

# Visual representations and cognitive development: A cultural-historical perspective

Gavriela Eilam Ph.D.  
Tel-Aviv University, 2002

## 1. Introduction: problem and approach

We are so accustomed to using the visual representations produced in our culture, that we live, to a great extent, in a world determined by those representations. We orient ourselves physically using maps, and temporally using clocks and calendars. We use lists for remembering, technical drawings and graphs for planning, and read papers in order to keep updated. A large part of our knowledge is accumulated in books and in other graphic or written forms of information storage.

These are but a few examples of the visual representations we have created and take for granted, and which form an integral part of our world. They play a major role in the way we perceive the world and our place in the world (in science), and ourselves and our thoughts (in psychology).

This chapter will focus on one of the main means of visual representation in our culture: the visual representation of language, viz. writing.

The main question we will consider is, does writing have implications on cognitive development and on the structure of the developing cognitive functions, and if so, what are these implications?

Learning to read and write – literacy – plays a major role in education, although it is still not clear what implications literacy has on the mind, the culture, or even on the success of individuals in society.

"Some have held that literacy is important for gaining access to a privileged elite. Others have held that literacy is not only useful but that it contributes directly to the growth of rationality and consciousness. Most believe that

literacy does both. At least enough to keep literacy high on the political and educational agenda as it has for well over a century." (Olson 1994, p. xiv)

Language is justly considered one of the main characteristics of being human, but systems for visual representation of language were invented relatively late in human history, and appeared only in some human societies. Often, there is not enough emphasis on the distinction between spoken and written language. Homo Sapiens as a species is 30,000 – 50,000 years old, and to our best knowledge, spoken language exists in all human cultures and societies. Yet, the first manuscripts known to us are only 6000 years old (Ong 1982, p. 2), and to this day, we know of human societies with no writing and no script.

Writing is no doubt a culture-dependent human invention. Thus the question as to whether writing has implications on mind structure, or on the structure of cognitive functions, is actually a part of the following question: Can the human mind be understood without referring to the use of tools or means during different historical periods and in different cultures?

More specifically, can one seriously study the human mind without taking cognizance of cultural differences in the use of tools and means of representation, such as tools and machines used for cultivating the land, or tools which make it possible to circumnavigate Earth, such as maps (not just 'cognitive maps') and time-keeping devices (not just 'biological clocks')? In other words, can one properly study the structure of human perception, attention, memory or thought without considering the use of written texts, books, archives, libraries, computers, and word processors? (Goody 1987, pp. 253-4; Havelock 1986).

Since the 1960s, and especially in the last two decades, a growing number of psychologists, anthropologists, and historians, have adopted a socio-cultural orientation for studying the human mind.<sup>1</sup> Many of these scholars criticize the 'traditional' approach, which presupposes 'psychic unity' and treats the human mind as a system (or an 'entity') with a fixed universal structure and function, independent of time, place, human activities, customs, or personal traits.<sup>2</sup>

According to the socio-cultural approach, cultural practices as well as cultural means and products have shaped perception, attention, memory, thought, action,

emotion, and consciousness. Throughout human history, changes have occurred in various cultural factors (customs, practices, sign-systems, tools and technology), which changes are associated not only with changes in the contents of cognitive functions, but also with changes in their structure, or in the way cognitive processes are organized and carried out. In other words, it is assumed that the structure of the human mind may be different – sometimes fundamentally different – in people living in different cultures. In addition, people in the past thought in a different way from the way we think now, and perhaps the way we think today is different from the way we will think in the future (Havelock 1986, p. 27).

If indeed there is a close and reciprocal connection between cultural factors and mind structures, then the study of the structure and development of cognitive functions (which is usually considered the subject matter of psychological research) requires interrelations amongst all the disciplines dealing with human knowledge, thought, language, culture, history, as well as human individual and social behaviour (philosophy, psychology, linguistics, anthropology, history, and sociology).

At the same time, if mind somehow reflects culture, then it should follow that cultural means such as the visual representation of language have a role – possibly a major role – in determining the organization and structure of cognitive processes.

Of course, one can not draw direct and simple relations of cause and effect between writing or literacy in general on the one hand, and the contents and structure of cognitive functions on the other. Literacy usually co-exists with other socio-cultural activities, so that it can not be isolated and its implications can not be studied separately from other cultural factors.

Some difficulties arise when attempting to investigate the implications of the visual representation of language on mind structure and on the cognitive development of children in our literate culture. One of them is the fact that children, before even learning to read and write, are already exposed – directly or indirectly – to different uses of writing and reading by people in their immediate environment: in

books, newspapers, documents, street signs, etc. Under such conditions, one can not isolate the characteristics of the 'pure' oral mind of a child who has not yet learned to read and write. Nor can the child's environment be insulated from the influence of certain uses of visual representations in order to study the process of cognitive development separately from these effects.

From historical and anthropological studies, it may, however, be possible to draw some conclusions about the structure of the cognitive functions whose development is conditioned by specific modes of the application of writing.

The following is a preliminary attempt to analyze some historical examples indicating that different means and technologies for, and different modes of, applying visual representation of language throughout western history, have had significant implications on the development of cultural knowledge. This development can not be understood without assuming concurrent changes not only in the content but also in the structure of cognitive functions of people who lived in these cultures.

## **2. The cultural-historical perspective: Vygotsky's research program**

The perspective that will serve as a framework for our discussion is based on the reconstruction of Vygotsky's cultural-historical research program (Eilam 1994).

Many scholars who adopt the socio-cultural approach regard Vygotsky's psychology as one of the sources of inspiration for developing their approach to mind research.

Vygotsky developed his research program (along with his colleagues Luria and Leontiev) from the mid-1920s until his death in 1934 (Luria and Leontiev continued to develop this research program, each in a somewhat different direction). The reconstruction of Vygotsky's psychology, based on his (and his colleagues') declared commitment to develop a Marxist psychology, reveals a comprehensive research program offering an explanation for cognitive development, and presents an outline of an explanation for the historical

development of knowledge (in other words, a genetic epistemology). The starting point for these explanations is the fact that man is a social labouring animal.

Marx did not develop a psychological theory nor formulated direct outlines for such a theory. However, the Marxist conception of man and of consciousness (mind) upon which Vygotsky's research program is based, can be reconstructed from the writings of Marx, and from the writings of Vygotsky and his colleagues.

One assumption upon which the proposed explanation is based, is Marx' claim that consciousness is a product of the human mode of life. The human mode of life is characterized by human social labour activity and by the social, institutional and political order, viz. social practice. Social labour activity is manifest in the process of material and cultural production. It is embodied in cultural products such as working tools, technological means, consumer goods, means of representation (such as spoken and written language, 'theoretical' knowledge, art, scientific theories), books, as well as in social and political ideas. According to this claim, social practice, its means and its products, determine consciousness - and not vice versa. It then follows that the mental functions of each person reflect, or represent, the reality of the specific socio-cultural environment in which that person lives and acts.

Another assumption, on which the cultural-historical research program is based, is the characterization of man, according to Marx, as a tool-making animal. Within the framework of social labour, man produces and uses means for material production (tools), as well as means for social communication. These latter means are representational means, such as language and other sign systems. Both kinds of means – the means of production and those of representation – are cultural means, whose methods of production and application are historically transmitted.

The emergence, development and structure of cognitive functions<sup>3</sup> are conditioned by the appropriation of cultural means. The term appropriation refers to acquiring the cultural means, an acquisition that includes not only owning the means (the tool or the sign), but also the knowledge about the manner in which it is utilized within the specific socio-cultural framework. Cultural means may be used in different ways, not necessarily in the way common within social practice in

a given society. For example, an axe may serve in one culture to chop wood, and in another to chop heads. The sounds comprising a word with a given meaning in one language may have a different meaning in another language, or even in the same language, when used in a different context.

In order to perform a job, a task, or an activity within a given social practice, a job or a task which is itself culture-dependent, one needs both the tools and the cultural knowledge of how these tools are to be utilized to perform the specific job, task or activity. Hence in order to appropriate a cultural means one has to acquire not only the means as an object, but also the manner of its use. Therefore the transmission of cultural means requires social interactions through which an individual acquires the manner of using these means in a given culture.

This explanation emphasizes the fact that the human child is born into a world that includes not only natural objects, but also cultural products and means, and other people through whose mediation the child is exposed to his natural and cultural environment. In fact, the child's cognitive development is conditioned from the moment of birth, by the cultural means and by the way these means are culturally applied, by the culture-dependent tasks performed by these means, as well as by the role and the meanings attributed to natural objects and situations in a given culture. All cognitive functions and mental operations are carried out, according to Vygotsky's research program, by representational means that have already been appropriated from the socio-cultural environment. The individual appropriates the cultural means first by participating in a mutual activity with a person who possesses the knowledge about the cultural mode of utilizing these means. Only after such active experience, is the cultural mode of using the means gradually internalized.

In the process of acquiring speech in a mother tongue, children at first use external speech for socially communicating with people who know how to 'use' the language. During the next developmental stage of speech acquisition, the child begins to use speech for himself/herself, in order to direct his/her own behaviour (referred to by Vygotsky as 'egocentric speech'). The mode of use and the meaning of spoken language are gradually internalized, and the internalized

speech becomes internal speech, which is used for performing cognitive processes and operations.

