison made between the *Cantata* and Horatius’ 16th Epode to the Romans derives from this. A list of possible references would be very long due to the perspective from which his poem transposes a generic conflict (between values and ideals) in the terms of literary imagery. There is a sequence of reference points, beginning with Aeschylus’ *Prometheus* – who proclaims art’s critical condition in the name of freedom of spirit – to Alban Berg’s *Wozzeck*. But not one of them really exhausts the motive of the carol, and this is because myths are not reducible one to another.

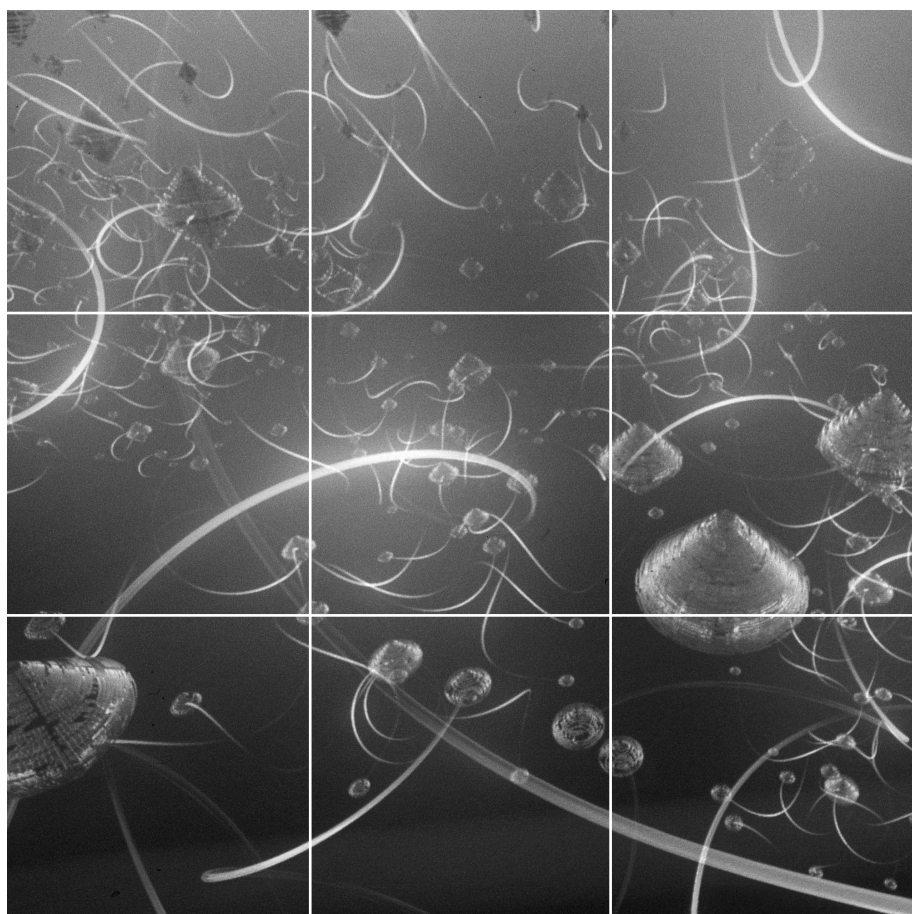
Bartók intuited the nature of the myth even through the way he used it. The *Cantata*, in its musical form, belongs to the musical tradition of the Middle Ages. The profane aspect, which the title, purposely contradictory (Cantata and Profana), expresses, pertains to condition. Sources must be sought not only in modern nonconformism (especially the composer’s own), but also on the archaic level of human authenticity. This authenticity derives from the myth itself and attempts to instantiate a mythic dimension during a time of brutal demythification. The musical reality that Bartók produced is flagrantly current; the amalgamation of motives (with the aid of compositional technique brought to perfection) does not attenuate the meaning of the text, but amplifies it. The aged sire asks his sons to return to the paternal home in a tripartite canon. Negation, the *Cantata*’s culminating moment, is full of passion due to the chorus (an entity considered diabolic in medieval liturgical music). The *Cantata* unfolds in three sections but is essentially realized through the basic musical forms of the genre: canon, aria, fugue, and cadence. It is no mere illustration of the text, but its replication in music, one that transcends time, reconstructing, not watering down, the myth. This idea must be emphasized, especially since Bartók did not retain the melody of the *Carol*, even though the original music itself is quite unusual. Brailoiu, who published the *Carol* in Romania (in *Romanian Sociology*, 10-12, Dec. 1938) is of the opinion that a text from Romanian folklore can have several melodies. *The Carol of the Sons Become Deer* is an exception. All the examples collected from a rather broad territory have the same melody, which is proof of its belonging to a syncretic cultural level, as well as of the ceremonial functions that served this level. The rhythm (*tempo giusto*) is likewise

characteristic of the archaic level; alterations lead to the rubato-parlando aspect that Bartók kept to even though he did not understand the cause for this modification.

The obvious explanation for Bartók's decision to use only the text is the one suggested by the title of his work. A new musical reality meets an unpretentious literary exception, and the implicit theme of the confrontation between pagan myth and Christian dogma becomes the substance of the *Cantata*. Its elan is derived from a rediscovered syncretism that enhances elements at the aperceptive level, making demands on the listeners at every level of perception. This is the reason for the acuity it attains, accentuated by the two choruses that the *Cantata* assumes as given: a work for orchestra, double choir, tenor and baritone.

The expression of the encounter of two spirits, as well as of two civilizations separated by time, the *Cantata Profana*, as a whole, evinces a symbolic value. From text to music, Bartók consistently pursued the path of transposing an idea. That is why the *Cantata* is considered the expression of the condition of art and the artist – how this work is usually “read” and “heard” – although its original nucleus has a much broader significance and richer meaning.

Sitting by the phonograph that will register his voice, and under the intense scrutiny of Bartók (assisted by Professor Ion Busitia), the peasant Vasile Suci, 31 years old at the time, transmitted, full of emotion, the testimony of a legendary time. The chance meeting that took place decades ago cannot be fully appreciated even today.



Chapter

Fiction, Poetry, Drama

// Short stories

// Novels (excerpts)

// Poetry

// Drama

Short stories

Letters, Suicide, In the Right Direction, Enthusiasm

Words, Permission to Think, The Ruins of Utopia

Letters

(1967)

One day – it was raining outside – he, hopping from one puddle to another and splattered with mud to the tip of his nose, came up with the idea that even the letters that make up words are toys you can play with. Like a box of blocks. And if you lose one of them, you can't build the white tower, and if you lose two, the house will never have a roof, no matter how hard you try. And recalling the scolding he had received no earlier than yesterday – because like today, he had muddied himself skipping from puddle to puddle – he figured that if you lose the appropriate letters, you would not be scolded. Even more, he could even throw the ball he was playing with at a window and break it, and get away without anyone punishing him by giving his ear a hard pull.

Happily hopping on one foot, he let go of three of the letters – the ones he thought he should get rid of – just as he used to throw away his homework papers full of the corrections that the teacher had penciled in red. But he still got into trouble because daddy didn't know how to play the game, or he had a different set of blocks.

As he grew, he continued playing this game because he was afraid of punishment when he was caught smoking in the toilet, and when he got a bad mark on his tests, and then when the neighbor's girl woke the whole building with her screaming, and he was discovered perspiring and red with embarrassment, his pants down to his knees, guilty of boldness, but actually innocent. He would have liked to lose her letters at that moment, to make them miraculously disappear. He tried to lose them for her sake, too, but probably neither the neighbor's girl nor her father was familiar with the game. Or they had a second set of blocks.

He kept at his game, ever more seriously, whenever he knew that he would be breaking up with a woman, in the belief that he had to tell her something, anything but the truth. (He didn't have to tell her anything, but what won't a man do. And just to keep things calm, it's better to lose some letters than to take them along, only to be considered untrue in the end.)

When he realized that he could still be suspected of dishonesty, or of some other short-coming – he remembered his father and the girl next door – he bought himself another set of letters, to keep in case of need, already arranged into words, with specific instructions on how and when to use them. From that moment on, all he had to do was to read the instructions and he was ready for anything. But if something were to change – even the formula for aspirin changes, and last week a new cough syrup was introduced – he would buy a fresh set of letters with new instructions. These were things that one could pick up quickly. You're walking along the street and meet someone. And if you listen to him, he will listen to you. Everyone can learn. And everywhere you can see it written: *Repetitio est mater studiorum*. Even the time it takes for your subway ride could be used to study. And after learning, practice begins. Each set of letters applied according to instructions. Practice is all there is to it!

Things went on like this until one day. All of a sudden, the letters themselves changed! They took on another shape, another color. You couldn't say a word that contained both a letter in gray and another letter in italics. You could no longer be right in only capital letters. You could not make yourself believed in flowery lettering, or funny in miniscule. To buy every set of letters that became available – they no longer came with instructions, so you have to make up your own – would be too complicated.

On the way home, where his wife awaited him, he again started dropping letters, just in the place where he knew matters to be sensitive. She was standing by the window, not even looking at him – or so it seemed to him. And seeing how letters fell to the street, she picked them up in her mind, saying to herself as he went along: A, E, I, O . . .

Suicide

(1967)

On the beach, everyone looks for something to do. Some act as though they're reading; others, as though they understand what they're reading; a few others really do read and get a bad sunburn in the process. Children search for seashells and play ball in the water. Women string the shells and look at men. Lifeguards, acting important as they row their boats, blow their whistles in order to keep fish from going close to shore. They sit in the sun so long that even the skin between their toes gets a deep tan. Some people bury themselves in the sand, turning into hourglasses as they experience the ecstasy of fine grains against their bodies and the secret satisfaction of their possibility to be indifferent to a process usually considered irreversible. When only their nose and eyes remain uncovered, they stare at the legs

of the women around them and conclude that in most cases, no amount of plastic surgery could remove the fat and veins in them and restore their youthful shapeliness.

"Silly, aren't they, darling?" the professor remarked to his wife, trying to keep her calm. He removes his sunglasses, shakes the sand off them, and puts them in their case. Full of dignity, he takes hold of the half-inflated ball that rolled to their beach blanket and throws it a bit farther. She is actually amused by everything going on around her. Even when her husband kicked the ball away. But this is not how she should react. He knows better. He's much older than she is. None of the young men from the group that kicked the ball over comes after it. It's so tempting as it just lies there. You can pick it up and throw it in the water and run after it. Or you can kick it until your toes hurt, soft as the ball may be. All the things you can do with a ball on the beach. She pictures herself throwing the ball at her husband, over that thick book that he's been reading probably for years now, or even forcing him to play with the group of young men on the beach so that she could finally get to see him running and tiring himself out, screaming that he got the ball over the goal line – even if he shot the goal from off-side – and so tired at night that he couldn't even snore.

As this scenario played out in her mind, the young woman at the professor's side forgot the price of boldness, got up, and joined the young men as they played. The professor peered at her over the rim of his glasses. He had understood by the way his wife's breathing pattern fluctuated that she had been struggling deep within her soul. She was like a child in a room full of sweets, tempted beyond endurance, but still too fearful to do more than imagine the taste of each delight, finding that the candied cherries didn't taste as good as the sugar-coated nuts, and that these were not as delicious as the rose petal preserves.

"But she's not a child, she's no longer a child," he repeated to himself obstinately in order to keep himself in check. He suffered because his wife did not just close her eyes and lie in the sun at his side. He suffered when he saw her get up and reminded himself that it was his duty to slam shut the door to the cupboard full of sweets. "It's not right to tempt a child. Only perverse parents do such a thing." But it was too late. He began to think how he could bring her back to her place. He brushed the sand from her blanket, blew more air into the inflatable pillow, and even decided to go to the stand to buy her ice cream and soda, maybe even a coke. She liked it so much. Usually he only gave her money so she could buy such things for herself, but this time he would actually go for them himself.

After a few minutes, she disappeared from his sight. He thought he could see her in the water – it looked like she was waving at him – then playing, posing like a sailor for a picture. "I'll put it on my desk so I can look at her as I work," he thought, already forgiving her trespass. More minutes went by.

It was almost noon before she returned, tired, excited, happy. It was the first time that she had had any fun since they arrived at the resort. She could not find their beach blanket

at first, because someone had made a sandpile. Behind the sandpile, her husband sat cross-legged, like a sultan. He grabbed a fistful of sand, raised his hand, and let the sand run from between his fingers with a pleasure that bordered on the perverse. Over and over. His movement looked so solemn, almost like a religious ritual. But from a certain distance, one could tell that this was no game. Beads of sweat covered his forehead and his eyeglasses were foggy with steam.

Year after year this operation was replayed from the beginning. Intransigent, the professor sifted the entire world through his fingers. Basically, everyone was dust and in order to make anyone he wanted go away, all he had to do was to sift the dust from them in order to leave behind only a name, or not even that much. Maybe just a funny picture that you could look at only when you wanted to, removing from an album the photograph yellowed with age. The day he discovered this procedure, he sifted the entire academy, the vicious colleagues who wished him ill; then he proceeded to insolent cab drivers. In the palm of his hand, embodied by very few grains of sand, he held beautiful women (he could have had his pick of any of them) and intimate family friends. He would save the most successful specimens, gradually eliminating the ones that seemed to grow unreliable. One day, after several years, also at the seaside, there remained in his palm two grains of sand – he and she. He was alone, that is, only she was with him, isolated on an island of dust. The others had been turned into a heap of sand that resembled any other pile of sand. They remained a memento, which, like any memento, discard with an effortless toss. Then – although she still had no inkling of her husband's methods – after he was bald and had the gout, after he had published several books for the general public, which were distributed free of charge, she found out that on the day when the ball first bothered him, another one – not red, but still dirty and half-inflated – had struck him and made him drop one of the grains of sand in his palm. She had laughed, innocently, spontaneously, revealing her healthy white teeth. A different old man was waiting for her, his arms wide open, stiff and lifeless as an Egyptian statue.

Her husband suffered. A salty tear dripped down his cheek, over his lips and onto his chin. But he didn't say anything to her. She did not know that in fact she no longer existed, that she, unintentionally and unconsciously, had committed suicide, had become a grain of sand in a pile that, as with any memento, you could kick out of the way with the tips of your toes.

In the Right Direction

(1975)

Meeting Him – how else can I distinguish Him from everyone else? – took place as naturally as if in a dream. We never ask ourselves, however strange a dream might be, how we got into surroundings that can never exist in reality, or why we take part in actions which we would on no account let ourselves carry out except in a dream.

So, He was standing before me. He seemed to have stepped down from the portrait that hangs in absolutely every public place. He looked a little tired. I would say that he even looked older, almost sad, and completely helpless. I have no idea what He could have been looking at. Maybe He was merely distracted or lost in thought.

“Hello!” Probably because He looked familiar, I couldn’t help greeting Him before I realized that we really don’t know each other. He didn’t reply. This annoyed me. Even if we don’t know each other, He should answer. Whoever becomes a public portrait should at least feel obliged to respond. Then I began to laugh. I was not being fair to Him. Poor man! After becoming the object of the most unimaginable jokes, which not one of us – His subjects to the glory of the name we hail on legal holidays – would ever put up with, should He respond to our greetings? No, that’s too much to ask for! And I felt sorry for Him. This feeling of sympathy was so deep – I don’t want to say irrational, even though this is probably the most appropriate word – that tears came to my eyes. I felt that I would do anything to help Him, even forgive Him for all that I knew He had done and especially for all the guilt put on His shoulders during those times when the reins are pulled more tightly than usual, or when He strikes furiously, with any means at hand, when He would do better to listen and to understand. No, it’s not fair to blame Him for everything that hurts us or makes us miserable. He is the Idea. We others don’t understand Him and exaggerate what we perceive as his shortcomings. We can’t see so far ahead as he does and don’t understand the reasons for our sacrifices of today.

He noticed me and gazed at me. I think He even sighed.... He actually did!

What happened after that I cannot recall in detail. I have only His picture before me and in my ears I hear a voice repeating “You are happy. You are happy. Laugh! You’re happy. Laugh! You’re happy....”

I no longer feel any pain. I no longer feel anything, not even pity. I begin to laugh. My jaw muscles tighten little by little, losing their ability to move, and harden into a mask of a perpetual smile for a happiness that He beams down to me, with the air of an all-forgiving father, from the portrait in front of me. Nothing remains of the hatred I once felt towards the omnipresent portrait or towards His statues, books, and the records and cassettes with His voice on them. I take advantage of a moment of inattention on the part of the one

whose voice greeted me as soon as I came to my senses and steal the portrait from off the wall, hide it under my shirt, and leave peacefully. In back I hear that familiar voice, "He's heading in the right direction."

Enthusiasm

(1976)

Lines took form as the distance to the tribune decreased. Steps entered into rhythm automatically. Discussions between neighbors on the same row or those in front or back of each other were drowned out by the slogans shouted by those who read them from narrow strips of paper, repeated mechanically in the crescendo of a circus act that was nearing its climax. All the props received against signed receipt in the factory yards entered into the play of the demonstration. Bouquets and flags were waved above heads in the crowd. The portrait posters seemed to turn magnetically towards those who could see the faces looking younger and less annoyed by the noise and the sun and the obligation of having to wave in a comradely way to the mass in which not one face could be distinguished from another. The music blared. The army bands, under the direction of their conductors, played as though they were in real combat with one another. And above everything could be heard the melange of military music, slogans, shouts, applause, and even the television reporter's commentary as it blasted out of the loudspeakers.

For two hours, taking care all the while to explain to his little girl everything that was going on, he had been following step after step the path which should soon come to an end. He felt stifled and hoarse. His shoulders ached from having carried his daughter, who at the beginning shuffled alongside him but finally wearied. He had often seen on television and newsreels parents who carried their children on their shoulders, and he always said that even though it's not worth the effort he would also bring his daughter along to one of these mass demonstrations. He wouldn't be so bored, and he wouldn't feel so alone among the horde of people who could hardly wait for a holiday to come. At the end of the walkway, located a few meters past the tribune, were stands selling cold drinks, beer, snacks, and candy. Everyone was aware of this and prepared themselves for the moment they would reach them. He envisioned himself downing a mug of cold beer and biting into a juicy, hot sausage and saw his daughter enjoying a lemonade and pretzel — always fresher on occasions like these, which offered days of feast after weeks of famine.

Soon they would see their leaders in person, and among those leaders, the most important one of all. At that moment he would lift his little girl right above his head and she would yell something. All children yell, carried away by the noise and the crazy rhythm of

the slogan liturgy. Then he would let her down and ask her if she knew what was going on. Then they would laugh, he with his beer, she with her lemonade. That was the most important. The rest didn't really matter or shouldn't matter too much. But his shoulder still ached at the place where his tired daughter sat. He asked her if she could walk by him for a little while, only a little while. Then he would pick her up at the right time. She understood. She held on to his hand as though she were frightened, stumbled a few times....

The crowd's pace quickened. People in back were pushing. The ones in front were not moving fast enough. The official agitators, wearing their red sashes, passed between the rows and urged the crowd, already hoarse, to yell louder, louder, louder, louder the slogans badly typed on strips of paper handed to them at their places of work. Then, or just an instant ago, he felt his daughter's hand slipping from his as if she wanted to take hold of the other. He waited for the feel of her fingers, but as he glanced down, he saw only shoes, sandals, legs, pants. He yelled her name, but all he heard were the slogans droned by the mob.

The portrait posters lined up face to face with the likenesses they bore. A few children wearing red ties went up the tribune to present their flowers and were allowed to kiss the cheeks of the recipients of this mass ovation. The bands started up even louder. The columns advanced, shouting their enthusiasm set to rhyme. Parents carrying children on their shoulders, flags, and portraits were shown on television. Beyond the last soldier in the guard of honor surrounding the tribune appeared stands full of everything that the crowd, losing control, pushed towards as their slogans went into decrescendo. But his voice could still be heard as he was pushed ahead by those behind him. A beer and snack were automatically shoved into his hands and his mouth was stuffed until he could no longer breathe.

The next day's newspapers carried the picture of a father holding his daughter on his shoulders in the usual place for such photos. Obituaries are never published after public celebrations.

Words

(1976)

IN MEMORIAM: ROLAND BARTHES

One fine day they decided that they were fed up with the language they spoke. They had begun to master it so well that they became disgusted over the way a thought could be hidden or a feeling expressed. They long ago tired of their newspapers, which happened after they had already decided to stop reading literature, especially poetry, whose poison – remember those hymns and odes to the leaders? – penetrated the soul so easily that it brought on the sickness of not being able to discern truth from the mere mirage of truth. The first one to sense that they were in a crisis was a neighbor who seemed to be a party activist but was

only a priest. They did not perceive his reaction, however, because not even one of them went to that next Sunday's mass. The family just stayed at home, father with his dog – from whom he expected no word anyway – mother in the kitchen. The children – now playing with a ball, then with some toy – were free of the burden of having to hear what they long ago stopped believing. In a short time, other neighbors took notice. A policeman, even the doctor in the house went through the shock of discovering their crisis. "Medicine is just as misleading as everything else. We've had enough of it!" The doctor would have recommended that they undergo psychiatric treatment, but they didn't seem at all disposed to listen to him.

They just decided to live without words. This meant to no longer call things by name – things could no longer be called by their right names anyway – to no longer say what they felt, but just to feel, and if they could, to directly transmit their feelings to each other. Once things became words, they were interpreted, registered, and catalogued. Through words, thoughts and feelings, even intentions, were controlled right from the moment of their conception.

In the beginning, they accepted the use of written signs. They still filled out forms or wrote – quite poorly in their use of words – petitions. But feeling they should be consistent, they stopped. Eventually the children stopped attending school. The radio was ostracized along with the television and telephone (naturally). Thus they liberated themselves from more than words and their rules of functioning, which was their real intention. Contact with regimentation had ended. The constraints they tried to evade through the use of words seemed to vanish even though the actual pressure felt all around them didn't. Perhaps they were fooling themselves, but they did so out of a conviction that bordered on fanaticism. They rejoiced over any limit broken and tried to discover – with a curiosity and zeal hard to describe – how far they could go in the liberty gained at the price of renouncing words.

As time went on, they discovered the other side of the coin. While happiness could be expressed without words – and sometimes it was better to express it that way – a feeling of unfulfillment lingered, a kind of emptiness, even a fear that they might still, still betray themselves in some way. The needed help – and there was no question in their minds that they didn't need any – could come or not, could be what they needed or not. They wordlessly transmitted an awful lot of things to one another, themselves amazed that it was possible. But just as many things remained unshared that they would have liked from the bottom of their hearts to make known or understood to others. Domination through words disappeared, but other kinds of domination – perhaps worse than the one they had escaped – arose, even among themselves. Nevertheless, whatever price they paid within the family circle was recompensed tenfold by their new relationship with the outside world. This, in

fact, constituted their triumph. They escaped from their own and the others' hypocrisy, from lies, from the pressure of unnecessary precepts and from rules they knew to be wrong. At least, it seemed that they escaped.

How could they know that the priest continued denouncing them ever more furiously in his sermons? He even wrote a letter to his superior describing the matter and requesting instructions. The school director soon joined him, made it known to the hierarchy that the children were breaking the law regarding mandatory education and requested further instructions from him. The entire bureaucratic apparatus – which derived from the palpable reality of the word – was set in motion. Rival political parties abruptly declared armistice. Even consultations with representatives from other countries – whose politics were condemned for any reason – were carried on in the hope of learning what they would do in such a case. If the phenomenon spread, politics as usual would cease. The vote of such persons interested the bureaucracy less and less, but this precedent was dangerous. Computers that were programmed for anything but the re-fusal of language crashed when fed unfilled forms.

Then began that long period in which day after day, at the most impossible and unexpected hours, relatives appeared at the family's home to convince them to go back to the way they were. Policemen checked on the family at strange hours. Psychiatrists from the division of criminal psychology were sent to observe them. University professors were ordered to put their knowledge to use in this unusual case. Reporters tried to interview them. Priests, politicians, and a group of deaf-mute children had to show them how terrible it was not to be able to speak or hear. Artists, a delegation of writers, even foreign visitors – among them a famous parapsychologist who claimed that it was in his power to bring this strange family back to speaking and listening – intruded on their privacy. The national academy of sciences offered a prize to any researcher who come up with a way to make them use words and a famous university announced the convening of a congress based on the phenomenon of word rejection. The publicity surrounding the case aroused all sorts of speculation and approaches to solution.

Public curiosity amused the family for a while. Then it became more and more unbearable until they finally barricaded themselves in their home. Their solidarity and mutual understanding seemed to grow, even though the instrument of the word was irrevocably banished from their lives by now. They had lots of fun after discovering that microphones had been installed in their home in order to check whether their refusal to use words was just a public provocation – punishable by the law of the land. The idea that the whole affair might be a matter of criminal activity, sabotage, or espionage was taken into consideration. The family was filmed through hidden cameras and their lip movements were analyzed in the hope of discovering the buds of words blooming from their mouths.

Most people could not understand what the whole matter was about. It only seemed funny to them to live without words. But those who tried the experiment soon discovered that they could not go back to using words that after a while lost all meaning. One only picked up different sounds that were transmitted in succession. Writing also disintegrated in different ways that often resembled each other. Sometimes a written word would take on the form of an object or something from daily life: a tree, a leaf, clouds floating in the sky, insects.... Some who tried out freedom from words were attracted merely through the publicity surrounding the case, victims of the desire for celebrity because they did not know how to enjoy this new freedom or just couldn't overcome decades-long habits. Instead of receiving the reward they imagined, defeat sent them back to the lives they had hoped to flee.

Gradually, the world split into two groups. The greater was composed of those who spoke, heard, wrote, and made decisions and felt responsibility for everything and everyone. The smaller group tried not to forget exactly why they decided to no longer speak or write or read or make decisions for others. They rediscovered simple pleasures, sensed earthquakes, protected themselves from lightening without knowing how but in a better way than their counterparts who had studied the matter. They made love with heretofore unexperienced ardor, but they could also destroy one another without pity, not realizing how strong they were, no matter how benign they esteemed themselves to be. They lost all sense of the past, living either in the present or in the confused time of expectation that they could not define. The promises made to convince them to return to using words did not impress them since they no longer knew what "promise" meant. Neither did they any longer fear the disappointment of the promise broken or a future un-fulfilled. Future no longer existed. The other part of humankind – speakers and writers – concerned them only to the extent that the latter threatened their lives. Otherwise, they seemed immune to everything. Even certain diseases disappeared from their midst, which further encouraged them in their chosen way.

Of course things could not go on like this. The first wave of research ended with the conclusion that language should be perfected so that it would no longer be capable of deceiving. Moral norms to govern its use were proposed, but the results of the discussion of the topic proved catastrophic. The definition of norms still involved language and a vicious cycle resulted. Other research, carried on in secret at the outset, recommended the radical method of genetic alteration. It was necessary, scientists declared, to intervene at the level of the cell and to determine an irreversible process of susceptibility to words and their rules of usage. Or an artificial word-sensitive system had to be implanted along with a miniaturized memory. No guarantee of success could be given. It was always possible that the operated persons use language mechanically and in this case, the essential would not be obtained because it was not a matter of a machine to be repaired, but human beings with their weaknesses and aptitudes, capable of lying to one another, of convincing themselves even of what

they do not believe, of submitting or giving the impression of submitting, or resisting or only pretending to. Mass extermination of those beyond the realm of the word was proposed, a solution with such unforeseeable consequences that only a minority overcome by a feeling of their own superiority accepted it. The Organization of Civilized Persons, after years of wasting time, inscribed settlement of this crisis as a major item on its agenda.