According to this explanation, not only the contents of cognitive functions but also their structures are conditioned by the cultural means existing in a given culture, by their cultural mode of application and by their appropriation. Thus, the socio-cultural environment conditions not only *what* the individuals think, feel, or want but also *how* they think, *how* they feel, *what* intentions, aims and wishes they may have, *how* they wish to accomplish them, and *how* they intend to realize their individual abilities. Hence the existence of particular means of visual representation, and the modes of using such means within a given socio-cultural environment, condition the structure of the developing cognitive functions and determine which cognitive functions will develop in the people living and acting in the given socio-cultural environment.

The capacity to read, for example, is undoubtedly a high cognitive capacity, but it develops only in cultures that use script and written texts, and only amongst individuals who acquire literacy. In cultures lacking the means for visual representation of language, the cognitive function of literacy does not develop, nor do other cognitive functions, whose development is conditioned by various ways of using and applying the reading and writing means (Goody 1987, pp. 255-6).

Clearly, within a given socio-cultural environment, not all people develop the same cognitive capacities.<sup>4</sup> The availability of the cultural means for appropriation by the individual within a given socio-cultural framework is conditioned by the social or institutional order and by the individual's role and status within this order. It follows that people of different social groups within the same socio-cultural environment may or may not appropriate certain cultural means existing in their culture. It is possible that within a particular socio-cultural environment, only certain social groups would acquire literacy, and not all the literate groups would use reading and writing in the same manner, to the same extent, and for the same purposes. Accordingly, there may be differences in the cognitive development of people from different social groups within the same culture.

The cultural-historical research program emphasizes the fact that man does not live in a 'pure' natural environment, but lives and acts in a cultural environment already modified by other people. According to this approach, the biological properties of the human organism and of the human mind are undoubtedly a necessary precondition for the mind's emergence and development. The biological abilities and capacities for developing the mind are thus basic universal properties generally common to all human beings in all cultures. It is assumed, however, that the development of the cognitive functions specific to man – such as conscious perception, conscious remembering and thought – is not a direct product of biological evolution, but is culture-dependent, a product of human history.

According to this explanation, the phenomena of cognition are universal in the sense that they develop in all humans living within the mode of life typical of man, viz. organized social labour and appropriation of the means and products of this labour. However, since cognitive development and the structure of cognitive functions are conditioned by appropriation of cultural means, and since cultural means, and the way they are applied, vary during different historical periods and in different cultures; it then follows that the developing cognitive structures are not fixed, but may differ in individuals who live in different cultures.

As previously said, the cultural-historical research program also offers an outline for explaining the historical development of knowledge. This explanation pertains to the process of appropriation and historical transmission of cultural means.

Since a cultural means may be used in different ways, the use of a cultural means in different situations by different individuals may yield the discovery of new ways for applying the means. New applications of a cultural means may, under certain circumstances, lead to the discovery of new knowledge and new tasks. These new tasks may be accomplished by cultural means that were initially produced and used for performing other tasks. At the same time, because the same task can sometimes be accomplished in a variety of ways, a situation may arise where different individuals would try to perform a given task by using different means. Such situations may yield the discovery of yet more means, sometimes by a combination of previously existing means and knowledge. When such new

discoveries are transmitted by social interaction, they may lead to the development of cultural knowledge.<sup>5</sup>

The explanation of the historical development of knowledge, presents a spiral developmental process: On the one hand, the historical development of the cultural means, as well as the development of the usage modes of these means, are conditioned by the social practice. On the other hand, at each stage of development, the means already produced condition the social practice and the possibilities for its continuing historical development.

This explanation may be illustrated by the processes of change and development that have occurred during the history of writing, viz. the invention and development of different types of writing systems, the development of the tools used for writing, and the development of the modes of using script and written products. Clearly, these developments are influenced by social, political, economic, religious, scientific, and other conditions that also change historically.

Of the cultural means, Vygotsky ascribes a major importance to language, specifically spoken language, as the main representational means for social communication. After appropriation and internalization, spoken language becomes the means for performing thought processes. Accordingly, a considerable part of his research, and writing, focuses on the relation between a child's development of speech and thinking.

The importance Vygotsky attributes to written language is apparent mainly in his short discussion of the implications of acquiring reading and writing on a child's cognitive development, where he emphasizes the cultural mode of using writing (Vygotsky 1997). Vygotsky criticizes methods of teaching young children to write, methods that concentrate on teaching the motor skills and not on acquiring the use of writing as a new and complex aspect of speech. Like spoken language, written language is also a means of representation developed throughout the cultural development of humanity, and written language too serves primarily as a means for social communication. Having internalized writing, an individual may use written language as a means for thinking and for thought-development. Thus the appropriation of written language, according to Vygotsky, marks a critical

turning point in the cognitive development of the child. While words in speech represent concrete objects and relations, the sign-system of written language (Vygotsky refers only to alphabetical script) is a system of arbitrary signs representing sounds and words of oral speech. He claims that written language is a second order symbolism. The symbolism of written language gradually becomes direct symbolism, when written language becomes, for the child, a system of symbols directly referencing the objects they represent and the relations between them.

Acquiring literacy provides, on the one hand, a means of representation used, after its internalization, for thinking. On the other hand, mastering written language enables access to repositories of knowledge and culture, and to the riches of written human creation, to an extent impossible by oral communication alone. Appropriation of written language has, therefore, far reaching implications for the child's cognitive development (Vygotsky 1997, p. 142).

The cultural-historical perspective briefly reconstructed here, will be adopted in order to analyze some of the implications of the visual representation of language on the development and structure of cognitive functions.

### **3. The Debate: Orality and Literacy**

The following discussion heavily draws on data from a debate ongoing since the 1960s between classicists, historians, anthropologists, and psychologists (specifically the studies of E. Eisenstein, J. Goody, E. Havelock, W. Ong, and R. Thomas). These scholars have debated and analyzed the characteristics of orality and literacy, and the implications of literacy, particularly in Western culture.<sup>6</sup> Generally, one may say that all the scholars participating in this debate implicitly or explicitly assume that cultural means, and primarily communicational means such as writing have implications – sometimes radical implications – not only on cultural development and achievements, but also on the structure of cognitive functions.

The data from the historical and anthropological debate about the implications of the visual representation of language, point out three critical turning points, each of which has brought about a revolutionary change in the history of cultural and individual development of memory, knowledge and thought. Each of the different scholars participating in this debate, attributes cardinal importance to a different turning point.

One turning point was the transition from primary oral cultures, that did not know the very possibility of writing (or of communication through writing), to literate ones. Ong (1982) considers the transition from primary orality to literacy as the most important and most drastic change in the development of culture and mind. Goody and Watt (1968) emphasize the deep mental differences between people living in oral cultures and people living in literate cultures.

The second historical turning point was the invention of the Greek alphabet – an alphabet representing language phonetically in an accurate manner. According to Havelock (1963, 1982), Greek alphabet was a non-thinking means which may be used for thinking. He regards this invention as the major turning point in the development of western culture and mind.

The third turning point was the invention of print. Eisenstein (1979, 1983) considers the advent of print to be of major importance for cultural and cognitive development.

The revolutionary change that occurred in each one of these historical turning points was not immediately manifest. At each turning point a change in the means of the visual representation of language, or in the technology of producing script, facilitated processes of cultural and cognitive development that lasted hundreds, sometimes thousands of years. Apparently, some foundations for the 'new' thought and cognition modes that developed after each of these historical turning points, were already in existence, and it was the new discovery, or the new invention, that opened opportunities for new modes of communication and new applications of language to be further developed. Those opportunities, in turn, having been realized, led to a cultural change and to changes in the structure of perception, memory, and thought.

From the debate about orality and literacy, it turns out that it is too early to assess the cognitive implications of the technological changes in the visual representation of language in our contemporary electronic age. Nevertheless, it is the technological changes in the electronic age (the development of secondary orality, to use Ong's terminology), which enable us to view the historical data from a new perspective. From this perspective we can point out the revolutionary changes that have occurred in the history of culture, knowledge, and mind, as implications of the visual representation of language.

First let us consider some of the characteristics of the mind in primary oral cultures. Formulating the characteristics of the oral mind, a mind in pre-writing situations, makes it possible to reveal and analyze some of the prominent changes that have presumably occurred in the structure of the human mind throughout Western history. We shall consider, in particular, the changes in mind structure that occurred with the development of systems for the visual representation of language, with the development of writing-technology (the tools used for writing) and with the changes in the modes of applying writing.

#### **4. The mind in primary oral culture**

"Fully literate persons can only with great difficulty imagine what a primary oral culture is like, that is, a culture with no knowledge whatsoever of writing or even of the possibility of writing... Without writing, words as such have no visual presence, even when objects they represent are visual. They are sounds. You might 'call' them back – 'recall' them. But there is nowhere to 'look' for them... they are occurrences, events." (Ong 1982, p. 31)

Until the invention of writing systems (or 'scripts'), human societies lived for hundreds of centuries in primary oral cultures. In primary oral cultures, there are no visual means for representing speech or spoken language, no ways for preserving what is said, and relationships between people are controlled exclusively by acoustics (with the addition of visual perception of body

movements). Thus the whole system of communication between people is like 'an echo system, light as air and as fleeting' (Havelock 1986, p. 66).

In literate cultures, oral cultures are usually perceived as traditional, underdeveloped, and backward. We should not infer therefrom that in pre-literate cultures there is no cognitive activity, or that there are no intellectuals in primary oral cultures. The more interesting questions are, however, not what primary oral cultures lack, but what these cultures possess by way of tools and activities? What cognitive structures develop or can develop? What is the mind structure of people living in these cultures? (Goody 1977)

In a series of articles published between 1928-1935, Milman Parry showed that the two Homeric epics, the Iliad and the Odyssey, that for thousands of years have been considered the pinnacle of literary creation in Classical Greek culture, are actually remnants of an oral culture. These epics had been orally transmitted and shaped for hundreds of years, and were probably the first two lengthy compositions written in the new Greek alphabet, around 700-650 BC.

From the study of the Homeric poems, and from anthropological studies of illiterate narrative poets in South Yugoslavia (conducted by Albert Lord in the 1930's and in the 1950's), it is apparent that the language of the Homeric poems had been developed through hundreds of years by epic poets in an oral pre-literate culture.

The oral poet did not verbally memorize the poetry he presented to the audience nor did he compose his poetry anew at each performance. Instead the oral poet used a rich repertoire of expressions, formulae and standard epithets from which he 'rhapsodized', or 'stitched' his story together, slightly differently each time he narrated it. By using standardized formulae, fixed expressions and standardized themes from his memorized store, the oral poet improvised his poetry anew at each performance, to fit the circumstances, the audience and the metric needs of verse (Havelock 1963; Olson 1994, p. 236-7; Ong 1982; Thomas 1992). Meter and rhythm facilitate memorizing, and are therefore essential in primary oral cultures. It is easier to memorize a verse of poetry than a paragraph of prose. It is even easier to memorize a song with a melody than poetry. Meter and rhythm in

an oral culture are means designed for functional purposes, in order to memorize and preserve the cultural tradition and the cultural knowledge (Havelock 1982, pp. 116, 186; Havelock 1986, p. 71; Thomas 1992, pp. 51, 113-23).

Illiterate narrative poets in Yugoslavia were also found to repeatedly use the same formulae and the same themes. Those themes and formulae were, however, 'stitched' together by the bard differently in each rendition, depending on the event and the audience's response, on the poet's mood and on other social and psychological factors. Comparing recordings of different performances by the same bard showed variety in performance, even when the bard claimed that he was repeating the same version 'word for word'.

Other studies of oral cultures yielded similar results. Goody (1977, 1987) found that although the LoDagga in North Ghana all 'memorize' the Invocation to the Bagre, there is variability in the exact wording between the recitations of different people, and also in different recitations of the same person.<sup>7</sup>

We have no possibility of knowing whether there was, in the history of oral cultures, verbatim memorization and recall of poems, prayers, hymns or other forms of oral art, since oral performance in primary oral cultures 'evaporates' and cannot be reconstructed. In oral societies, exact verbatim repetition is apparently rare, and in fact may be useless in everyday life (Goody 1977, pp. 117-19; Goody 1987, pp. 176-7, 189; Ong 1982, pp. 57-68).

Memorization and the organization of knowledge and thought (in fact the organization of the whole noetic world of people in primary oral culture), are presumably based on fixed formulae. In such a culture, there is no way for preserving knowledge outside people's minds. Thus knowledge, efficient administration, and wisdom, need fixed and formulaic thought patterns which are easily memorized and must be repeated out loud time and again in order not to be lost (Havelock 1963, 1986, pp. 70-71; Ong 1982, p. 24). In primary oral cultures, a carefully articulated thought process that was achieved as a solution to a complex problem can be retained for later recall only if one thinks memorable thoughts. Therefore, thinking must be accomplished by means of rhythmic patterns (e.g. by verse), by using repetitions, formulaic expressions, and proverbs that are

constantly heard and therefore easily memorized and recalled. In primary oral cultures, fixed rhythmic expressions (similar to those we know from proverb books) are constantly used. These expressions create the substance from which thought is constructed, so that it may be retrieved. A thought process thought-through in non-formulaic, non-patterned, terms would be a waste, because it cannot be reconstructed. Even the law in primary oral cultures is formulated in sayings and proverbs, which the judge has to repeat and apply to the case at hand, in order to derive a just verdict (Ong 1982, p. 33-6).

Since an oral utterance vanishes the moment it is uttered, oral discourse is characterized by redundant or 'copious' phrases, helping to focus the attention and maintain the continuity of thought (Ong 1982, p. 40).

All verbal communication in primary oral cultures takes place by direct interaction between people. Knowledge is 'anchored' in the human lifeworld, in the context of the immediate familiar human activities and human interactions, competitiveness and struggles. The known is not separate from the knower. Accordingly, the verbal formulation of knowledge reflects human competition and struggle in a polar world of vice and virtue, of villains and heroes. Proverbs and riddles in primary oral culture are used not only for preserving knowledge, but also for provoking others to verbal polemics using contradictory or apposite proverbs (Ong 1982, p. 43-5).

Anchoring knowledge in the activity of the human lifeworld finds its expression in the second book of the Iliad where the famous catalogue of ships presents the names of leaders, and the regions they ruled, as involved in human actions. The Homeric poems reveal the fact that they have been designed as 'encyclopaedias' for preserving the culture's practices and attitudes. The information is not formulated as logically related propositions, but as a sequence of concrete events and actions, which is a suitable construct for preserving culture in live oral memory (Havelock 1963, 1982; Ong 1982, p. 42-43).

The thinking of people in oral culture is not organized in a linear, analytic manner such as the course of a formal logical argument (e.g. syllogism, where a necessary conclusion is derived from some general premises). This, however,

does not indicate pre-logical or illogical thinking in the simplistic sense. People in oral cultures have no difficulty understanding causal relations in the practical sense, but since what is said vanishes right after it was uttered (as there is no way of fixing what is said), inconsistencies and even contradictions are incorporated into the flow of speech. Therefore, in such cultures, the process of criticism is harder (though not impossible), and it is difficult to develop causal relations in the abstract logical sense (Goody 1977, 1987; Ong 1982).

Since there are no means for preserving knowledge outside the minds of living people, all forms of knowledge are retained only in the minds of individuals, and are transmitted directly between individuals in face to face communication. Recurring oral performances in front of an audience who is invited to participate in its memorization, are essential for preserving the painstakingly accumulated knowledge. Consequently in oral cultures, the wise elders, who specialize in preserving knowledge and repeating stories of the past, are highly esteemed.

Oral cultures are often considered conservative and traditional, but they do not lack originality. Originality is expressed not in the making up of new stories, but by the re-mixing of traditional formulae and subjects, so that each time the story is told, it is appropriate to the situation (sometimes a new political situation) and to the audience's reactions. Innovations and changes occur throughout the oral transmission of knowledge and tradition. These changes, however, are usually presented as sustaining the tradition of the ancestors, a tradition that virtually disappears once it is changed or stops being repeated out loud. Since there is no record of the past, it cannot be reconstructed, and so memories of the past and the components of cultural heritage having no contemporary relevance are forgotten or transformed, and are lost. In oral cultures, only things that are essential for everyday life, and are in accordance with the present beliefs and needs of society are remembered. All the rest is abandoned and forgotten (Goody and Watt 1968; Havelock 1982, pp. 23, 187; Ong 1982, pp. 41-2; Thomas 1992, pp. 108-9).

The attempt at formulating general characteristics of the oral mind, as differing from those of the literate mind, is, of course open to dispute, criticism and a wide range of interpretations.<sup>8</sup> Some of these characteristics have served, and still

serve, some of the critics themselves for identifying change and assessing historical development in literate cultures. In fact, the formulation of oral mind traits is applied to the understanding and comparison of the minds of people whose cognitive processes have been formed within different literate cultures.

### **5. Orality and literacy: The transition from oral culture to a culture with a visual representation of language**

From the psychological point of view, Ong (1982, p. 82) considers the transition from primary orality to literacy to be the most radical change that had occurred in the technology and use of writing. He considers it a change more revolutionary than the transition from handwriting to printing press or computer technology.

First, the transition from orality to literacy pertains to the use of different senses, and to receiving different sensual impressions. Orality pertains to hearing and voice characteristics, while reading and literacy pertain to sight and the characteristics of objects in space, objects that may be silent. Speech may be accomplished merely by the human body, without extraneous tools, while writing necessitates tools in addition to the human body – at the very least a writing implement and a surface to write on.

Secondly, speech and writing have special relationships to different dimensions. The vocal representation of language has a special relationship to the time dimension. Speech is a transient event - we sense the voice as it is produced, and if the voice stops, there is silence (Ong 1982, pp. 31-2). Writing adds to the audible information a spatial framework, altering the channel of language communication from an auditory to a visual one. 'You hear speech and see writing; speaking with mouth, listening with ear; writing with hand, reading with eyes' (Goody 1987, p. 186).

In primary oral cultures, language communication is direct and requires concurrent physical presence of both speaker and listener. Script, on the other hand, is more constant. It enables recording of what is said, and the transfer of information with no direct face-to-face contact. Introducing a visual representation

of language opens up new and revolutionary possibilities for storage and historical transmission of knowledge both intergenerationally (from generation to generation), and intragenerationally (within a single generation). At the same time, it opens up further possibilities for mind development.

Goody (1977, 1987, p. 3), sometimes refers to writing as a 'means of communication' and at other times as a 'technology of the intellect'. He relates the changes in the means of communication to changes in patterns of human interaction, and hence to changes in the cognitive processes man is heir to, and to the ways in which he understands his universe. Thus, Goody actually expresses the position presented in the cultural-historical program, according to which writing serves primarily as a means of social communication, and after its appropriation and internalization, it serves as a means for performing cognitive operations and processes.