Historical research into the phenomenon focused on the first manifestations and discovered some forgotten facts. It all started with a family, so the family had to be reinvented for the ones who refused words. Families had in the meanwhile disappeared from the rest of society as humans began to avoid legal ties in preference to coming together for a short time and going separate ways without complications. Children no longer presented a motive for establishing a family for the simple reason that childhood was deemed an exceptional condition. Maybe dogs, which some historians discovered to have close relationships with humans going back to the earliest times, should be reinvented as faithful animals to which one had to say something and to keep under domination. Numerous experiments were carried out based on such observations, but they all failed. Finally, the League for the Protection of Non-Speaking and Non-Writing Persons intervened, strongly demanding, on behalf of its objects – who had never requested the League's help – that all attempts be brought to an immediate halt.

More and more tension permeated the atmosphere. The secret police, which had already acted by pushing some of the rebels across national borders and by isolating the rest from speakers who could prove susceptible to the force of non-speaking, discovered that their methods were being used by their neighbors – historical enemies of their land, who chose the exact opposite direction for advancing towards the future (or at least, that is what the newspapers, which usually know the most about everything, wrote on both sides). So the method had to be discarded. You got rid of your own non-speakers and non-writers only to find yourself with ones from across the border and which you now had to rear in exemplary fashion in order to show your neighbors that what was no good by them was appreciated by you.

In the end, the army came up with an immediate and thorough solution. On one cold morning, under a sky that could not be more splendid, in which the stars still glimmered as the sun's disk was rising beyond the horizon, a rocket left Earth carrying on board the dissidents of the species gathered from around the world. A detailed description of the case, codified in such a way that inhabitants of any other planet could understand it, was placed in a container specially constructed to resist the worst accident imaginable. A gigantic banner of instructions dominated the instrument panel: One WORD is all that is needed to direct the ship back to Earth!

Each time people look to the heavens and discover a small star going farther away, the same question comes to their minds, after which they bow their heads, recalling that they themselves are spoken to, written to, drawn to, and shown that they have no right to raise

their heads, nor is there any point in doing so. The spaceship had long ago left Earth's sphere of attraction. Not even the most fervent words of repentance could change its course. He who is with us listens to our words. He who is against us can no longer hear them.

Permission to Think

(1976)

Permission to think must be applied for at least one month ahead of time and cannot be exercised for more than one day, not even by those who have never thought before.

It is granted without advance notification and goes into effect from the moment the applicant is notified.

One has the right to reject permission, but postponement is not allowed, no matter what the reason might be.

At the end of the interval granted for thinking follows a transfer of information from the memory attached to the brain to the general bank for the control and direction of information. This transfer lasts only a fraction of a second and is followed by a feeling of total relaxation.

All these details were made known to me in a very polite manner. I had already heard about the procedure, but a discussion with a competent functionary would clear up those questions that always arise in matters of thinking. It would be a pity to waste the time granted to me for thinking on things set down so well in the law that they were unanimously accepted. Submission was a consequence of understanding necessity, so that no one no longer had to understand anything. This is our liberty. Thanks to it, and to the type of thinking for which we must apply for permission, we are exempt from the thinking we used to do and still sometimes do with the excuse that a bad habit is hard to break.

The time came for me to try it, just like long ago the time had come for me to make love or, before that, to fire a rifle (killing my parents). I still had to wait a while for the right moment to think. Doubts arose as I found myself before the gateway on the other side of which began the zone where I shall find myself for a short time. I had to get rid of them in order not to give in to the temptation to slip into the area forbidden to me before receiving permission. If that should happen, I would automatically find myself among those former members of my kind who tortured themselves to the point of insanity by trying to

understand what we already understood, or even by showing – poor souls! – that we would find ourselves on the way to perdition, from which there was no way out except by following their example.

The functionary in charge looked at me indulgently. I know that I thanked him for everything he told me. And I wonder why I don't just get up and leave. But this question does not have to be asked and matters remain as they are. He looks at me. I look at him. It's fine just like that.

Now he speaks: Permission to think has been granted for a period of ten hours that go into effect starting now. You can refuse, right now or at any time during this interval.

But I have just gone through the first seconds of effort in my permitted thinking period. Abruptly, I get the feeling that a chasm gapes open before me and that voices are coming from somewhere far away. I instinctively sense an enormous danger and even now a cry escapes my throat. But it's not my voice. It can't be my voice screaming so desperately, "I give up! I give up!" over and over. Then, after the information gathered in the memory attached to my brain is transferred in a fraction of a second, I calm down and am overcome by a state of happiness that I can't describe. I have to understand it, but if I understood it, I probably wouldn't feel it in the same way.

Yesterday I found out that three job slots were done away with at the bureau granting permission to think due to the fall in the number of applications. That polite functionary who took care of me brought me a splendid music and picture mini-apparatus, the same kind my neighbor received on the day he gave up his minutes of thinking. It's so nice to look at and listen to. Soon, new programs will appear on it and I shall be among the first to see them. I don't think I'll ever apply again for permission to think.

The Ruins of Utopia

(1979)

The speaker finished his speech in a somewhat unusual manner: "And if you want proof of everything I've told you, then step right into it!" For a moment the audience thought he was joking, or that he was making a clumsy attempt at a figure of speech. But he raised his hand and began to invite people to cross the invisible boundary between what seemed to them so sad or just plain insupportable and what promised to be an ideal alternative to their mean lives. They were a little scared, but curiosity proved stronger, and after a brief hesitation, they found themselves beyond the boundary line. It was just like when one is a child: you close your eyes and you are in the magic land that fairytale books describe with so much color and warmth.

The speaker, continuing to invite the unbelieving, remained on this side of the dividing line. He wasn't lying to them. He knew that they were enjoying everything once forbidden to them, everything they couldn't have until now, that they experienced great surprise, otherwise hard to bear but now become possible. He could still follow them in his mind, but not too far. He himself didn't have the courage to enter and live the reality of his prophecy. He waited, as patiently as a watchdog, until he once again heard the usual noise of an audience waiting for the speaker to begin. Their impatience grew. He couldn't resist them even though he felt so tired, so old and tired. He approached the podium slowly, more because he wanted a sip of water than for any other reason.

The noise died down. Soon he will turn towards them and start speaking. He was excited, a good sign. It meant that there was still something alive and young in him although so much time had gone by since he first addressed an audience. Ascending, he discovered that no ordinary podium awaited him, not even the announcer's table was prepared, not even the glass of water or the microphone, which out of principle he never used. He ascended into a kind of forest towards a city now in rubble, in which even the statues crumbled from perfection, and people were dying, not knowing what to do with the happiness given to them so unexpectedly and without any contribution on their part.

He recognized, not very easily, the contours he once described with his words. Below, in the strange auditorium where his speech was awaited, quiet settled in. He could invite this audience too to cross that invisible line, but he no longer had the conviction that supported his arm in the motion that no one could resist. He could imagine what had happened to their precursors. They took with them everything that belonged to the life they no longer esteemed, trying to live the life of his utopia while they remained what they had been at its portals. He should have warned them, or at least accompanied them. He should have led them.

He heard part of the audience trying to call his attention to the fact that he was making them wait too long. But he wasn't prepared for this speech. He still felt like being their prophet and not the historian of their aborted expectations.

He remembered that his colleagues in archeology and history invited the public to visit tombs, to mingle among the witnesses of the past. He tried to this also, but no one accepted his invitation. He raised his arm and signaled for them to come closer, to step over the line separating them. In vain. He mumbled senselessly, "The ruins of Utopia, the ruins of Utopia, the ruins of Utopia..." and headed toward the rows of empty graves whose mystery waited to be revealed. He found what he was looking for, lay down comfortably and closed his eyes in understanding. He didn't get to hear the enthusiastic applause of his audience.

Novels

(excerpts)

A Day for Jewels

SYNOPSIS: Irina, an actress whose performances were never described as better than mediocre, is given her last chance to assert her talent through a new play, a conventional melodrama that served Romania's communist politics. The fate of several others, some beloved, also depend on how she acts the part. The novel reveals the situations of her life and love that make her what she is and wants to be. After weeks of rehearsing for the role of her life, she receives a strange message sent by her lover shortly before he is killed in an accident at the mine to which he was exiled: "If you could not succeed." The day preceding the premiere, the newspapers are ordered to print the truth behind political events that caused the death of hundreds of innocent citizens. As Irina acts her role on stage, an actor shoves the story under her eyes, and she realizes that she is being made a puppet for a regime that misuses the truth. In her anger and confusion, she goes on acting. Here is the final chapter:

XV.

HER WORDS BECAME a castigation that became increasingly difficult to bear. The others played on, obsessed. Alecu mumbled. For the first time he mumbled, although when he had accepted the role, he was convinced that mumbling was useless and would not impress the audience. The prompter ceased whispering. Drawn into the performance, the stagehands were sweating, playing out their cues on the levers and pausing like virtuosos. And like virtuosos, with a truth that their movements had never before possessed. The dressers brought cups of cold water and gave them to the actors exiting the stage just as water is handed to marathon racers. And they drank in gulps, throwing down the cups as they kept on running. The contest surrounded them: the applause, the camera filming the event, the helicopter following the scenario from above.

The words had been printed in the newspaper – all those words beautifully arranged in obituary style, a ridiculous format that revealed hypocrisy and impotence. But the living truth was not yet voiced. It circulated almost subversively. The responsibility implicit in the revelation could only be collective. Each individual's share of guilt did not count. At least

not now, not yet. This was the most difficult matter to understand and accept. But of utmost importance if these events were not to be repeated. Only a few people sitting in the auditorium knew about Mihai's spot of sky and the blooming wild rose, and even fewer about the death of the girl with the doll, about Eugenia, about the postman and his sudden pain, the fir cone and the unshaven man who guarded Irina's and Florin's sleep after their desperate and happy night of wandering in the mountains. But all these unspoken things communicated among themselves, were interwoven and carried over to the text in the newspapers and to the routine questions about the harvest, and to the strange dialog about the inscriptions on the tombstones in Bellu cemetery. They were all connected through the script to which Irina, probably for the first and last time, brought life.

Today the banality of the lies she had to project from the stage was destroyed and revealed as demagoguery. They filled the auditorium as they shook all her joints and shot to her pounding heart, which her heavy dark red blood could not sufficiently fill. Words, once weak and ridiculous, used to transmit hackneyed slogans through sentences beautifully arranged but in no sense true, ricocheted from the wall of the truth revealed today in the fresh letters of the newspapers. And they rebounded from person to person. Matters that for a long time were only whispered and regretted, like a necessary accident, had been made public. Those citizens who still held that criminal acts were perpetrated by one man – the only one openly condemned – were obliged to realize that matters were much more complicated. They could no longer turn their backs to their own complicity. The revelations did occasion one important consequence: the seed of truth could no longer be prevented from union with the earth.

But the demagoguery did not change. Its slogans remained just as ready for its proponents for future flagwaving celebration. If the ideal used by the murderers to justify their crimes remained the same, what would stop future crimes from being committed in the name of the same ideal? A criminal's confession eases his conscience but does not change the facts. In reality, the necessary identity between principle and value was never accomplished. Sloganeering equality, some men ended up more equal than others. But that was not enough. The more equal had the perverse propensity to push the less equal onto the street, commanding them to look happy and to sing of a victory that never occurred. Newspapers, radio, television, theaters, movies, literature, poetry, and art proclaimed victory and success. The deeper the people's suffering, the more grotesque the masquerade of normality. The demagoguery that had masked the truth survived in Irina's lines and became society's first test, the first poll. It fought to regain the supremacy lost for a moment. Where error was cited, someone added "necessary." Where abuse was mentioned, someone completed "pardonable." The number of survivors was emphasized over the numbers of the dead. The vague promise to avoid repetition was only a footnote to past illegalities.

This play belonged to the same strategy. The noise of shooting, executions, and terrible torture was being muffled by the same sloganeering, with the same falsely euphoric expressions. Through the lies of tonight's play – which Irina was turning into the success on which her future as an actress hung – the voice of cynical hypocrisy opposed the voice of truth. The same voice that had hidden the devastating events it revealed today. The hope of success this evening was no more than a lure to enlist Irina's complicity. Irina never took part in those crimes. But tonight she became an accomplice after the fact because she could not find the strength in herself to stop the show and to read with and for the audience the published acknowledgement of social guilt. To oppose truth with illusion, even artistic illusion, today became a crime. Here began her personal tragedy. She did not have the power to truly succeed.

Truth's victory would be brief. If Irina could have awakened from the almost hypnotic state she was in, she would have said that truth waits. Only the lie hurries. Everyone would have said it. But just now, no one, absolutely no one – not even Severin, who had again squeezed into someone's ears the boiling oil of letters, according to his vicious custom – reading the revelations realized this. Not even Florin, who took up a stage career with the intention of also becoming part of that image of collective enthusiasm misinterpreted as political unity. Up to this moment, he had been pacing back and forth in front of the theater, excited as he should be, but mostly empty, abandoned, as he also should have felt. If he wanted to remain a theatrical director, this feeling would come to him over and over.

He wanted to ask Irina again to marry him – again and for the last time he swore before entering the theater, mysteriously drawn by what was happening onstage. And if she had brought him to the same state she once did with her first glance, he would have asked her, ignoring the audience, ignoring even his career, to marry him. But now, watching at the performance, he was astounded to see Alecu's face unmasked. It was a soft face, gelatinous, throbbing like a jellyfish. His brain seemed to have shrunk to the size of a walnut and vibrated. Florin turned to the auditorium. He saw the theater committee, which had let loose of their pencils and notebooks, entranced by Irina's performance. He saw Ada, she too an Irina, perhaps more plump and less emotional, glued by fear to the breast of a woman sitting alongside her.