### **5.1 What are the possibilities for cognitive development in cultures with a visual representation of language?**

Based on the interdisciplinary debate of historians, anthropologists, and psychologists about orality and literacy, one may point out some possibilities of cultural and cognitive development that are conditioned by the use of a means for the visual representation of language.

Writing enables recording of what is said and re-examination of the details in a much more accurate and critical manner than possible in oral discourse alone. Moreover, writing enables not only the recording of information, but also its reorganization. Writing makes possible alterations to the written visual representations, the disconnection of words from their context, and their reordering. It is possible, for instance, to create written lists (or tables), and sort them, according to various criteria, almost completely separated from any context of human action (unlike the 'oral list' of ships and leaders in the Iliad) (Goody 1977, pp. 78, 80-84; Goody 1987, pp. 187-8, 275, 287; Ong 1982).<sup>9</sup>

Words in written language have a status different from that of words in spoken language. The sounds of speech exist only as a prelude to their demise – in other

words, when speaking the second word in a sentence, the first word is, of necessity, 'gone'. Written texts, on the other hand, are thing-like. Words are represented in them as quiescent objects, as signs immobilized in visual space. Since writing fixes words in space, the importance of spatial organization is accentuated, as the written text may be scanned in different directions. Thus, a world of new order is created (an order that does not exist in primary oral cultures), a world of order where direction in space is an important part of language communication. Indeed, early systems of writing were somewhat ambiguous about direction. Until directional conventions were accepted, texts were written in various directions: from right to left or from left to right, downwards or upwards, and also in a few directions concurrently (Goody 1977, pp. 46, 123; Ong 1982, pp. 91, 100).

Visually fixing language through writing provides language with an atemporal spatial dimension, allowing separation and distance (both spatial and temporal) between the reader and the writer. Consequently the structure of written language is different from that of spoken language (Vygotsky 1986, 239-42). Speech usually takes place between people at a particular time, within a given context, with a specific speech intonation.<sup>10</sup> Writing requires more detail and linguistic sophistication than speech, because unlike speech, writing is supported by neither intonation, face and body gestures, nor by extra-textual contexts common to both the reader and the writer. Writing gives rise to a 'context free' language - the writer has no way of knowing who will ultimately read the text. The reader does not know precisely how the written matter is to be pronounced, and with what intonation (although punctuation marks such as the question mark, comma etc. may partially signal the intonation). Moreover, the reader can not directly determine what the author's meaning was. Thus, for example, actors and directors often dedicate a long time to deciding precisely how to interpret and pronounce the words in the texts of plays (Goody 1987, p. 287; Olson 1994; Ong 1982, pp. 78, 101-103).

Writing creates a distinction between the written contents on one hand, and the writer and the process of writing on the other. In other words, it separates the known from the knower which enables personal disengagement, separation from

the immediate context of the human lifeworld, distancing, and 'objectivity' (Ong 1982, p. 46). The visual fixing secures the text's endurance, and the possibility of its being 'renewed', when re-read in different contexts (Ong 1982, p. 81).

## **5.2 Writing and memory**

The use of writing alters the extent, order and the structure of cultural and individual memory. In oral cultures, recollection (repeating the past) is a creative re-processing of that which is relevant for the present. In literate cultures, knowledge may be stored and accumulated in written texts outside the active minds of living people. The written text remains unchanged, and can be compared with that which is remembered, as well as with different versions of the written material. New knowledge can build upon earlier knowledge in an incremental manner. Apparently, verbatim memorization flourishes in literate societies due to the possibility of comparing that which is remembered, with a fixed text. Conceivably, verbatim memorization became a custom of literate cultures, because of the need for exact word-for-word copying of text during the process of preserving knowledge in script-cultures (Goody 1987, pp. 174-89, 256).

The ability to preserve data and information in the form of written text created new conditions in the realms of social and cultural activity. In trade and administration, writing made it possible to rely on written documentation and not only on eyewitness testimony. In trade, the use of writing as a means of information storage allowed more deals and more complex actions to be performed simultaneously. Possibly, bookkeeping (which was established as a method for controlling complex trade) was the basis for the development of precise recording of scientific observations (Goody 1986, p. 78). While writing provided the means for enlarging both individual and cultural memory banks, the various possibilities of listing and classification through writing (e.g. sorting lists alphabetically) created new means for organizing memory and re-organizing thought (Goody 1977, pp. 110-11; Goody 1987, pp. 187-8).

### **5.3 Logical and scientific thought**

The development of logical and scientific thought also relies on the visual representation of language. In oral cultures, there is indeed, a certain measure of critical thought, skepticism and logical reasoning. However, criticism and skepticism in primary oral cultures depend on timeframes and specific contexts. Since formulation of thought vanishes and is forgotten if not repeated out loud, there is hardly any possibility for a critical, skeptical tradition to develop in such cultures. Primary oral cultures lack the means for developing systematic critical thought, accumulated skepticism, and formal logic (Goody 1977, pp. 44-7; Goody 1987, p. 220).

In literate cultures, where versions of the past and of past beliefs are permanently recorded, the past is more difficult to dismiss, or 'erase'. While written documentation does encourage orthodoxy, at the same time it enables historical inquiry, that may in turn lead to skepticism about the ideas already written (including ideas about the universe), and to attempts to examine alternative explanations. In fact, systematic recording, which is only possible in literate cultures, changes not only the way of expressing thought, but also the manner in which thinking is done. Systematic recording of both factual evidence and the thoughts and doubts of multiple individuals in society, creates a tradition of accumulated skepticism, which may in turn lead to the creation of a corpus of new knowledge. The accumulation of critical texts enables the development of methods for the detection and identification of contradictions, and the development of logical 'proof' and deduction procedures that have played such a significant role in the development of science.

The systematic recording of data has been vital to the development of science, a good example of which is the development of astronomy. People in oral cultures often watch the movement of heavenly bodies, and observe their rising and setting. However, without an efficient means of accumulating the recordings of repeated exact observations and a comparison thereof, generalizations can not be made about the movement of heavenly bodies and their future predicted movements.

Therefore, Goody (1977, 1986, 1987; Goody and Watt 1968) claims that the major advancements in science (in the sense we usually think of it), took place only after literacy had become widespread. In ancient Greece, after the invention of the Greek alphabet, and in the renaissance period in Europe, after the invention of the printing press.

Psychologically, the use of writing makes it possible to rely on text, relieving the mind of a part of the recollection activity, and allowing the mind to focus on the thought process, while preserving the succession and continuity of thought. Writing makes it possible to re-organize the contents of thoughts, identify contradictions, eliminate redundancy and attain analytic precision in formulating thoughts, to a level unattainable in oral discourse in primary oral cultures. Analytic precision attained through writing is internalized into thinking, and affects speech as well as the entire use of language in literate cultures. For example, Ong (1982, p. 105) relates the precision in the formulation of Plato's dialogues to the influence of written texts.

It is important to keep in mind that writing has implications not only on the mode of life and on the cognitive processes of literate people in a culture, but also on the illiterate – both adults, and young children who have not yet learned to read and write. These implications express themselves in the utilization of products whose development and application depend on the use of writing and other systems of visual representation such as technical drawings and graphs. In addition, the literate may orally reconstruct for the illiterate the knowledge they have acquired through reading. Scribal cultures, where a particular social group specialized in reading and writing, are an example of the impact writing had on the contents of knowledge and on the cognitive processes of individuals in society, even where a large number of the individuals could not read and write (Goody 1977, p. 109-10; Goody 1987, pp. 114-15, 251; Thomas 1992, pp. 150-1).

Thus far, we have dealt with implications writing may have on cultural development, specifically on the structure of cultural and individual thought and memory. But do these developments actually occur?

Historical studies show that not all developments made possible by writing are predictable, and some of them may not even actualize. Writing and its various uses depend on social and cultural factors, which may vary as much as human cultures vary. Therefore, general consequences of literacy on the human mind can not be determined, and neither can constant and specific changes in mind structure as a direct result of the existence of script, or of writing in general.<sup>11</sup>

On the other hand, at least three main factors related to writing may be pointed out as having potential implications on mind structure.

- (a) The type of script, in other words what the script visually represents.  
Different types of script: pictograms, hieroglyphics, cuneiform, syllabary and alphabetical writing, represent different things. Some types of writing (like pictograms) represent the world; other types represent spoken language in various ways.
- (b) Writing technology - the means used for writing: inscription on stone, metal, pottery, or wax boards; writing on papyrus or paper using a brush or a pen, and later, printing presses.
- (c) The manner in which writing technology is utilized, and different uses of writing as a means of representation in various cultures and by different individuals within a given culture. Not all differences between the modes of using writing may be attributable to differences in the means serving for writing.

The transition from an oral to a literate mind is thus not a discrete, dramatic transition, but is rather a series of small changes, which are associated with the manner in which people communicate with each other. These ways of communication are related to, inter alia: social practices and social organization, discovering and preferring specific writing technologies as means of communication (a discovery and a choice conditioned by social and cultural factors), and different modes of using writing (which are also socio-culturally conditioned) (Goody 1987, p. 59).<sup>12</sup> Writing makes possible certain cultural and cognitive developments, but not every society applies these possibilities immediately, if at all. Not all individuals in a society appropriate reading and

writing, and not all individuals are equally exposed to the different applications of writing in a given society (Goody 1987, pp. 217-18, 221). It is therefore not unexpected that there would be variability in the development of different literate cultures, as well as in the development of the cognitive processes of individuals within a given culture.

A historical perspective is needed in order to estimate the impact of writing on mind structure, and to analyze the realization of potential uses of writing, and the associated implications on cultural and mind development. In addition, this requires sensitivity and attention to the differences between cultures, and between social groups within a given culture.

## **6. Different types of writing systems**

Do different types of writing systems have differing implications on cognitive development?

Havelock (1963, 1982, 1986) links the possibilities of cultural and cognitive development not only with the very existence of writing, but also with the type of writing system used, as well as with the socio-cultural framework in which the given writing system is used.

"To speak ... of writing in the abstract, or attempt to discuss it as a general phenomenon, is a mistake. There are only specific systems of writing, each of which has its own specific effect within a particular social system." (Havelock 1982, p. 55)

Thousands of years before the invention of the first writing system, humans drew pictures, and societies used a variety of visual means as memory aids, including notched sticks, rows of pebbles, etc. Graphic signs were used long before the appearance of writing, in order to mark ownership of property. Identification marks were used in the economy of urban areas in the Ancient Near East. For example, hallmarks found on the currency silver in order to guarantee its quality, and impressed markings (from around 3500 BC) found on the surface of the clay

tokens that were used for trade in Mesopotamian economy (Goody 1986, pp. 47-52; Olson 1995, p. 103-4).

One may consider any semiotic sign as writing, but script (in its full sense) is a coded system of visible marks by which the writer can determine the exact words that the reader will generate from the text.

It appears that different types of writing systems were developed independently of each other. The first script we know of is cuneiform, invented by the Sumerians in Mesopotamia towards the end of the fourth millennium BC (Goody 1987, pp. 28-30; Ong 1982, pp. 84-6). Generally, early scripts did not focus on representing the sounds of the words of language, viz. phonetics. When phonetic representation was developed it was usually based on a large number of signs and it therefore did not foster widespread literacy.<sup>13</sup> An efficient system of phonetic representation is one that 'copies' or transcribes the sounds of the language, using a limited number of visual signs. The alphabetical script (an example of such a system), was invented around 1500 BC by a Semitic people (or peoples), in the same region where cuneiform appeared about two thousand years earlier. It appears that the different types of alphabet in the world were derived from this one alphabetic script. Alphabetical script does not represent things, it represents sound as a thing (Goody and Watt 1968; Havelock 1982, pp. 54-5).

The Semitic alphabet was composed of consonants without vowels (and so are the Semitic scripts – Hebrew and Arabic – to this very day). The readers of Semitic script must understand the text they are reading, and rely on contextual data in order to know what vowels to use with the consonants.<sup>14</sup> The Greek alphabet, developed from the Phoenician alphabet around 720-700 BC, is a system of signs containing consonants and vowels, which enables reading and writing in languages with which the reader is not familiar, and is therefore easier to use and learn than the Semitic alphabet (Goody 1987, pp. 40-41, 46-7, 51, 63; Goody and Watt 1968; Havelock 1982, pp. 12, 15, 197-8; Ong 1982, pp. 89-90; Thomas 1992, p. 12).<sup>15</sup>

According to Havelock (1982, pp. 6-9), the Greek alphabet brought about revolutionary changes in social and personal means of communication, followed

by transformations in the mode of thinking. Havelock ascribes all the great cultural achievements of Classical Greece to the use of the Greek alphabet (a use which depended, of course, on various social, cultural and economic factors), and which led, according to him, to revolutionary changes in major aspects of the culture. Through the use of writing, law and morality, formerly based on procedures anchored in social customs, began to develop into a system of general principles, to which directions were added, indicating how these principles were to be used in different situations. Havelock (1982, pp. 86-8) claims that the alphabetic script made possible considerable progress of knowledge in all arenas, the rise of philosophy as an intellectual discipline, the appearance of scientific thinking and the formulation of novel thoughts and new ideas in classical Greece. Since it was possible to preserve thoughts in writing there was no longer the need to restrict the use of language to formulae or to rhythms that would facilitate memorizing - the new thoughts were formulated in prose. 'Written thoughts' could be perused repeatedly, further developed into new thoughts, and distributed amongst the readers.<sup>16</sup>

Greek society did not become literate immediately upon the invention of the Greek alphabet. The use of alphabetic script gradually developed in Greek culture in a process that lasted about three hundred years. Activities based on thinking and oral expression were apparently deeply anchored in Greek culture and society, and did not disappear when an efficient means of visual representation of language was introduced.<sup>17</sup> Apparently, for many generations after its invention, the Greek alphabet served chiefly for the transcription of speech and verse, for inscriptions on objects (so that they could 'talk' when the inscription was read out aloud), for preserving and strengthening the habits of the pre-literate society, and for broadening traditional commemoration customs (Thomas 1992, pp. 62-5).

From the sixth century BC, literacy gradually began to fulfil an important role in the public life of Greece and Ionia. In Athens, for example, the Solon laws were presented to the general public for reading in 593-4 BC. In 403 BC, the Greek alphabet in its final form was adopted by decree for use in Athens' official documents. In the fifth and fourth centuries BC, Greece already had a corpus of written literary knowledge, and City-state governments used documents,

inscriptions, and archives. Despite that, society was still essentially oral - much more was heard and spoken than written and read, and until the second century AD, written texts were often transmitted orally to the public (Thomas 1992, pp. 3-5, 124-7).

For a long period after the invention of the alphabet, the main users of the alphabet were craftsmen and traders, while the education of the leisured classes in Greece was still oral. Such education included memorization of poetry, improvisation of verse, and oral delivery of verse and rhetoric prose, which was based on the principles of verse, musical performance, singing and dancing. Only towards the end of the fifth century BC was the writing of the letters of the alphabet included in the curriculum, and the number of readers increased (Havelock 1982, p. 187; Thomas 1992, pp. 3,10).

Presumably, reading was also exclusive to specific occupations in Classical Athens of the fifth century BC. We should keep in mind that writing in the Classical Greek period was difficult to decipher, as the words in the written text were usually not separated from each other. Books were written on papyri and were often unavailable, and copying manuscripts was a lengthy and laborious process. The reading of papyrus scrolls required an uncomfortable posture, and silent reading as we know it was actually rare until the advent of print. Books served in the ancient world mostly for reading out aloud, often by a slave (Goody and Watt 1968; Thomas 1992, p. 4).

Havelock's studies (1963, 1982) show that the historical turning point in the transition from oral to literate culture took place in Athens only at the beginning of the fourth century BC (Plato's time), when broader and more efficient use of writing can be discerned. The literate revolution is expressed in Plato's writings. On one hand, Plato criticizes writing as a mechanical, inhuman way of processing information, a way that does not respond to questions and is destructive to memory. On the other hand, Plato's philosophical thinking depended entirely on writing. Havelock claims that it is not by coincidence that Plato excluded poets from his ideal republic - they represented the traits of traditional oral thinking, using formulae and cliches (Havelock 1963; Ong 1982, pp. 24, 79, 167-8).

Nevertheless, even after the fourth century BC, residue traits of the oral mind remained in script culture, at least until the invention of the printing press, and in fact, even later.

## **7. Writing technologies and different uses of writing**

Throughout history, various means were used as writing implements. Styli, goose quills, brushes, and other means for inscribing or for spreading ink or paint were used for writing on a variety of surfaces. Writing surfaces were inter alia, wet clay tablets, animal skins relieved of fat and hair, bark of trees, papyri, dried leaves, wax and wooden tablets, metal boards (lead, bronze or gold), stone, marble and paper. Various methods were applied for mixing fluid ink, which was preserved in containers such as bovine horns.

The different means of writing had undoubtedly influenced distribution, the modes of applying writing, and its implications throughout history. Preparing and using some of the writing implements required special skills, hence it is not surprising that writing remained, for thousands of years, in the hands of a limited professional group. Paper did facilitate writing greatly, but despite the fact that paper was apparently produced in China in the second century BC, it spread into the Middle East only in the eighth century AD, and was first produced in Europe only in the twelfth century (Ong 1982, pp. 94-5; Thomas 1992, pp. 82-4).

The cumbersome writing tools, combined with oral customs (like thinking through one's thoughts aloud) dating back hundreds of years, encouraged the use of dictation through to the Middle Ages. During the Middle Ages, it was mostly scribes and monks who engaged in writing. Authors in the Middle Ages frequently employed scribes, although they occasionally used script in order to develop their thoughts (mostly in the form of short essays). In eleventh century England, writing by the authors themselves was still rare, and the process of creative writing took place in an oral discourse style, and in an oral psychological setting, with authors imagining they are writing what they would recite in front of an audience. Even in sixteenth century England, educated people who could read often depended on a

scrivener or secretary when they needed something written (Ong 1982, p. 95; Thomas 1992, p. 10).<sup>18</sup>

The slow, gradual historical process of transition from oral minds and cultures to literate ones, was revealed through the modes of applying writing throughout the Middle Ages and afterwards. Documents or written texts were frequently used for supporting memory, thought, and oral customs.