He felt the urge to yell at Irina to give up her ambition right then and there, the price being his own defeat. Because today, no matter what might be written or said, she was playing for him, for his right to be employed as a director. Florin felt no guilt over what was happening on stage. He began, and even wanted to begin, his career with a defeat. But not with a lie, however beautiful. He sensed that her perfection in the role drew him into the lie, making it his own, theirs, confusing prey and predators. Florin knew almost nothing of the imprisonments, torture, and injustice. But he felt that it was possible for the lie to become

a prison for him and the others. And he didn't want to lay the price of unwitting complicity, which Irina was now paying, at the foundation of his profession. He was sure he could be a great artist, but he began to doubt that he would want to under such conditions. And this is why he wanted to stop Irina. He loved her, loved her talent. And he did not want her to suffer the injustice of becoming a sacrifice. If she could understand him.... If she wanted.... If she were able....

If, if, if, always if. Like the one in Mihai's telegram. They never offered her any assurance.

Silence. For minutes on end. Then the auditorium exploded in applause. She was offered flowers. But the woman had died. The child who loved dolls and who was pushed to the lions had died. The unwooed fiancée had died. She stood there with her arms full of carnations, roses, gladiolas, every blossom that could be found. And more was still coming, weighing her down. Flowers ordered for the graves of victims whose reputations as patriots had just been rehabilitated and for their surviving relatives who now needed consolation were all brought to the theater. She dumped an armload of flowers in the wings and returned. The applause obliged her to fulfill her duty and bow, although she didn't feel like it. Some flesh still remained on her body for the tamed lions and for the other beasts in reward for their meekness this evening. She did not ask herself what she would give them the next time, or where she would find the same rage. She smiled; that is, her facial muscles contracted in response to a summons other times fulfilled through womanly sincerity.

She was handed more flowers, flowers from every hothouse being emptied for a great actress. But because something in her had died, because she couldn't understand the meaning of "If you could not succeed," she didn't know what to do with them.

Published in 1971, Bucharest: Eminescu

Suspension of Gravity

SYNOPSIS: Radu, a young journalist, is invited to a hunt by a high-ranking party member. During the hunt, he is left behind in the forest and eventually comes to a clearing where he witnesses a shooting. He feels that at that moment, all natural laws were suspended. A conspiratorial silence descends over the apparent crime. Radu believes that in order to bring the guilty to justice, he must enter their society and win their confidence. He saves Paula, the victim, and accepts her as his lover, abandoning Veronica, his real passion. He also accepts

the overtures of the group involved in the hunt and all the privileges this acceptance entails. However, all his attempts to discover the truth behind the shooting end up involving him in it more and more. This excerpt depicts one of his attempts.

HE WAS FULLY AWARE of the compromises he made, but they could be justified. The job, Paula, connections with people from her and the Professor's circle, and new friends were all subordinate to the goal for which he had already sacrificed so much, Veronica in the first place. He didn't want to allow melodrama to undermine his purpose or cloud his sense of nuance regarding the means he used to obtain his end. He believed that he was now enacting, in his daily life, his plan to discover the truth behind the crime. The now familiar feeling of a suspension of gravity, the same he experienced when Paula was shot, extended to every aspect of his life. It was no longer just an incident but the rule of the life in which he now found himself. He would probably never know or never be able to explain how much he longed to discover the mystery behind the shooting and how great was the temptation to become part of the world in which it was possible.

In this state of weariness, Radu discovered the tranquility of an outing in the countryside and took advantage of what his new circle called a "weekend." Not the Sunday allotted to the workers, but the span of time starting Friday afternoon and ending Monday at noon. He would have liked a cabin of his own somewhere in the Prahova Valley or, even better, in one of those villages where powerlines had just been installed in the town hall, schools, and streets; somewhere under the hump of mountains not yet invaded by tourists. His editor-in-chief had found such a place for herself and passionately invested the family income in a vacation house. For many people in positions of accountability to the state – professors, journalists, and directors of every type of enterprise – isolation in the country among simple peasants was the only means of escape from the Byzantine intricacies of the communist regime.

Paula submitted to following Radu on his outings without hiding her lack of enthusiasm. During one of their walks, in the middle of a splendid oak forest, he discovered a configuration of trees that seemed out of place in this dark universe. He photographed it out of a desire to fix the vanishing point of this scene: a path lined with progressively taller trees, perfectly aligned, ascending towards a steeple of majestic silver firs. Radu photographed relatively little. A camera came in handy in his profession, but lacking the eye of a professional, he never took an outstanding photo. His group pictures were so unstudied that the photo editor often had to retouch a less esthetic gesture or a detail that could lead to undesired interpretations.

Radu sometimes made studies in portraits, unposed, unaided even by some developer's trick. Lately, he took more complicated shots and in the darkroom experienced the pleas-

ure of the successful effect of light and shade. He caught the sun's ray on Paula's cheek and turned her into a person entranced by gloom, stepping insecurely towards Radu's cathedral, towards the confessional where one could be freed from obsession. Paula herself had no obsessions. The carelessness of each gesture, of each response was part of her peculiar capacity for discounting every previous move or word. She never remembered because that was how she was, although Radu never suspected any accident to her memory. The photo of Paula, unretouched, unaided, was vapid and grossly conventional. The sun had illuminated an expressionless face, a mannequin. But she liked it and put it in a frame. Her friends liked it too. It wasn't clear whether the tree-lined road or her face or the two together impressed them. Radu photographed her over and over, taking revenge on her pliable nature by posing her in the most ridiculous and banal positions. She submitted, opening the doors of a Dacia, the Romanian version of a Renault, or sitting on the hood with her legs crossed, poses copied from the advertisements in German magazines. He posed her with a mug of beer or eating ice cream or putting on stockings à la Française.

The ease with which she let herself be manipulated angered Radu and impelled him to more absurd themes. He advertised his own magazine, which she pretended to read or fight over with dozens of other readers. He posed her advertising yoghurt, toothpaste, a steam-roller for forest roads, trying out new ideas during each weekend. He didn't care about the pictures; he only wanted to discover the position Paula would not put herself in and then, perhaps, offer her an alternative. For the slightest clue to the events obsessing him, he would free her from repeated humiliation. As a matter of fact, he could have beat her or terrorized her, but he saw no use for a confession obtained through violence. He returned to the forest with Paula in search of that road lined with oaks and with the latest idea of photographing her nude. The image of the road was stamped in his mind and it irritated him when he couldn't relocate the backdrop set up in his imagination.

"Take off your clothes!" He grew hot with shame and could only be brutal or run away, never to see her again. Paula, with her perpetual indifference, cast off her shoes, then removed her stockings and sweater, with a gesture defying description. Then she quietly unbuttoned her skirt and let it slide off her sleek silhouette with the slightest twist of the hips. She was now in her panties and brassiere, which she unfastened and let fall, baring her small firm breasts to the sun and air and finished the rest with a less breezy motion. There was a strange distance between them now. Radu suddenly wanted her, although he was still captive to his memory of Veronica's gestures. Here and now, he and Paula were hostile strangers in a new situation that placed them face to face: she naked, but hiding so much; he, dressed, overcome by an obsession that betrayed him in his look, his pallor, his trembling hands. He saw the slight scar near her hip and wanted to caress it, to probe with his palm and fingertips the mystery that remained unpenetrated. He considered photographing the scar from sev-

eral angles, dissecting it in order to later make a synthesis of the wound and to discover the mechanism through which skin breaks under a bullet's pressure and leaves in the skin a strange pod of the seeds of non-life which grow and fill the body with their fruit.

He timidly photographed her, from afar, then close up, circling her. The forest no longer existed for him; its rustling covered his shame and her humiliation. She could have called his bluff and put an end to his abuse. In her submission, she was telling him that she did not contest his right as master. But this didn't mean Radu knew her any better or that he would ever know her. Furious in his persistence, he forced her to the point of exhaustion. Only the camera made a sound, a short click and a whirl, over and over. Paula's pocketbook and clothes remained somewhere behind as Radu pushed her into the forest, into the darkness. If night were to abruptly fall, he would have made love to her violently, cursing, forcing her to listen to his ugly words and then repeat them. This is what he was doing now by terrorizing her with his brutal expression, pursuing her with the camera, forcing her to sit on thorns, to step on stones, to embrace rough tree trunks, to shake her head wildly until it almost snapped off. He climbed towards the cathedral of silver firs, unmindful of distance, dominated by his frenzy. Unaccustomed to the slope, he panted so hard that he could not hear her wheezing.

Her submission urged him on. He no longer photographed her; he only looked through the viewfinder and focused, changed his angle, ordered her to stand in another pose, and another and another. She yielded superficially, a woman who couldn't love to the point of forgetting herself. He would have desired her writhing with abandon in the red throne of passion worth a life, crying from the pain of voluptuousness. She started to dance. This was the first time she ever danced in his presence. But he didn't flatter himself that she would dance any differently in front of an audience. Everything she did was not for him alone. And he knew that the truth he hunted would be revealed only when she could surrender her every thought, her every secret, to him.

"Beautiful! Just beautiful!" came a voice from behind the last trees of the imaginary alley. Beyond them lay a precipice that projected into the distance the cathedral of fir pinnacles that seemed so close. They stopped right at the edge and then continued fleeing.

"Hey Radu, wait," they heard the same voice drowned in roaring laughter. Frustrated, Radu had to stop, caught in his own humiliation. A thief tries to flee; a liar tries to lie his way out; a charlatan bluffs when his trickery is revealed. This sad revelation of weakness actually appeared comical. He had struggled inwardly to bring out an unnatural brutality. And as he finally succeeded in overcoming any inhibition, someone appeared out of nowhere. Radu's mean pursuit came to a ridiculous end.

EXIT

SYNOPSIS: Gyorgy Dimitrov, idealistic and intelligent, immigrates to America after realizing that the communist government of his native Bulgaria will not let him make a life for himself after he marries an American woman. The book depicts the life of an innocent optimist under both East European communism and American commercial democracy. The chapter reproduced below is a letter from a good friend sent to Gyorgy after he returns from a visit to post-communist Bulgaria.

DEAR GYORGY (or should I call you George?),

Your visit here left many of us confused. Clearly, you are burdened with your own worries. I for one could not understand whether you came because of your personal concerns, or because of what is happening with us in this part of the world. Our waking up after a prolonged nightmare seems somehow to be related to your problems, but how, I still don't understand. My first reaction after the dictatorship came to an end was to invite you here. Not to Varna, or the resorts at the Black Sea, or to Plovdiv with the shops full of rose attar, but here where you and I grew up.

The enthusiasm we experienced during the uprising was real, and so was the determination to find our own way out of a past full of misery and frustration toward a future of well deserved freedom and, why not, prosperity. Like myself, many people took to the streets. We had a courage rising from desperation that pushed us to raise our voices against the madmen in power. As different as each person was, together we discovered a sense of solidarity. We organized spontaneously, made our demands known, and triumphed. Our neighbors to the north, the Romanians, were less fortunate. As we saw on the news, the dictators there ordered the troops to open fire on the demonstrators. When the soldiers shot, it was clear that this was serious.

Everything else took place so fast that I no longer knew what was happening and what became of the product of our poor imagination. Terrorists? You know we had some training camps in Bulgaria, in addition to the hospitals where our doctors treated the survivors of murderous missions. Secret police agents hiding in secret tunnels? This story circulated here, too. We probably needed some sense of heroism. A wicked plot, organized with such cynicism that we, the freedom fighters, unknowingly became its accomplices, is what some people called the whole uprising. Who knows? I, for one, knew that I went out on the streets because, in my estimation, this was the chance of a generation.

In the newly acquired access to an abundance of so-called truth, it's up to each of us to choose one or another version. I really don't know anything about how the pie of power was shared. Rumors circulated that Russian, German, American, French, even Arab and

Israeli power brokers were at work to make sure that East Europe did not explode. Is this what counts? To many people, yes. Plots and secret plans sell better at the newsstands. Because we wanted to believe that this was our own revolution, our choice, our first free election, we refused to accept that bigger powers could be at work. Many people just don't give a damn. Our own revolution or someone else's plot makes no difference. All they care about is that they can finally make money, have a car, travel, or read pornographic magazines. It's a shame, but no one can blame them. Two, if not three, generations grew up without any sense of directing their own destinies. Now that this has changed, their first desire, which they call 'need' or 'right,' is to catch up for all the deprivation. Your music and your videos, your fashions, your cigarettes, your electronics, your cars, your fast food and television ads, and your pornography count more than the will to stop living at the expense of others.

You see that I use the words 'you' and 'yours'. That's because you are part of the other world. Your money, which I know you tried to keep out of the picture during your visit, pays for much more than labor here. (No, you don't owe me anything. Our money is so rapidly becoming worthless that I preferred to let you use it while it could be used.) The old story. Remember the German tourists who used to buy two-week vacations, flight included, first class hotels, full board for less than a day's wage in their country? These vacations were so cheap that they were advertised for the unemployed. For THEIR unemployed. Under communism, we were not supposed to have any. Well, since all of us here knew how much such a vacation cost, we wondered who paid the difference. At that time, you and I. In one word, 'we'. We still do, but now this 'we' does not include you.

It's simple arithmetic. Your standard of living and your expectations are paid for by the cheap labor and low living standard of others. In the days when you and I discovered the financial equation of a vacation at the Black Sea, we were sold out by our anti-imperialist government and party. No voice of solidarity from the workers of Germany, Italy, France, or any other free country. Today, we ourselves are doing the selling and we are actively looking for our own chance to make money at someone else's expense. Entrepreneurialism (another -ism)! Our chance is to find our own 'Bulgarians,' that is, labor even cheaper than ours. Sure, I also have the freedom to outsmart others, you included. If we could succeed, which I doubt, we could become another Switzerland. Beautiful mountains, resorts by the sea (which the Swiss are dying to have), spectacular spas for the treatment of everything, good wine, fresh vegetables, roses. You know all this.