Medieval writers did not consider writing a substitute for memory, nor as a means for extending memory. Memory was regarded as the primary tool for thinking, while writing served as a mnemonic device, a system of visible marks that can be used for checking memory. The action of memorization was described as 'inscribing' on the mind or as writing on a surface, without differentiating between the two kinds of actions. The 'loci' system served, on one hand, as a memorization method where important items were 'located' in familiar places in memory, or by making marks on a surface. The most highly literate people in the Middle Ages were usually also the most highly oral. Knowledge was considered to be in the mind, and highly literate medieval clergymen relied on memory in order to examine, criticize and develop ideas. The modes of application of written texts in the Middle Ages indicate the influence of writing on the modes of memorization and memory, which focused primarily on memorizing written texts.<sup>19</sup>

In fact, medieval culture in Western Europe was permeated with oral ways of thinking. In the eleventh and twelfth centuries, for example, oral testimony of witnesses was considered more reliable than written documents. Written documents, such as those relating to property, were often certified not in writing but by attaching symbolic objects (such as a knife) to the document by a leather strap. Early land ownership charters in England were not originally dated. Until the development of the widespread use of writing, after the advent of print, most people in Medieval and Renaissance Europe did not locate themselves temporally using an abstract computed time. In twelfth century England there were neither clocks nor calendars, and it was not clear what origin point in time should be used to compute dates for various purposes, and whether the same point should serve as origin for date computations in both religious and secular documents. Thus most people did not know (nor cared to find out) in what year they were born. In

cultures with no newspapers or other dated material, most people have no need to know the current date and how it relates precisely to dates in the past (Ong 1982, pp. 96-8).

Ong (1982) points out two domains where remnants of oral thinking illustrate the gradual process of freeing the mind from the customs of oral tradition, and the formation of a 'literate' mind: Rhetoric and Learned Latin.

### **7.1 The art of rhetoric in the Middle Ages**

Rhetoric played a major part in the education and culture of Ancient Greece, Ancient Rome, and of all Western cultures until the end of the eighteenth century. In Ancient Greece, the teaching of rhetoric, which represented many of the traits of the old oral world, was far more prominent than the teaching of philosophy, which represented the structures of new literate thinking.

Rhetoric was originally the art of public speaking, but it was based on writing while preserving some remnants of orality, at least until the eighteenth century.

"Over the centuries, until the Age of Romanticism... explicit or implicit commitment to the formal study and formal practice of rhetoric is an index of the amount of residual primary orality in a given culture." (Ong 1982, p. 109)

Even after rhetoric had become the art of writing, instead of public speaking, rhetoricians still encouraged the fluency of speech, redundancy and volubility, that were common in oral cultures (they called it *copia*). The language of rhetoric was prose and not poetry, but rhetoric preserved the agonistic pitch that characterized the traditions of oral cultures and the formulaic style of oral discourse.

Rhetoricians regarded writing or developing a topic for an oration as an 'invention', in the sense of finding suitable arguments for a specific case, out of a common reservoir of arguments (analogous to the formulae of oral cultures), in order to prove or disprove a proposition in the face of opposition.

The common reservoir of arguments, sometimes called *loci communes*, i.e. 'commonplaces', was a collection of arguments for any and all subject matters.

*Loci communes* were of two types: one supplied a list of abstract 'titles', such as definition, cause, effect, contradictions, similarities etc. The list of titles, varying in length from author to author, was used for developing an argument, to 'prove' or think through any subject. It was always possible to find something to say by defining, looking for causes, effects, contradictions etc. The second type of *loci* was a collection of proverbs about a variety of themes, such as loyalty, evil, decadence, friendship, etc. which could be used for preparing an oration or for writing. Ong claims that the oral, highly analytic debates in medieval universities and in scholastic tradition, indicate a mind in transition - trained to comment, orally and in writing, on written texts (Havelock 1986, pp. 46-7; Ong 1982, pp. 105, 108-12).

The remnants of orality gradually disappeared, mainly after the invention of print, and rhetoric itself gradually changed from the art of oration into the art of writing. In the sixteenth century memory had already been excluded from the five traditional parts of rhetoric (invention, arrangement, style, memory and delivery). Learning rhetoric today usually means learning how to write effectively, omitting the fourth part above (Ong 1982, p. 116).

## **7.2 Learned Latin**

Between 550 and 700 AD, Latin, previously a language spoken in different parts of Europe, developed and split into the early forms of Italian, Spanish, Catalan and other Romance languages. The various languages that developed from Latin became gradually differentiated from the original language, to the extent that by 700 AD, Latin was no longer used as a mother tongue. Schooling, however, was still conducted in Latin, as was most official discourse of the church and state. Since in script culture, the literary, scientific, philosophical, medical or theological works taught in schools and universities, could not be translated to the hundreds of oral vernaculars and dialects (most of which have never been written to this very day), there was no alternative. Thus, Latin became primarily an academic language - Learned Latin - a language acquired, developed and utilized predominantly through writing.

Learned Latin had at least two denominators in common with rhetoric. One was their common classical origin, the other was the fact that for over a thousand years, Latin was a gender-linked language, learned, written and spoken exclusively by men.

As with rhetoric, Learned Latin emanated in the old oral world, its grammar and basic vocabulary originating from the same era, though over the centuries it was used, it incorporated thousands of new words. On one hand, there were no 'purely oral' users of Latin, since all Latin speakers over the next thousand years or longer, could also write it. On the other hand, the aim of classical education was not to create an effective writer, but rather an effective public speaker.

Latin was pronounced in a variety of ways, but was always written the same way, thus making communication between scholars from all over Europe possible. Learned Latin, claims Ong (1982, pp. 112-14), illustrates the capacity of written language to disengage itself from oral discourse, to separate and distance the knower from the known, and to attain objectivity by creating a distance from the human lifeworld. Latin grounded knowledge in a medium disassociated from the emotional load of a mother tongue. The modes of abstract thought of medieval scholasticism, as well as the development of scientific thought and modern science, were nurtured on the ground of Latin that had served as the writing language for theologians, philosophers and scientists.<sup>20</sup>

### **7.3 The advent of the printing press: A revolutionary change in the technology and application of writing**

Eisenstein considers the advent of printing in the middle of the fifteenth century to be a critical turning point in the history of Western culture. She claims that this invention initiated a radical change in the milieu of intellectual life, and eventually effected all realms of human life (Eisenstein, 1983, p. 107). As with other turning points related to the visual representation of language, the change did not occur at once. The transition from script culture to the printing press era took at least a century. During this time, the mode of application of writing underwent gradual changes, associated with the new writing technology (print), and its implications

(as well as those of its products), on culture and mind. 'By 1550, one may say with some assurance that the age of scribes had ended and the age of printers had begun' (Eisenstein 1983, p. 114).

In script culture, before the advent of print, scholars had only limited access to written texts. The bookstores of Ancient Rome, the Alexandrian Library, and medieval monasteries and university cities created an environment that enabled the literate elite to develop a 'bookish' culture. However, manuscripts were often unavailable and were easily corrupted by repeated usage and copying. Thus, a large part of the accumulated knowledge was orally transmitted, and literary essays were 'published' by being read out loud (Eisenstein 1983, p. 7).

The advent of print initially led to an increase in the number of books available, and to a drastic decrease in the number of hours of labour required to produce them (Eisenstein 1983, p. 13). In the first years (1450-1500 AD), an 'average' edition of a book was probably between two hundred and a thousand copies. Estimates as to the number of copies per 'edition' in the fifty years immediately previous to the advent of print are not available (Eisenstein 1983, p. 9).

The vast increase in the quantity of books available, gave rise to far reaching changes in all that was directly or indirectly related to the use of written texts. Printed editions of books afforded students and scholars, of all disciplines and all regions, access to significantly more books, and introduced the possibility of purchasing books for a relatively low cost. There was no longer a need to become a 'wandering scholar' in the search of books. The increased distribution of copies, and the larger diversity of books, made possible the comparison of books, instead of scholars engaging predominantly in commentary on a single text, as previously (Eisenstein 1983, pp. 43, 51).

Despite the radical differences in their production methods, the first printed books that appeared after the advent of print (towards the end of the fifteenth century), resembled manuscripts in their external appearance. Manuscripts, however, were written and edited with utmost consideration for the scribe, who had to invest abundant time and effort in copying each text. Thus, medieval manuscripts contained numerous abbreviations that helped the writer, and hindered the

reader. Within one generation after the advent of print, the entire orientation of book editing had changed, and began to focus on the reader's convenience (Eisenstein 1983, pp. 20-22; Ong 1982, pp. 121-3).

Before the invention of printing press, books usually did not include title pages, and books were usually catalogued by the first words in each book. Handwritten manuscripts sometimes introduced the book to the reader as if starting a conversation, e.g. 'Here you have, dear reader, a book which so-and-so wrote about...' (Ong 1982, p. 126). Such introductions suggested residuals of the oral heritage. In printed books, clear well-organized titles started to appear, enabling easier, more uniform cataloging of books, and an attempt was made to organize the text in new, improved, well-indexed and more readable editions. When manuscripts were indexed prior to the invention of print, the index was not always usable in copies of the manuscript, since the index was not recreated and hand written copies did not always have identical pagination. In printed editions, the edited index was duplicated hundreds of times and was identical for all copies of a book from the same edition. Eisenstein emphasizes the influence that the presentation and organization methods of the printed books must have had on the structure and organization of the readers' thinking (Eisenstein 1983, pp. 64-6, 73; Ong 1982, pp. 125-126).