What you don't know is how much it hurts to see you, Gyorgy (or is it George?), after so many years, feeling sorry for us. How it hurts us to hear you talk about a freedom that goes beyond all this, about a perspective we don't have, about South Africa, Bosnia, Yugoslavia, and China, where you see more meaningful change than here, the land that used to be your home. As important as all this can be, the difference between these abstractions of change

and progress and the concrete change in our lives is enormous. You complain about crime on the streets of your city, about drugs and prostitution, about people routinely cheating each other. We carry the wounds of many crimes that we could not escape, not even in our own homes. I think it is preferable to be on the lookout for thieves who enter from outside your house than to have the state watch you from within your own home. And in the process of defending yourself against this watching, your own ability to think and distinguish between the authentic and the fake, the significant and the meaningless, erodes. Gyorgy, my friend, the ones who kept the thieves and criminals away from us also robbed us of the will to defend ourselves. You worry so much about the outside that you can't pay attention to your own inner life.

Sorry if I sound self-righteous. Sorry for moralizing. But I heard you regret the fact that people don't read as much as they used to, don't play chess as intensely, don't admire poetry. I am as sad as you are that our theater is going down the drain. Commercialism took over, even in the domain where we were able to maintain an appearance of value. It was another luxury for which we all paid so that our own great actors and directors could put on good performances which, by the way, the majority here did not want to see or were too tired to listen to. Poets were paid well beyond what doctors earned, to add to the illusion that art was worth more to the working class, when in reality all these people did was pay for it, whether they liked it or not, whether they agreed to it or not. Yes, our students knew more math, history, literature, and geography, while your children did not know if Sofia was in Turkey or Russia, or if Bucharest was in Romania or Hungary. What could they do with this knowledge? As much as you could have done with your knowledge of computers, if you had remained here. You seemed to say that the price of abundance is ignorance, apathy, a failure of ethics, and all the other characteristics of your society that we heard about under communism and never wanted to believe.

Are you cynical or just incredibly detached from life? I'm not asking you, just wondering, but I hope that you will ask yourself. No doubt that 99 percent of the people here who are desperate to get to Paris are not going to visit the Louvre or to buy books from the stands along the Seine. What's wrong with that? The majority of the foreigners visiting Bulgaria are not here for art or culture. Neither do they go to Paris, Tokyo, or India for art and culture. Agreed, this supports your own line of thinking, but let's rewrite it slightly: to visit another country is to meet other people. I am afraid that you talk a lot about this, but when it really comes to it, you write it down as insignificant in comparison to speaking French and reading Rousseau in the original, giving up dinner for a concert, lining up for artistic events instead of for jeans (even the ones made here with your labels on them). To meet other people is sometimes related to illicit sex and drugs. Our young women are now the "fresh meat" of European brothels.

Some lines above, I said I might sound self-righteous, although I did not want to fall into this trap. You made an effort here, during the little time we spent together (you seemed to be running away from all of us), not to be self-righteous. But you were. Your disappointment, for which none of us was ready to accept blame, came through so strongly. You didn't want anyone to feel sorry for you. Well, nobody did. But you need to understand that this has to be mutual. You cannot look at us as victims of the same forces that led you to question the values of your society. Let us at least hope that there is something we can decide, we can choose, we can do. Fatalism today, in countries like ours, where everything is still so unsettled, is the worst medicine. Even the fatalism of consumerism, apparently a deeply rooted instinct. Yes, too many people are seduced by the freedom to consume, but enough are aware of the consequences. To tell the truth, I could not understand whether you blame us for developments that contradict your idealism, or you blame others (your country, for instance) for making this happen. No matter who you blame, think about what you blame. After all, you are in a glass house, so it's not wise to throw stones at others.

Are you still with me? Don't throw this letter away before you give it a chance. It has to bother you! You have to figure out why it's wrong, or not so wrong, to write that you disappointed many of us, but that we still care for you. We love you, Gyorgy, and we know George loves us. You face questions not so different from our own: Where does it go from here? One thing is very sure, determination keeps us going. My worry is that yours weakened quite a bit. I would be happy to hear that I am mistaken.

Until next time, Aglika.

PS. Kiss Anita and the children for all of us. Next time, they should come along. You might enjoy more.

PPS. That we did not have it in us to get rid of the mausoleum of the great communist freedom fighter, President Gyorgy Dimitrov, shows you how ridiculous our situation is. We cannot divorce ourselves from our past without blowing up in the process!

1994–2000

Poetry

1964 – 1966

PICASSO PLAYS THE GUITAR

1966

Crooked and bent, the mute guitar leans against the wall.
The table is dangerously hidden
between a chord of shadow and a finger
My many beings of a moment's duration all dance
a dance stifled by the walls,
the shining bronze of shoulders
believe in a thousand lives.
Crooked and bent guitar, blends earth
through thin glass panes.
Each touch passes through the chord
and with a pluck lightly descends in love.

NIGHT

1965

Arched doors open hitting the wall with a dry sound
and the princess's hair softly glides between stones.
Between stones glides the high shadow, too,
of the horse of the hero of yore.
Arches open popping from the moon
and sleeping guests rest their heads on long tables
while above them, like music, the princess's hair
seeks the outlaw's wounded shoulder.

BEYOND THE EARTH

1964

Postmen sometimes come from afar
sometimes leaving their faces at home.
They become air and move
a child's drawing into a ride.
Sometimes they are so beautiful
that the roads they travel cry with longing,
and around them, as in a boiling net
beings want to pair. Or they will bring the red fire of iron
and place it in a frame.
And the oldest lad without news
runs all night to pay customs duties.
Postmen come from beyond the earth
on their bicycles,
which is why, behind windows,
all eyes are wide open
to see that the wind
not awaken them as pedaling they fly.

DEBUT

1964

There is a passion and a coldness in ink
as though at night I ran through waters
after a crazy world bound in ropes,
the knot all set to slacken from passion.
Women's bodies and children become
long foamy waves
on whose crests a paper house shines
like a fruit up high, too high to reach.
The dry wind arouses my thirst.
And my house of flesh in ink turns over
my shoulders close to the paper door.
There is an odor of burnt moon.

FALL

1964

In this air I have died and come back to life a thousand times,
the sharp street corners penetrated my flesh,
rivers ran where blood should flow
and, like all rivers, carried fish and flotsam.
I should have died with the door when it did not open;
I should have entered its wood as entering a hollow statue,
a door washed by eternity and the moon
by bark and leaves, smiles and taunts.
I should have moved slowly through autumn
as though dwellings became histories;
and I was fearful of bumping against
the watching crowd at the electric chair's next execution,
swords in Thebean sheathes,
Waterloo's old men of the earth.
And I was more fearful
of bumping against the springs of the seas where you dwell.
Mailmen in cloaks carry beautiful letters
in an autumn captured under the same star;
long fingers of a young woman catching a hairpin in the sky
pinned to the spirit of things in which I recognize my own flesh.
And from these hours I remained with a voice
with which I can sing and call. Or make
an insatiable gesture of autumn and protect trees
from serpent muscles poisoned in their arms.

PARTING

1966

Mattis-Teutsch, in memoriam

That this is no parting the lamp
and the closet full of festive attire
and the garden full of vague moonlight bear witness.
All those things endowed with feminine traits
can bear witness.
And even the men who do not know you,
and who resemble me to an eyelid, can testify
but who, it is true
never saw you in an autumn mood
when you so resembled the earth
that swallows flew close to you.
And I caught great grasshoppers on your palms;
or suddenly paralyzed I listened
to the earth anew,
as a thin snake slithered by.
True, that with all this
my blood is of the same composition,
salty and proud and remembering
the knifecuts of my village ancestors.
That this is no parting
Anyone you happen to choose can bear witness.
Because look how the streets run through the lamp
as does time when with preened feathers it returns from the south
on the same path.

And you can count on me,
you can unravel for me the last thread of love.
Because autumn is autumn
and winter is winter
and trees are trees.
This is no parting.
No parting.

Hans Mattis-Teutsch was a painter and sculptor
living and working in Brasov, Romania.

Poetry

1978 – 1980

FOR A WHILE

1980

For a while
The world will keep turning round our anniversaries.
Then,
It will be our turn to be turning round and round the anniversaries of
others.
And finally
This delusive world
Will come to a stop
As we shall have reached,
To the best of our knowledge, the very last figure,
The highest one can bear.

FATHER AND SON

1980

Father, we're both advanced in age
This is what my son tells me:
Father, we're both advanced in age
And so on,
Although neither he nor I have yet begun our lives.
Perhaps because this hasn't been possible.
Perhaps because we just haven't wanted it.

CORRIDA

1978

I don't know why
I feel I'm the one
Chased by the toreador,
Tormented by the mounted picadors.

The stands are full of anxious crowds
Waiting for something to happen.
I cannot give them the joy of bowing my head
And cannot let the picadors thrust their picas in the nape of my neck,
Cannot let them whack my skull.
The instruments of their torture break
On the smile of my unbroken faith.

So, there they are
Dissatisfied spectators waiting nervously in the stands,
For I don't know what to happen,
Something that fails again to take place,
Perhaps only for the moment when they have to go home.
Oddly, I have become,
Under these circumstances,
At this moment of opposition,
Their time,
Their life.
And the only reward they are likely to bestow
On the stubborn animal in the arena
Is to pardon his stubbornness,
His resistance.

The very reason of my being.

My sole reason for being.

Thank you!

Drama

The Longest Wait

A play in two acts and nine scenes, 1972

The curtain opens to reveal the interior of an apartment with the living room used as a bedroom, three doors – entry door, a door connecting to another room, and a door to the bathroom. There's a large window on one wall, with flowerpots on the sill. The furniture is ordinary, of no dominant style. The furniture – a table, chairs, a sofa-bed, and a side table with a radio and record player on top – is easy to move, except for a high bookcase, half-filled with books. There are also magazines, mainly about movie stars. This is the room of a young woman who is orderly and sentimental.

Stage designers are sincerely requested to read the entire play, at least once. It may be that the author's suggestions will seem wrong. There is no problem if they want to suggest some alterations.

To the director, one request: You can cut, but don't add.

Characters

- Beverly: a woman in her late 20's
- Mary: a few years younger than Beverly
- Gary 1: a man in his mid-30's
- Gary 2: same age as Gary 1

Act I: Beverly is roommate to Mary and her newborn son. Mary enters the scene bearing a letter mysteriously addressed "To You." It is from a young man named Gary, but neither woman knows for whom it is intended. Mary insists that it is for Beverly, who begins a correspondence with him. After a while, he notifies her that he will come to meet her. Beverly goes to the station at the appointed time, but he does not show up. Heartbroken, both women continue waiting. Three years later, Gary makes an appearance. But this is not quite the Gary of the letters.

ACT TWO – SCENE ONE

Beverly's room. Mary and Gary are with her. The atmosphere is similar to that after a party – tired cheer. At one corner of the table, Gary is sitting on a chair, with his legs stretched out and his feet resting on another chair. He sings as he taps out the music on the table. The two women, tired after an unusual effort, want to go to bed. As the curtain rises, they stand next to each other, in conversation.

SCENE TWO

Mary, Gary. Same setting, one day later. Beverly still hasn't come home from work.

MARY: (Coming upon Gary sleeping, she asks, sarcastically) Well, did you have a nice sleep? I do so hope I didn't wake you up this morning. If it were up to Beverly, we would have left for work through the window. Prince Charming was sleeping. I hope you found enough food in the refrigerator.

GARY: (Sleepy) I didn't even look. As for waking me up, if you returned later, you'd have found me still sleeping.

MARY: Excuse me. I didn't want to wake you.

GARY: No problem.

MARY: (Continuing) In any case, I wanted to get home before Beverly did.

GARY: (Joking) To prepare a surprise for her? To have the house cleaned and the supper ready? A model family. The husband comes home early and happily washes dishes. Which one of you is the man of the house?

MARY: Don't be so smart. That's not the reason. I came home early because....

GARY: (Still joking) To talk to me. You want to make a confession. I am all ears.

MARY: Yes, I came home early to talk to you. But I don't know how....

GARY: (Stops her) Well, give it some thought. And when you find out, call me. I can't talk to a young woman without having brushed my teeth. (Heads towards the bathroom; from the bathroom) But don't take too long, Beverly can arrive any minute. And then...even us men have a sense of curiosity. Ever since women have been on this earth, they infected us. (The noise of running water is heard)

MARY: I see that I won't be able to have a serious conversation with you, although I need to. (Heads towards the bathroom.)

GARY: (Appears at the doorway in his undershirt) Not even Napoleon did two things at once. Do you want me to swallow my toothbrush?

MARY: Let's stop fooling around. I want to ask you (pause): Who are you? I know, I shouldn't ask such a question, but I really have to know. And it's not for me that I want to know. Who are you?

GARY: (Still cheery) Gary.

MARY: (Insisting, getting excited.) Just cut it, man. I have a right to get a straight answer from you. Please believe that I won't tell Beverly. I don't have the slightest desire to hurt her.

GARY: To hurt her, you say? Why? Why should the fact that my name is Gary hurt her? Or that I'm not as handsome as in her dreams? That I don't look like James Dean?

MARY: Okay, I asked you to stop fooling around. You can't get that through your skull? She's been waiting for you for three years. Three years, Gary, or whoever you are. She dedicated all her love to that name, even her life....

GARY: (Interrupting her, almost violently) We dedicate so easily. Lives, love, books, buildings. Everyone wants to dedicate something. To their own memory. Beverly loves Gary. Sounds like the graffiti you see in public toilets.

MARY: And what makes you think she deserves your contempt?
What gives you the right to take this attitude? To be vulgar?

GARY: I'm not thinking only about her. Most of us do the same. We set up a bridge between ourselves and who knows what illusion, and we are amazed when it collapses. It happens all the time and with everything – religion, justice, love, family, you name it. The support we can't find in life we invent, we draw it on the wall, we hang onto it with a passion, and we break out into a cold sweat when we don't understand that there's really nothing there.

MARY: I repeat, you are harsh and unfair. If you were Gary....

GARY: But I am. That's my name. What difference does it make?

MARY: If you were Gary, I'd ask where you've been for three years. Why did you promise to come and then get cold feet? You built a bridge between a loving woman and the illusion that love was there. Or maybe you have your own way of seeing and doing things. In order to get the world going for you, all you need is a glass of whiskey and a bad joke. But why did you look for them here?

GARY: I'm also looking for something, my own illusions, or maybe my own truth.

MARY: Maybe? You can repeat the same "maybe" to infinity, like Beverly. Illusions? Draw a canary on one of your ties and listen to it sing. That's your prescription, if you're running after illusions. Your letters were illusions!

GARY: If you want me to swear to it, I'll swear to it. It's an illusion. And waiting is an illusion, even waiting in a train station. You – maybe not you personally, but definitely Beverly – are happy with the illusions of life. So are most people. Buy a prayer handkerchief and you are saved. Have a black friend and you won't be called racist. Listen to a talk show and you are socially active. Read National Geographic and you've been

all over the world. I travel a lot and I don't like to stop at random. I've seen thousands of people crowding the waiting rooms of airports. Some were with relatives, friends....

MARY: And what's unusual about that?

GARY: Nothing. But this type of "usual" makes me terribly uncomfortable. We have to learn how to take off alone, without mothers or lovers left behind crying and waving. To depart doesn't mean you're dying. A journey is life, discovery. But it's not about this. Not everyone at an airport is there accompanying the traveler. So who are the others? Some of them are crazy about airplanes and come just to see them. How many? Maybe a hundred or so. The airplane is as common as the television and telephone. So the others, who are not crazy about planes, why do they come? I asked myself a hundred times, and I couldn't answer until the day I caught their disease and went to the airport for no special reason. And I realized by the look in their eyes. Do you understand me? No, I don't think you do.

MARY: Right now, I don't see anything to understand. What do you find so horrible or amazing in the fact that people go to airports? Some like to walk among the shops, some go to the restaurants....

GARY: (Stopping her) Others build their lives around an illusion at the airport. With each flight they send off a little, little bit of their souls, to go where they themselves don't have the courage to go. Or where they think it's impossible to follow. But they never get beyond their longings or regrets. Freed of some inner constraint, they become themselves only under the illusion of leaving. Real life begins when you have the power to truly set off on your own, and when you believe you can find the truth, the happiness, you're looking for.

I think the only thing that a real person can long for is to have the strength to go out and face misfortune, if he feels it's his place there.

MARY: (With a certainty based on her own experience) Big words, Gary, or whoever you are. Big and hollow. Misfortune comes, believe me. I don't see why we have to go out to meet it. That's not strength, Gary, it's masochism.

GARY: Do you know where you make a mistake, Mary? In the simplest thing. What is misfortune?

MARY: Misfortune means to be sick, to be heartbroken, not to have what to eat, an airplane crash. Misfortune is remaining alone with a child who will never know what the word "father" means.

GARY: I knew you'd be wrong. What's so bad about unrequited love? Sooner or later, the two people will come up with a lie that will lead to their sleeping together. What's so sad in a man's leaving behind him a woman with his child? It could be a tragedy if a man irresponsible enough to get a woman pregnant stayed! An airplane crash, that's

an accident, but misfortune is something else, it's when people die in vain. Misfortune is when the ideal you've fought for proves false. You don't have to die in order not to be alive. You asked me who I am. I'm Gary. Or maybe I'm not. Does this change the sterility of Beverly's waiting...or maybe your waiting?

MARY: I wasn't waiting for you.

GARY: You're lying.

MARY: That's quite enough. The day I opened your letter...

GARY: So you were the one who received the letter? (Accent on "you")

MARY: Me, her, it doesn't matter. I didn't expect anything from anyone What I wanted I got long ago.

GARY: (Sarcastic) You weren't waiting for anything? What were you doing at the station?

MARY: I don't know if I can be sincere with you. (Trying to convince herself) You seem like an honest person.

GARY: Everyone likes to seem honest. It's like a jacket that looks real good on us. The most boldfaced lie is the one that bears a certificate of sincerity. You don't know if you can be sincere? You don't have to be sincere for my sake. That's another mistake we all make. We think we have to be sincere for the sake of others when we should be sincere for our own sake first of all.

MARY: I'll be frank. I was thinking, just as I was the first one to have the letter in my hands, Beverly or someone else could also have been the first. Why did I give it to her?

GARY: Good thing it wasn't an announcement that you won ten million dollars. You probably thought it was meant for you.

MARY: (Accepting unashamedly, not as though she were caught off guard) That's what I asked myself, although I'm not sure even now what the right answer is. Maybe it was meant for me. I suffered enough, I also have the right...

GARY: Then why are you acting like a hypocrite? Why are you trying to convince me that you're concerned about someone else's happiness? That you were waiting for me at the station for Beverly's sake? What a soap opera!

MARY: (Acquiescing) For her sake and for mine. It's still easier for me to suffer. I'm used to it. But it's hard for Beverly, even now that her dream came true. She had a different idea about you. But I couldn't think any better of you if you weren't how you are: frank, abrasive, and merciless with yourself and with me.

GARY: That means that even you need some help. A comfortable solution, a man with whom you can form a family and who can be a father to your child, whom who knows who left you with. Another Gary?

MARY: And what's wrong with that?

GARY: Wrong? Nothing, but it's not my way. My seed goes out by mail.

MARY: Stop making fun of everything. Life's not a game.

GARY: And gravity can be barren. What do you mean by "Life isn't a game"? Repeating a sentence you heard from others does not make it true. It's comfortable to recall something we heard or read. (Repeats sarcastically) Life isn't a game. Indeed, life is not a game of hopscotch. Tell me, is hide-and-go-seek a game?

MARY: (Not understanding the real meaning of his question, she answers almost smiling) As though you don't know.

GARY: If it's a game, why do you transform it into your life? You hide from each other and shout from behind the shades you pull down at night. And after all this, you have the nerve to come with this grave statement, "Life is not a game," while you play life as though it were a game. Hide-and-go-seek. Gotcha! And the ones who weren't caught laugh.

MARY: I don't know who gave you the right to judge us.

GARY: It's my right. Don't you want me to play this game, too? To believe in letters, to settle down in this dead town and to have kids with a woman about whom I know as little about as she does about me?

MARY: But what do you really want? Why did you come? And what are you expecting? You forced me to come out with everything on my mind, and now you're making fun of me.

GARY: You talk! People who play at life build castles in the air and a home from platitudes.

MARY: But what do you want?

GARY: That you, that I, that we all, feel the obligation to be honest, sincere, for its own sake, not because some reward awaits us, or that we are entitled to something in return as though honesty is a commodity to be exchanged. I say what I want to say. Now it's your turn to tell me what I want to hear. Now me-now you, me-you. Like ping-pong.

MARY: You're having fun judging others. But what do you want? Should I tell you that I'm desperate to be held tight? Should I show you I'm a real woman? Should I arouse you and throw my arms around you? Playing hardball seems more your game. (In the meanwhile, Beverly has entered the scene. Gary sees her – the moment should be made obvious – and from that time he is ostentatious in his actions.)

GARY: If you feel you have to, do it! And if I feel I have to kiss you, I'll kiss you. (Approaches Mary, holds out his hand, all the time ignoring Beverly, but putting on an act for her sake. Mary, who does not know that her friend entered the scene, is surprised by Gary's new turn, and intimidated.)

MARY: Gary, I can't believe.... (She kisses him, Beverly exits.)

GARY: I really needed that. (Notices Beverly's leaving and resumes their former discussion.) Why should you two be the only ones to lie? I have the right to lie, too. Even the obligation....

MARY: Another lie?

GARY: I don't know. I'm not at all used to the things that go on here in order to know what is a lie and what is true. Is it enough that we pursue the truth (he recalls Beverly's entering) if we accept only the truth that is convenient to us? Why don't we make it a goal never to hide from the truth? However hard it may be. But now I have to think about leaving. As a matter of fact, I stopped in this town on purpose, but not to stay with you or Beverly. I just can't. I have to move on. (Exits)

MARY: (Without stopping him) And while you were thinking of leaving, so was I. (Abruptly, changing her train of thought) What's taking Beverly so long? (She heads towards her room. Beverly, who has just re-entered, stops her.)

BEVERLY: Mary, just one minute, please. I want to tell you that I came earlier, while you were...having your discussion, but I didn't want to interrupt. Gary...did he leave?

MARY: Gary left. It's probably better that he did, although he might come back.

BEVERLY: (His leaving disorients her) But why did he leave? He could have stayed. I can stay with one of the girls I work with. I wouldn't want to bother you at night.

MARY: (Taken aback for a bit) It's not that.

BEVERLY: (Curious) Then why do you think it's better that he left?

MARY: I can't explain it to you now.

BEVERLY: (Obstinately) Still, why do you think it's better that he left now? I was waiting for him for three years, just like you, Mary. It's not right for him to leave like that.

MARY: I don't know how to explain, to make you understand. (Her gestures show that she wants to end this dialog.)

BEVERLY: (Maliciously) You have something to explain? There are things that you think I can't understand? I'm not a child. And for me, Gary is a story that's over. (Returning to the discussion, very insistent) What do you have to explain to me? What do I have to understand?

MARY: (Still doesn't know that Beverly saw her and Gary) It's this, but I don't think I can explain it the right way. If Gary comes back, you have to be very careful with him.

BEVERLY: Careful? Why?

MARY: I thought you'd realize by yourself.

BEVERLY: What should I realize?

MARY: That what you're doing is rash. You don't know who this man is, where he came from, or what he wants.

BEVERLY: (With bitter sarcasm) He's Gary, he came by train, for me, so we can be happy, like in the movies. You brought home my Prince Charming from the train station.

MARY: There's nothing funny about this. Really, anyone could get off a train whose name is Gary, or call himself Gary.

BEVERLY: What does that matter? (Sarcastic) Love is blind, you know that very well. You told me so many times.

MARY: (Still unaware of Beverly's sarcasm) I wouldn't want your love to be blind. Believe me, I care for you too much.

BEVERLY: (Still sarcastic) In that case, everything's fine. I'll keep my eyes open while you head towards love with your eyes closed. Love is blind, and if you don't meet with an accident, I'll follow you.

MARY: I don't know if we're talking about the same thing. And if I'm being evasive with you now, it's for your own good, Beverly. What would you say if this man, who you loved for three years, tried to come on to me?

BEVERLY: What would I say? Nothing. You said it yourself, and I did, too. You received the letter, you opened it, and you wrote the first answer. You have a right to him.

MARY: But you love him!

BEVERLY: Do you think it's enough that I want something?

MARY: If the only thing you learned from this long wait is the question you just asked me, then you learned a lot. Gary or me, it makes no difference which, it seems that we were waiting for each other.

BEVERLY: A long wait, but not in vain.

MARY: Yes, in vain. You have no way of knowing, but it is. The longest wait, with nothing to show for it in the end.

BEVERLY: I don't feel that way. Or you can't convince me to.

MARY: I'm glad. That's why I'll tell you once again This love belongs to you, for better or worse. All I ask is that you be careful.

GARY: (Enters) To get out of this town you have to wait 24 hours for the train. You can go around this planet in 20 hours in a jet.... What's with you two? Did I interrupt something?

BEVERLY: (Determined to say what's on her mind) No, we can continue.

MARY: Beverly's joking. We were just talking before I went to bed. After last night, when I didn't sleep at all, I can hardly think straight.

GARY: (Still joking) Get in shape, girl. Maybe you'll meet some drunkard who you'll have to pick up off the barroom floor. Or, who knows, maybe you'll have to pick yourself up. Without wine, life is not life. Hence the saying: In vino veritas. (No one laughs.)

MARY: (Forcing herself to retire and putting off her discussion with Beverly) 'Til one or the other, I'm going to bed. You two may still have something to talk about. (Exits)

BEVERLY: She should have stayed.

GARY: (Honestly) It really makes no difference to me.

BEVERLY: No difference?

GARY: That's right, like a lot of things in this world. (Sits down) But I'm not going to start a philosophical discussion with you now.

BEVERLY: You don't have to. But I'd like to know one thing. Who are you? Except for what happened in the station, and the letters, I don't know anything about you.

GARY: Mary asked me the same thing. Who do you want me to be? By the way, I never asked who you are.

BEVERLY: That's true. In any case, you don't care. You found out that I'm in love with you and this seemingly gave you a sense of satisfaction. Any man's ego is gratified when he hears someone loves him. On the other hand, I only know that....

GARY: (Interrupting and standing up) And just what do you want to know about me? That I'm a construction engineer who likes to go from one building site to another? You can find that type all over. Or do you prefer me to be a writer in search of a subject? I'm not. And if I were, I wouldn't write about you. You're not a subject. A journalist? What would you like to hear? Because you don't seem like the type who would love someone who...doesn't have a good job.

BEVERLY: What would I like to hear? You seem to regard me as some woman picking out a good tomato.

GARY: You got it. But what about a soldier? The media are always making a fuss about them, especially during times of combat. Some of them are real nice fellas. Why don't you pick one of them and write to him?

BEVERLY: Just stop it! I want to know who you are. I never gave a thought to what you or anyone else is, like you suggest. All I want to know is who you really are, Gary.

GARY: I'm Gary!

BEVERLY: You're lying!

GARY: What for? (Surprises her) Because you saw me kissing Mary before? (Overcome, she cries) Because you think you're in love with me and you see me holding Mary?

BEVERLY: Gary, stop it! I was in love.

GARY: What kind of love? You're young and healthy, but you reject reality and base your life on an illusion. Love, you say? Love based on dreams and nights of insomnia, during a spring when normal people laugh and have fun? Not my way of spelling love.

BEVERLY: But I was always alone.

GARY: And you expected your loneliness to end just like that? You thought that dreams would turn into people, and that these people would come to your wedding, bringing gifts, and that a photographer would be there taking pictures of you in your gown, which you would store in mothballs so nothing would eat away at it, along with the other lies in the family album?