In the first decades after the advent of print, print contributed to the development of knowledge, not so much by the distribution of new texts, but by providing more readers with easier access to copies of existing texts. Scholars in the first century after the advent of print had access to many more manuscripts from the medieval world, than scholars who actually lived during the Middle Ages, and medieval world pictures and cosmologies were presented in print in new visual forms. Though medieval maps had been more accurate than ancient maps, very few people during the Middle Ages had access to any of the ancient or newer maps. After the advent of print, editions of printed atlases were published, presenting, side by side, maps of different regions and from different periods. Texts written by experts from various disciplines, such as doctors and astronomers started to appear side by side in scholars' libraries. The accessibility to large quantities and varieties of texts from various disciplines, written in different periods, opened up

new possibilities for readers. The reader could now compare disparate traditions, identify contradictions, and develop new systems of thinking by merging existing theories, to an extent and in a manner that was impossible in previous script cultures (Eisenstein 1983, pp. 44, 49, 116).

Print made possible standardization that was difficult (if not impossible) to achieve in script cultures. This standardization affected calendars, dictionaries (whose editing and spread were limited in script cultures), reference books, maps, charts, diagrams, and other visual aids, as well as systems of musical and mathematical notation (Eisenstein 1983, p. 52). The large number of reference books and guides that were published, offered detailed practical advice encompassing many more diverse fields than the limited practical manuals that had been compiled in the late Middle Ages (Eisenstein 1983, pp. 60-4). Multilingual reference guides, books and dictionaries were printed (e.g. the Polyglot Bible published in London in 1657 in nine languages), and the introduction of pagination led to a more precise indexing system, annotation and cross-referencing in the newly published guides and books (Eisenstein 1983, pp. 69-70, 73). 'Increasing familiarity with regularly numbered pages, punctuation marks, section breaks, indexes, and so forth helped reorder the thought of *all* readers, whatever their profession or craft.' (Eisenstein 1983, p. 73)

Print, considerably more than hand written manuscripts, anchored visual representation (the written word), in a defined position in space. The uniformity of a large number of identical copies of books created a communication revolution. Readers in different places could simultaneously look at identical texts, images, maps and diagrams, and thus hundreds of scholars and scientists could now check and compare, criticize, and update printed texts, to an extent impossible before the advent of print. The uniformity of copies provided scholars with a uniform reference frame, which could not be produced by manual hand copying. New discoveries were introduced into new editions, enabling the development of an accumulating research tradition. Eisenstein claims that the communication revolution brought about by the printing press, had further reaching implications on early modern science than ordinarily ascribed to it. Studying 'the great book of

Nature', she argues, relies on exchanging information through 'little books of men' (Eisenstein 1983, p. 188; Olson 1994, p. 56).

"It is partly because we envisage the astronomer gazing away at unchanging heavens, and the anatomist taking human bodies as his only books, that the conceptual revolutions of the sixteenth century – which came before methods of star gazing or dissection had been altered – seem particularly difficult to explain." (Eisenstein 1983, p. 188)

In order to study the world and nature, individual scholars need precise, uniform maps and data - collected, compared, and sorted by other scholars, in different regions and during different periods, about stars, plants, animals, or minerals. These observations must be recorded and disseminated, in order for them to have scientific value. In script culture, the possibility of making new observations 'universal' or 'public' did not exist (Eisenstein 1983, pp. 193, 197), certainly not to the extent made possible by print. Eisenstein considers the availability of 'old' data, as particularly important for the development of modern science, even prior to the accumulation of new data. She claims that the great theoretical advances in astronomy, from Copernicus' time on, were initially an outcome of the possibility of gathering large quantities of previously existing data, even before new observations were collected. Thus the revolutionary change that took place in Copernicus' lifetime (1473 – 1543) was a consequence not of new data discoveries, but of a change in the availability of data. Young Copernicus probably found it hard to locate even a single copy of Ptolemy's *Almagest* in the 1480s, but towards the end of his life, he had at hand three different editions. In Astronomy, unlike in some fields of science, data is required from observations gathered during different intervals, and through long periods of hundreds, sometimes thousands, of years. Copernicus, claims Eisenstein, had the opportunity to review a wider range of records of astronomical observations than any astronomer before him. Although, for half a century after Copernicus' death, there were no changes of revolutionary potential in the data available to astronomers (as pointed out by Thomas Kuhn), Copernicus, claims Eisenstein, lived precisely in the decades when such changes had occurred that transformed the availability of data to all book readers. '...systems of charting the planets, mapping the earth,

synchronizing chronologies, codifying laws and compiling bibliographies were all revolutionized before the end of the sixteenth century.' (Eisenstein 1983, p. 78)

By virtue of the new production possibilities provided by the printing presses, the following generations could rely on the works of sixteenth century scholars, instead of concentrating on attempts to gather scattered remnants of such works. (Eisenstein 1983, pp. 78, 206-9)

In addition to enabling the exchange of knowledge, data, theories, as well as ancient and new world-pictures, print also made possible the exact reproduction of illustrations. Although the art of printing design for decorative purposes had been known for hundreds of years, printing techniques were not used for including illustrations in handwritten manuscripts. Illustrations were copied, time and again, by artists who (because they were not experts in the illustrated field) often missed the importance of the paramount details the illustrations depicted. The resulting inaccuracies in illustrations sometimes made it impossible to later identify the drawn object precisely. Only towards the end of the fifteenth century, did the printing of visual designs come into systematic use, where clear drawings began to appear alongside the text explaining them, thus creating new relations between pictures, numbers and characters (Eisenstein 1983, pp. 22-4; Ong 1982, pp. 126-7).

The developments in respect of copies of maps, and access to them, were similar. During the years 300-1300 AD, geographical data was gathered from the voyages of traders, pilgrims and sailors, but a comprehensive atlas based on the gathered data could not be published, even when the data was used for the drawing of maps by trained cartographers. A monastery near the Vienna University served, in the fifteenth century, as a major center for the gathering of geographical information and advanced cartography. Some scholars and astronomers could visit the monastery and examine the maps that were drawn, but the majority, dispersed in remote places, had no access to these maps, and could not use them for guidance, nor check or update them. The best maps were often kept hidden from view, due to the fear (that existed before the advent of print) that producing a large number of copies would have led to the physical deterioration of the maps, and to the potential distortion of the data (Eisenstein 1983, p. 201-5).

The analysis of the implications of the advent of the printing press, and the development of its applications in the realms of intellectual and social life, reveals one thing clearly: the possibilities opened up by the visual representation of language were, in fact, only fully realized in the printing era. Print, which enables precision, a multitude of identical copies (standardization), and scrutiny of a wide diversity of data, played a significant role in this realization.<sup>21</sup>

## **8. In Conclusion**

From the cultural historical perspective, the historical, cultural, and psychological aspects are fundamentally interwoven. According to this approach, consideration must be given to the entire scope of human socially constructed activities, and the cultural means applied for performing these activities, in order to understand the development, structure, and mode of performance of cognitive processes.

Specifically, the means for the visual representation of language, and the ways in which these means are applied, are pivotal to the explanation of cultural development (usually studied within the disciplines of history and anthropology), as well as to the explanation of cognitive development (usually studied within the discipline of psychology).

Our research has illustrated that visual representations (such as writing) had far-reaching implications for the development of cultural knowledge (and social practice), and for the development and structure of cognitive functions throughout Western history.

The brief (and very selective) historical journey undertaken in this chapter, illustrates that there are some important differences between the structures of the cognitive functions (particularly memory and thought processes) of people who live in primary oral cultures, and people living in literate cultures. Throughout Western history, however, there is no evidence of an immediate transition from an 'oral mind' to a fully developed 'literate mind' - the structure of the 'literate mind' gradually changed and developed. For thousands of years after the invention of the Greek alphabet (in what was previously an oral society), remnants of the traits characterizing the mind in primary oral cultures persisted in the literate cultures of

Western Europe. The historical analysis has established, that the impact of writing is not determined by the mere existence of script, but it is also conditioned by the technology used for writing, and by the ways writing and its products are utilized within a given culture.

When individuals acting within a given culture appropriate writing, they also acquire the cultural mode for using writing and its products, which mode changes historically. The structure of the individual mind is conditioned by the individuals' appropriation and manner of utilization of reading and writing. The type of script, the technology of writing, the cultural modes for applying writing and its products, as well as who appropriates writing, how literacy is appropriated, and for what purposes people from different social groups use reading and writing - all depend on the social practice. At the same time, the social practice and its further development depend, inter alia, on the existing type of script, the existing technology of writing, and the cultural modes of applying writing and its products. Therefore, psychological research of the implications of literacy should be focused not on the acquisition of writing skills, but on the way writing is applied within specific social practices. Literacy, however, is only one of the socio-cultural factors, and only one of the cultural means (albeit of major importance in some cultures), that condition the development and structure of the cognitive functions of individuals in a given society.<sup>22</sup>

The historical picture reveals a process of 'spiral' development, in accordance with the explanation of the historical development of knowledge outlined in the cultural historical research program. The transition from orality to literacy and each of the changes and developments in the means of writing, and in the modes of applying writing, were based on previous means and modes of application. At the same time, each change in the means of writing and its modes of application created the foundations of, and the possibilities for, new developments in all the realms of social, and cultural life. The development of the first scripts was apparently based on the previous application of signs, presumably for trading purposes. The Greek alphabet was developed in a previously oral culture, and may have been a consequence of an attempt to adapt the Phoenician alphabet to the phonetic needs of the Greek language (Havelock 1982, pp. 197-8). Nearly all

of the technical knowledge on which the development of the printing press was based had already been in use for centuries, for other purposes (such as printing designs) (Ong 1982, p. 118).