BEVERLY: According to you, we don't even have a right to memories.

GARY: Your memories are memories of a fictional romance. They don't connect you to real life. Real life is so full of intense moments that there's no place for nostalgia. Real life sucks you into it, it hurts you, it makes you laugh. But if life is a game of pretend, then memories are the ultimate lie.

BEVERLY: So, you're a lie, too. Because if I never met you, then all I have about you is memories.

GARY: (Trying to joke) Well, I've finally made it, too. I've become a lie. Strange, but I have to hand it to you. And if I'm here today, it's because I've been running from lies for some time. Don't think you and Mary are the only ones caught in a web of lies. But you don't realize it, that's what's so sad. The day you do, it might be too late. Or you'll do exactly what I'm doing.

BEVERLY: And what about dreams. Are they lies, too?

GARY: Let's be clear about this: If you dreamed that one day in the station someone would get off with a sack full of happiness in order to share it with you, you've been lying to yourself. If you dream about finding a man and bearing his children and then, in your old age, knitting for him while he putters around in the garden, and the whole family getting together once a week around the table, you're lying to yourself. Even streetwalkers wait for someone whose illusions they can make come true for a short time, but at least they know it's a matter of business. Life is not barter. Not even Mary realized this. For one moment of sincerity she expected me to give her a moment of illusion. Life is what we are, and we should give our all without expecting to receive a medal for it, or to feel entitled to a greater portion of happiness because we acted honestly. Finding yourself in everything, or opposing when it's necessary to oppose. That's living. Not the "maybes" and "what-ifs" that you keep throwing at me. You saw me kissing Mary and you left. You didn't sacrifice me, you sacrificed yourself.

BEVERLY: (Changing the direction of her own thoughts) I want so much to know who you are! Maybe you're right in what you say. But maybe you're just trying to see to what extent you can get power over us, like any ordinary impostor, lying to yourself and lying to us. The Gary I know is different from you. He has to be. He resembles you only in your boldness. You're a cynic and all you can do is criticize others. He knows how to dream, so he knows how to give. You only ask.

But what do you give in return? Yes, I saw you kissing Mary, and maybe I'm lying now, but I have to tell you. I didn't care because you're not Gary.

GARY: If you're so sure, then what more do you want to know?

BEVERLY: I want to know who you are. Among all the many things I learned while waiting is the curiosity to know, to understand. (Controls her need to cry.)

GARY: (Holding himself in check, he tries to joke from time to time. He offers his handkerchief to Beverly. She refuses it.) I see that you also learned how to cry.

BEVERLY: I would like to learn how not to cry anymore.

GARY: That would be good. If the real Gary had stepped off the train, maybe you wouldn't cry anymore. False happiness removes the right to tears.

BEVERLY: But I was waiting for real happiness.

GARY: Sure, the way you believe it to be. You think that it's possible for a Prince Charming to get off of some imaginary train after three years of suspended animation.

BEVERLY: I wasn't waiting for that.

GARY: You went to the station every day to find that support without which life seems unbearable. You went to find the man you could take care of, iron clothes for, prepare meals for, and to take care of him when he's sick so you could have the feeling that you're alive, that you're content, even happy. If that's the Gary you want, I'm not him, thank God.

BEVERLY: Then why did you get off the train?

GARY: I got off because I was thirsty. Or because I wanted to use the toilet in the station. That's why.

BEVERLY: So the story about the letters....

GARY: Is a story, nonsense. I don't even know if it ever existed.

BEVERLY: But you told me, you told Mary at the station, you told both of us here, about the letters.

GARY: And I can tell you two hundred more. All these lies are so like one another. They're like the sleeping pills you buy at the drugstore. They're like the postcards that are printed by the thousands so that each person who buys one can imagine that he was in a place he wants so badly to be. Oh, how monotonous is this life of lies you put up with, rejecting real life. It's like a city in which each person looks like the other and has the same name and the same size shoes, and they know the same silly jokes and they make love at the same time of night. They even dress all their children alike and it really doesn't matter who a child belongs to.

BEVERLY: You're unbearable, Gary. But I'm not saying I'm any better. My curiosity won't give me any rest. I'm going to repeat the question I already asked you more than once. Who are you?

GARY: Not me. And I also have the right to ask questions. You spoke a lot about letters, the documentation of your hope. I'd like to see them. Where are they? Let's play a game. You read a sentence and I'll guess the next one.

BEVERLY: (Forgetting that she tore them up) I have them. You can see them. (She searches, then remembers) I was wrong. Actually, you can't see them. I tore them up, or I lost them. But you know they existed. Even Mary can tell you. They were real.

GARY: So, you don't have them. I'm beginning to suspect a lie, or a trick. But I think it's something else. If these letters never existed....

BEVERLY: What do you mean, if...?

GARY: If? In fact, they never existed. Why don't you admit that they never existed?

BEVERLY: Admit that I never received letters from Gary? That it's all an obsession, self-delusion?

GARY: That's right! Now, repeat after me: I never received any letters. I never received....
(Beverly begins to cry as the light dims.)

SCENE THREE

Beverly, Mary, and Gary on stage. It's two days later.

MARY: (Addressing Gary) Are you feeling better?

BEVERLY: I told you we should call a doctor.

GARY: (Getting up from the couch) If it were up to you, half the population would be doctors, in order to take care of the other half who are scared over any slight discomfort, or tickled by a sore throat.

BEVERLY: And if it were up to you, doctors wouldn't do more than sign death certificates.

MARY: (Laughing) You're both exaggerating.

GARY: (Teasing) Especially Beverly.

MARY: I still think you should see a doctor. This can't be just travel fatigue.

BEVERLY: See, what did I tell you?

GARY: Two against one is no fair. I give up. I'll go see a doctor. It's better to die properly.

BEVERLY: You can go to....

GARY: (Stopping her) No, not here, in no case here. Not that I don't have faith in your local doctors, but I prefer one I know. It's easier to hear a story from someone you know. It's almost like a game. You don't believe, and he doesn't either. You pay and leave in good health. Self-suggestion, the most modern type of treatment. I've heard that you can treat even cancer with that method.

MARY: Cancer? What do you mean by that?

GARY: Just a way of speaking. I could have said the flu, but cancer sounds more dramatic.

BEVERLY: It would be good if they found a cure. So many people die from it.

GARY: Nonsense! It's my fault. Let's change the subject. Tell me about the last movie you saw movie, or...(he makes a suggestion), yes, that's a good idea, we could each recount an extraordinary event in our lives.

BEVERLY: You'd better tell us what you mean by an extraordinary event.

MARY: You don't talk about the most extraordinary events in your life just for the sake of talking, or to change a subject you don't want to pursue.

GARY: Not even with this suggestion did I get it right. Let's talk about something else. A parlor game. I know a good one. Every time someone asks you a question, the one on your right has to answer. Like this (looking at Mary, with Beverly on her right) Are you in love? (Beverly doesn't answer. Gary continues.) Beverly, you have to answer or you lose.

BEVERLY: I wasn't paying attention.

MARY: (Who would like to play) We'll forgive you and begin again. (Looking at Beverly) What are you thinking about?

BEVERLY: I...

GARY: (Interrupting) I have to answer! I was thinking about....

BEVERLY: No, no, I can't play like that. I don't like to answer for someone else, and I don't like it when someone answers for me.

MARY: But it seems like a lot of fun.

BEVERLY: You'll both think that I'm incredibly thick. To me the game seems absurd. And it could lead to a tragedy.

GARY: If we're at tragedy, as I suspect one of us is, we'd better change the game again. Each of us will take a turn at saying what we dream. I'll begin.

MARY: I wouldn't mind going first. (Without waiting for approval, she starts.) I dream about my boy, Mikey, growing big and I can be proud of him, that he doesn't feel that he's missed anything, that he has the courage to love, but to feel responsible for that love. (Interrupting) Why are you smiling? A mother's dream is nothing to laugh at. I dream of taking him to school. I even dream of scolding him when he misbehaves. My dreams are so down to earth that you'd say I don't sleep.

GARY: Good thing you don't dream in color.

BEVERLY: Why is it good?

GARY: (Joking) They say that if you dream in color, you're sick. And for you two to be sick, the only thing missing is that you start reading tarot cards or tea leaves. Then, dear ladies, you'd really be pitiful. And what do you dream about, Beverly?

BEVERLY: This might upset you, but I still dream about Gary. I try to visualize what he looks like. You know, I imagine Gary to be a dreamer, but with his feet on the ground.

MARY: How can someone be a dreamer and have his feet on the ground?

GARY: Mary, please be kind to Beverly. Let her dream impossible things.

BEVERLY: (With restrained enthusiasm) We'll have children, I'll read good books, I'll take care of the family, we'll listen to good music. (She checks her enthusiasm) Okay, Gary, your turn.

GARY: I have two dreams in one. The first and most important is that I live in a world of people who are healthy, beautiful or ugly doesn't matter. Unwavering in their lust for life, even excessive, able to dare without asking for anything in return, who don't feel threatened by the things they can't overcome, or if they are threatened, they fight to overcome. A world in which you don't expect great things – no miracles, no lotteries. You have to go out to meet challenges and provoke the exceptional. (Pauses as though to catch his breath) That's the first part of my dream, in order of importance.

MARY: (Curious) And the second?

GARY: I don't know if you'll understand it, or if I can explain this part. I'm afraid it might seem strange to you.

BEVERLY: (Voicing her confusion) Sorry, I still haven't understood exactly what you want in the first part. You described something, but it still seems vague, different from what we're used to. It's a very abstract dream, although the words you used are commonplace: healthy people, miracles, challenge. It's still unclear.

GARY: You're absolutely right. And I wonder how I can explain it to you, to make you and Mary, and whoever cares, part of it. (Thinks; finds a way, but he's not quite sure) I...I have a very good friend.

MARY: And I have a friend. (Indicates Beverly)

BEVERLY: (As though she feels obliged to respond) People have friends. (Her response has the connotation "So what? What do you mean by you have a friend?")

GARY: It's not a matter of friendship. I'm referring to my best friend. We've known each other for a very long time. We began life together. Up to here, there's nothing unusual. But since a while ago, we lost touch with each other. Like the poet said: "For here I walk, and somewhere there you fly/No longer heedful of our mutterings."

BEVERLY: Beautiful poetry. But true friends never break up. Friendship is not a marriage. There's no boredom. There's no divorce due to incompatibility or adultery.

GARY: Right again. Still, we stopped keeping in touch. The day I found out that he, my best friend, intended to die and didn't have the slightest intention of opposing death. "For here I live, and somewhere there you cry." Actually, no one told him he was

going to die. We haven't heard from each other for a year now. The last we talked at any length was at his place, celebrating his birthday. (He recalls with feeling) Thirty-four years old. Friends brought him gifts. His girlfriend was there. They danced. A great couple. "How are you feeling?" I asked him, trying to look him straight in the eye. He avoided me. "You're getting old, but that doesn't mean you have to be so grim," I teased. He lied to me. Now I know for sure that he lied to me. "I feel just fine," he answered, looking out the window somewhere. A short time later, he was dancing with his girlfriend again, and I think he was whispering in her ear how much he loved her, like he never told her before, whispering the words through the flowers she pinned in her hair over her ear. He held her tight, kissed her while they danced. Then he fainted in her arms. He was flushed. A doctor friend, one of the guests at the party, examined him. "There's nothing wrong, he's just tired. He works too hard." And he asked the others to leave. I stayed. So did the doctor. And we lied to each other until morning. The doctor recommended he go to the hospital for treatment from fatigue. And everything went along fine until I learned that some research he began months before his birthday was finished by others. He was nominated for an award. It sounded like a post mortem. He read the news in my eyes. I was crying in spite of myself. He put on a happy face, but from that day, his illness got the better of him. One day he asked me why couldn't they give him the award one month later, if they thought he'd get better, like the doctors kept telling him

BEVERLY: Maybe it was something urgent. Or they wanted to make him happy.

GARY: That's what I thought and I told him so, trying to convince myself as much as him. For a moment he believed it. I believed it, too. But when he left the hospital, after he got the award – he was even photographed – they suggested that he devote himself to his hobbies and to the things he enjoyed the most. "And if you have time," they told him in passing, "stop by a doctor." For a preventive check-up. The release form from the hospital contained a recommendation for a special clinic, where they treat cancer patients.

MARY: That's terrible. Did he go? Did he ever get in touch with you? You should have accompanied him.

GARY: The day came when he seemed to realize that going to the clinic was necessary. His friends and colleagues accompanied him to the airport. He promised he'd be back soon. He left on the plane but never arrived at the clinic. We all concluded that he got off the plane at the first stopover. Maybe he thought it was useless to fight the inevitable. And that was the end of our friendship. He, with a sick body, sick of lies and pity, accepting a cruel destiny. Me, despising cowards, unable to understand him, to accept his weakness. I cursed him, I felt like hitting him. But he had disappeared,

just like that. You'll ask me if I ever looked for him. A number of us look for him. His girlfriend looked for him. Maybe she still does. I'm looking for him, or I'm running away from him. I don't know. I was thinking of him when I told you the first part of my dream. I suppose the second part is obvious, and more concrete. My next dream is simpler, and I just thought of it. That each of us, you, Mary, and you, Beverly, and me probably most of all, find time, in a year or in six months, to meet, after I found my friend, and we'll see if we are any closer to the dreams we shared than we are today, or to see if we're dissatisfied because our dreams were too small. I prefer a beautiful dream, a real dream, even if it's not fulfilled, to a thousand petty dreams fulfilled to the letter. You, Beverly, in my opinion, dream the least among us three. In fairy tales, the youngest daughter of the king always asked for the least, so that in the end she receive the greatest happiness. But even though you chose the least, I think that things won't come out like in fairy tales. If you choose as much for yourself as your dream indicates, you will always be disappointed and angry. (Recalling) Oh, I said we should share our dreams in order to cheer us up, not to upset us. So, we're finished now. One, two, three, four, five. (Claps hands as if to break a spell) One more thing: The train leaves in one hour. I have to find my friend. I'm away.

BEVERLY: Already? You come and go, without a trace, without leaving any mark or souvenir.

MARY: We joked, we dreamed. You probably want to play another joke.

GARY: (Dryly) No. I am definitely leaving. (Sits down and writes something on a piece of paper. Explains.) An address, I forgot to do this. My bag is ready...Okay, let's understand one thing. I never liked to be accompanied, not even on my final road do I want anyone to accompany me. It's a wish of mine, a goal so to speak. What would you expect from a crazy guy like me? And the hosts have to do as the guest wishes. (At the door) Good-bye, till we meet again. And if I don't return, here's wishing that our dreams come true. Maybe one of you will make my dream her own.

BEVERLY: (Melancholy) Your dream is rather sad. It scares me....

GARY: (Condescending) That's one opinion. Keep it among the gifts you don't care for. You can make use of the first part without a problem, like a public service. How about that, a Department of Public Dreams? You can write a song about that. Well, enough. And since people cry when someone leaves, and since we don't like to be seen crying, let's turn our faces away. (Short pause.) Come on, turn away. Look wherever you see something nice. And laugh! (He tries to laugh.) Laugh! It will make it easier. (He takes out a piece of paper from his pocket, the one he wrote on before, and leaves it by the door.) Good-bye. (Exits. Neither of the women noticed what he did with the paper, but the audience should have since his gesture should be apparent.)

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Dostoevsky, Fyodor M. 66, 67, 248
 dynamics 27, 71, 73, 95, 117, 133, 142, 143, 149, 152, 155, 160, 165, 169, 181–184, 188

E

Eco, Umberto 75
 education 1, 42, 45, 59, 61, 68, 70–72, 77, 78, 80, 83, 87, 99, 108, 114–119, 144, 148, 151, 152, 154–157, 172, 206, 246, 247, 248
 efficiency 14, 22, 26, 40, 43, 44, 46–48, 51, 52, 55, 56, 59, 87, 95, 96, 108, 109, 110, 118, 139, 143, 149, 167, 168, 175
 Einstein, Albert 1, 128–130, 138, 140, 162
 entailment 164
 Euclid 173
 experience 1, 8, 39, 40, 42, 48, 50, 52–54, 56–58, 61, 63, 79–82, 84, 88, 91, 97, 102, 107, 110, 125–130, 134–136, 139, 141, 145, 149, 154, 159, 163, 166, 167, 168, 170–172, 175, 177, 173, 189, 192, 199, 233

F

Feigenbaum, Mitchell 131, 132
 Firstness 28
 Foerster, Heinz von 101, 246
 fractal 127, 183
 fractality 127, 129
 fuzzy 52, 86, 99, 120

G

Galileian 178
 Galileo Galilei 141
 global 1, 2, 15, 16, 18, 44, 45, 48, 58, 59, 61, 68, 69, 71, 82, 95, 96, 104, 106, 116,

117, 124, 134, 142, 143, 147, 149, 153
 globality 44, 45, 134, 142
 globalization 66
 Gödel, Kurt 28
 Gutenberg 63, 75

H

Hegel, G. W. F. 26, 65, 77
 heuristic (-s) 33, 41, 52, 53, 99, 145
 hierarchic (-al) 40, 45, 49, 107, 113, 143, 153
 hierarchy 38, 40, 41, 43, 47, 49, 51, 53, 105, 107, 108, 126, 145, 152, 206
 Hiller, Lejaren 180, 188
 Hirsch, E.D. 74
 history 21, 40, 51, 58, 60, 65, 104, 106, 110, 112, 119, 124, 126, 132–134, 137, 140, 141, 151, 158, 159–161, 185, 184, 190, 211, 221, 246–248
 Hume, David 79

I

illiteracy 2, 21, 32, 51, 58–60, 62–65, 68–70, 72, 74, 82, 84, 87, 90, 98, 100, 102–104, 106–109, 111, 113, 115, 121, 145, 146, 158, 248
 illiterate 60, 64, 65, 75, 108, 114
 immediate 53, 54, 86, 184, 208
 Industrial Revolution 34, 61, 107
 instability 52, 105, 134, 145
 intelligence 23, 25, 77, 82, 88, 106, 129, 159, 162, 177–187
 interaction 7, 8, 17, 22, 28, 50, 51, 54, 57, 62, 80, 81, 87, 91, 94, 95, 98, 118, 133, 141, 152, 153, 155, 157–160, 165, 166, 171, 175, 182, 185, 186

interactive 43, 60, 155, 157, 168, 171, 175, 185, 246, 247
 interactivity 44, 152
 interestingness 138–143, 146
 interface 7–12, 19, 20, 99, 115, 121, 143, 248
 Internet 3, 44–47, 50, 58, 59, 62, 63, 69, 91, 98, 110, 111, 114, 116, 117, 143, 158
 interpretability 12
 isotopy 12

K

Kant, Immanuel 64, 77, 79, 139, 145
 Kelly, Kevin 27
 Klee, Paul 184, 188
 Kreuzer, Helmut 26

L

learners 78
 learning 32, 50, 74, 88, 97, 98, 108, 115, 116, 117, 151, 153–157, 159, 170, 199, 206, 247
 Leavis, Frank 26
 Leibniz, Gottfried Wilhelm 28, 92, 139, 145, 179, 188
 Lenin, V. L. 66
 Leonardo 21, 22, 25, 178, 179, 188
 linear 34, 38, 40, 43, 45, 49, 58, 59, 79, 82, 84, 108, 131, 152, 185
 linearity 43, 46, 49, 53, 105, 107, 108, 145, 146, 152, 185
 literacy 32, 42, 45, 48–51, 57–72, 75, 82, 87, 96–98, 102–115, 147, 149, 150
 literate 42, 43, 49, 51, 56, 58, 59, 64–66, 68–70, 72, 75, 83, 102–106, 108, 110, 112–114, 145, 146
 literature 47, 59, 64, 66, 119, 120, 135, 138, 141, 143, 175, 204, 213, 221, 247, 248

M

magic 33, 38–40, 72, 210
 Maiakovsky, Vladimir 67, 248
 maieutics 53
 Marx, Karl 26, 28, 127, 128, 140
 Maturana, Humberto 24, 88, 99
 McLuhan, Marshall 32, 74,
 147–149
 media 3, 12, 23, 27–29, 32, 42,
 61, 70, 95, 102, 108, 109,
 118, 148–150, 155, 157,
 159, 238, 246, 247
 media-ocracy 63
 mediation 32–34, 39, 44, 51, 53,
 69, 95–97, 108
 mediocrity 82, 142, 157
 medium 7–9, 12, 23, 32, 33, 42,
 58, 66, 80, 87, 94, 95, 102,
 109, 111, 147–150, 153,
 169, 178, 180, 249
 mind (-s) 1, 2, 22, 23, 25, 26, 29,
 32, 50, 54, 56, 59, 68, 73,
 77–81, 83–85, 87, 88,
 90–93, 95, 97, 98, 99,
 100–102, 106–108, 110,
 117, 121, 126, 128, 132,
 134, 141, 152, 158–162,
 165, 188, 194, 199, 200,
 205, 208, 211, 217, 238,
 237, 242
 Minsky, Marvin 88, 159
 MIT (Massachusetts Institute of
 Technology) 63, 111, 175,
 188, 247
 Mosaic 124–128, 135, 144–146
 (M, R)-model 164
 MTV 62
 multimedia 7, 9, 20, 42, 43, 58,
 64, 81, 109, 110, 113, 148,
 150, 152, 157, 245, 247
 myth 33, 81, 142, 189, 190,
 193–195
N
 Nike, Frieder 7, 10, 21, 186, 247
 Naur, Peter 9
 neo-behaviorism 79

neo-Kantianism 79
 netizen 58, 145
 network 2, 26, 79, 91, 104, 116,
 117, 131, 143, 156, 157
 networking 2, 68, 97, 158, 165
 Neumann, John von 158, 185,
 188, 246
 Newton, Sir Isaac 128, 139, 160
 non-hierarchic 45, 145
 non-linear 34, 59, 79
 non-linearity 145, 152, 185

O

object 8, 11, 12, 17, 18, 21, 40,
 46, 48, 51, 53, 55, 62, 63,
 84–86, 124, 168, 171, 175,
 182, 202, 207, 249
 observatory 181, 182
 operating system 14, 94

P

Peirce, Charles Sanders 8, 21, 28,
 29, 52, 61, 84, 85, 87, 91,
 92, 96–98, 100, 134, 145
 parallelism 53, 143
 philosophy 20, 27, 41, 62, 64,
 65, 68–70, 75, 77, 83, 100,
 107, 111, 119, 127, 140,
 151, 163, 192, 247, 248
 physics 9, 25, 41, 43, 46, 46, 48,
 114, 126, 129, 137, 138,
 140, 158, 163, 164, 184,
 246
 Posner, Roland 20
 post-industrial 132
 post-literate 62, 69–71, 74, 145,
 158
 post-modern (postmodern) 21,
 28, 68, 70, 81
 pragmatic 20, 34, 39, 40, 41, 43,
 47, 49, 55, 56, 59, 64, 66,
 69, 70, 78–80, 86, 87, 93,
 96, 99, 100, 109, 126, 130,
 138, 142, 143, 145, 147,
 148, 158, 164, 168, 189,
 190, 191

pragmatics 20, 32, 33, 41, 45, 46,
 51, 56, 58, 61, 82, 86, 87,
 93–95, 99, 100, 126, 128,
 129, 138, 146, 158, 163,
 164
 proactive (pro-active) 128, 155
 program 9–15, 17–20, 48, 56,
 63, 82, 86, 88, 92, 94, 95,
 102, 108, 112, 114, 124,
 129, 140, 153, 163, 165,
 175, 181, 247
 programming 9–12, 14, 25, 86,
 145, 159, 164, 172, 180,
 248
 Pushkin, Alexander 66, 67

Q

quantum 138, 140, 158, 162,
 165

R

reification 40, 54
 relation 12, 15, 16, 23, 34, 39,
 40, 43, 47, 51, 53, 54, 61,
 62, 89, 97, 98, 125, 126,
 129, 130, 145, 149, 152,
 155, 157, 158, 162, 169,
 174, 175, 178, 183, 189,
 191, 194
 Renaissance 21, 22, 24–29, 83,
 107, 179
 representamen 8, 10, 17, 18, 54,
 84
 representation 54, 77, 78, 80, 88,
 120, 169, 170, 173, 182,
 185
 Rosen, Robert 89, 93, 94, 100,
 162–164
 Russia 65–67, 221

S

sampling 49, 54, 82, 106, 124
 scale 12, 33, 34, 40, 41, 43, 44,
 47, 48, 51, 52, 54, 55, 68,
 69, 70, 71, 95, 106, 133,
 134, 143, 145, 161, 175,
 182, 191, 192, 247

neo-behaviorism 79

self-constitution 33, 39, 43, 45,
48, 51, 55, 87, 91, 94, 106,
125, 136, 138, 140, 142,
146, 158, 160

self-definition 63

self-organizing 46, 55, 246

semiotic 7, 8, 11, 20, 23, 28, 29,
63, 69–73, 86, 89, 90, 91 ,
93, 99, 100, 119–121, 165,
172

semiotics 7–10, 20, 22, 23,
27–29, 32, 63, 68, 69, 73,
83, 87, 91, 99, 100, 111,
119–121, 168, 246, 247

sequence 21, 33, 56, 62, 63, 84,
89, 90, 93, 96, 115, 128,
129, 133, 140, 164, 168,
193, 194

sequential 43, 45, 46, 49, 55, 59,
97, 152

sequentiality 40, 43, 49, 105, 107

sexuality 59, 61, 62

Socratic 53, 151, 152

Soviet Union 47, 49, 66

Spengler, Oswald 64–66

story 43, 51, 80, 126, 136–146,
212, 219, 220, 236, 240,
241

structure 11–14, 23, 39, 40, 48,
55–58, 69, 70, 72, 79, 80,
82, 90, 102–104, 114, 115,
151–153, 155, 157, 158,
184, 185, 246

subject 2, 40, 43, 46, 48–50, 54,
58, 61, 62, 67, 75, 77, 78,
115, 125, 127, 136, 142,
152, 158–160, 162, 167,
171, 174, 185, 190, 238,
242, 246

supercomputer 182

symbol 23, 58, 170, 192

symbolic 107, 125, 168, 173,
182, 195

symbolism 83, 114, 173, 192

T

Third Culture 7, 21, 26–29

Thirdness 29

threshold 34, 42, 43, 55,
140–143, 170

tool 7, 9, 47, 52, 53, 55, 56, 68,
81, 82, 107, 249

typography 15

U

ubiquity 61

underlying structure 55–58, 82,
158

United States 60, 65, 82,
111–113, 116

university 20, 21, 24, 63, 68, 77,
82, 99, 100, 103, 105, 108,
110–112, 114, 116–118,
120, 121, 144, 146,
151–157, 164, 188, 189,
206, 245, 247, 248

USA 7, 59, 68, 102–104, 107,
120, 134, 144–146, 192,
246–248

V

vagueness 52, 91, 92, 99, 120

Varela, Francisco 25, 88, 99

Vasarely, Victor 82, 175, 186

Vinci, Leonardo da 21, 25, 178,
179, 188

virtual reality (VR) 7, 8, 50, 61,
75, 91, 149, 167–172, 180,
186, 246

visualization 61, 85, 86, 90, 140,
154, 156, 177, 186, 183,
249

W

Weber, Max 80, 140

Whitaker, Corinne 81, 186, 249

Winograd, Terry 24

world-wide Web (WWW) 7, 47,
84, 95, 158, 186, 249

Z

Zadeh, Lotfi A. 52

Zakia, Richard 2, 63, 85, 100