The new possibilities opened up by new means were not immediately realized. After the discovery or development of new means (a new type of script or new writing technologies), these means were first applied to brace traditional practices. The Greek alphabet was used initially, mainly as a means for transcribing traditional modes of oral discourse. Hundreds of years elapsed until some of the new applications made possible by the Greek alphabet were actualized. The printing press was used at first to produce copies resembling hand written manuscripts, and even after the external appearance and internal organization of the books changed, many of the newly published books during the first decades after the advent of print, were copies of preexisting texts. The printing press did, however, create an environment that made possible a new kind of availability of knowledge and data, which gradually led to cultural development in a variety of spheres, including the development of modern science, and new ways of thinking.

Writing, and the means (or technology) by which written texts were produced also brought about changes in the social practice. The invention of writing led to the emergence of a class (or classes) of experts in the complex art and technique of writing (Goody 1987, pp. 74-5). The advent of print, led to the appearance of printers' workshops in urban centers throughout Europe. These workshops produced books in nearly all the Western European languages. New trades were created, such as compositor and type-founder, and traditional skills that had been developed by metal workers, tradesman and scholars, were put to use for achieving new objectives. New occupational groups arose, that were engaged in looking for markets for the products of the printing workshops (Eisenstein 1983, p. 114).

The changes in the means for preserving and developing knowledge, which occurred with the transition from primary orality to literacy, and with the development of modes for applying writing and its products, brought about shifts in what was considered 'reliable knowledge' within a given culture. In primary oral cultures, knowledge is preserved in the minds of living people. Accordingly,

reliable knowledge is considered first hand knowledge, relying on personal experience, the testimony of eye-witnesses, the wisdom of elders who remember and can relate past events, and the recollections of 'specialists' whose role is to memorize and retrieve (usually by reciting before an audience) the knowledge they acquired from the ancestors.

Writing, which represents language spatially, introduced a revolution in the means for representing, organizing, preserving, developing and retrieving knowledge. This revolution gradually led to changes in the structure, scope and content of knowledge, as well as in the consensus on what should be considered 'reliable knowledge'. In literate cultures the accepted sources for reliable knowledge are not only eye-witnesses, but primarily documents, books, and written or other visual repositories, or 'experts' (such as teachers) who obtained their knowledge by consulting written texts. These sources of knowledge are often valued more (and considered more reliable) than knowledge from direct personal (practical) experience.

Written language is often considered, in our literate culture, to represent language in general, but our discussion of the historical data emphasizes the structural and functional differences between spoken and written language, presenting them as different, though related, cultural means of communication.

Can historical (and anthropological) research contribute to enhancing our understanding of the development and structure of cognitive functions?

Not only in psychological research, but also in historical and anthropological research, it is impossible to separate the use of writing from other socio-cultural practices.<sup>23</sup> Historical and anthropological research, however, provide opportunities for studying the structure of the human mind within different cultural settings, where the cultural means applied, their mode of application, and the social practice differ from those we often take for granted in our contemporary culture. Our research indicates the urgent need for interdisciplinary research and close collaboration between empirical and theoretical research in history, anthropology and psychology, particularly where the research pertains to the application of cultural means.

It should not be expected, however, that the cognitive development of individuals will duplicate the precise stages and course of the historical development. Cultural means and their mode of application change throughout history, while the cognitive development of individuals, on the other hand, is achieved within a specific socio-cultural environment, where given means and products of writing are already being used in specific ways and for specific purposes. Individuals are exposed to the uses of reading and writing customary in their culture, and they appropriate these means within that culture. A detailed historical and anthropological study on the cultural and cognitive implications of literacy in a variety of specific socio-cultural frameworks, could be informative in this respect.

Our preliminary historical research cannot offer definite conclusions. It does, however, emphasize the need to reconsider the questions usually formulated within psychological and historical research, specifically research on the impact of literacy (and other cultural means), on the development and structure of cognitive functions.

---

### **Notes**

1. J. Bruner, H. Gardner, C. Gertz, J. Goody, E. Havelock, D. Olson, R. Shweder, and J. V. Wertsch, to name just a few.
2. For criticism of the 'traditional' approach in psychology and anthropology, see Shweder (1990), and Bruner (1990).
3. Vygotsky uses the term 'higher cognitive functions' to mark the cognitive functions specific to man: conscious perception, conscious or intentional attention, thought, conscious will, etc.
4. Undoubtedly, some basic cognitive differences are due to the unique genetic heritage, and biological constitution of individuals. The individuals' cognitive development and the structures of their cognitive functions, however, are shaped by cultural and social factors.
5. See also: Freudenthal (1986).
6. The different arguments presented in this debate have been criticized, mainly because of the attempt made by some of the scholars to present a dichotomy

between orality and literacy, and on account of the importance ascribed to literacy as a major factor in cultural and cognitive development. These criticisms will not be discussed here, as they are not germane to the subject matter of this chapter.

7. The Bagre Invocation is a long recitation of the myth related to the Bagre society. The recitation presents the relationship between man, God and the beings of the wild. The general message is that God almighty has withdrawn from the world, because mankind has been led astray by the beings of the wild. Had God been involved he would have been summoned to set everything in proper order. The recital also deals with human experiences, with problems of disease and death, breeding and growth, and with the problem of evil. (Goody 1977, p. 28)

8. For example, see Olson (1994, pp. 11-12, 16) for a summary of some positions emphasizing the sophistication of thinking in primary oral cultures. Thomas (1992) criticizes the attempt to present a clear distinction between orality and literacy, but actually uses previously characterized mind traits in primary oral culture in order to present her argument about the interaction between orality and literacy in classical Greece. Coleman (1996) criticizes the approach that assumes a Great Divide between 'oral' and 'literate' thought, and the historians who adopt this approach for studying the Middle Ages.

9. For a more detailed analysis of the use of lists and the implications of writing on listing and cognition, see Goody (1977, pp. 103-11).

10. The situation can be different, of course, in a developed technological culture, possessing means of audio recording, playback and transmission of speech.

11. See also Thomas' (1992, pp. 15-22) criticism on considering literacy a cause for general cognitive and cultural change.

12. For an emphasis of the complex relations between orality and literacy in different historical periods, see also: Thomas (1992, p. 5).

13. However, both early Egyptian hieroglyphics (3100 BC to second century AD), and early Sumerian-Akkadian cuneiform (3100 BC to 75 AD) could represent the sound and meaning of words by means of a complex system of signs and 'determinatives'. A determinative was added to the sign to indicate the class (e.g. 'city', 'deity' etc.) to which the intended meaning belonged. Phonetic indicators were sometimes added to word signs in early writing systems, in order to specify the sign's pronunciation (Goody 1987, pp. 28-39). For a more detailed

discussion of the graphic sources of writing and of the development of the different writing systems, see: Goody (1987, Chapter 1).

14. In present day Israel, for example, diacritic signs indicating vowels are added to texts intended for children who are learning how to read and write.

15. For a description of the assumed process of the development of Greek alphabet from the Phoenician alphabet, see: Havelock (1982, pp. 12-13, 197-198).

16. It is important to note that not all scholars agree with Havelock's resolute position about the uniqueness of the Greek alphabet. Some scholars do not accept the radical distinction between the different types of writing, and assert that there are no clear breaks between logographic, syllabic and alphabetical systems. Other scholars indicate that despite the fact that the complexity of some types of writing retarded the development of a democratic literate culture, these types of writing, such as the Chinese script, still formed a basis for scientific, educational, and literary achievements (Goody 1987, pp. 62-4).

17. About the process of internalizing writing, which lasted hundreds, sometimes thousands years, see :Goody and Watt (1968).

18. See Thomas (1992, pp. 8-12) for the distinction between different applications of orality and literacy, and about the importance of distinguishing between writing skills, and the skills required for reading different types of texts written in different techniques (e.g. handwritten or printed).

19. Carruthers (1990) summarized by Olson (1994, pp. 61-64). See also: Thomas (1992, p. 23).

20. Other languages were acquired and utilized predominantly through writing during the same period in Europe and in Asia. These languages were usually gender-linked and were common to big literate populations sharing a common intellectual heritage, e.g. Rabbinical Hebrew, Classical Arabic, Sanskrit, and Classical Chinese (Ong 1982, pp. 114-15).

21. See Tufte (1983, 1990, 1997) for some examples of the impact that the visual display of a large quantity of data and information may have on scientific understanding and new discoveries.

22. The entrenchment of literacy in the social practice is illustrated by Luria's research, performed in the early the 1930s in South East Asia (Luria 1976, 1979). This research addresses the implications of both social practice, and the way

literacy is applied, on the structure of cognitive functions. For a discussion of Luria's research within the framework of the cultural-historical research program, see: Eilam (1994, 2003).

23. See Luria's research from the 1930s (Luria 1976, 1979).

### **Bibliography**

Bruner, J. (1990). Acts of meaning. Harvard University Press.

Carruthers, M. J. (1990). The book of memory: A study of memory in medieval culture. Cambridge University Press.

Clanchy, M. T. (1979). From memory to written record: England, 1066-1307. Harvard University Press.

Coleman, J. (1996). Public reading and the reading public in late medieval England and France. Cambridge University Press.

Eilam, G. (1994). Dualism versus materialism: Philosophical solutions to the mind - brain problem and the scientific research program of the human brain. Unpublished Ph.D. Thesis, (in Hebrew). Tel-Aviv University.

Eilam, G. (2003) The Philosophical Foundations of Aleksandr R. Luria's Neuropsychology. *Science In Context*, 16(4): 551-577.

Eisenstein. E. (1979). The printing press as an agent of change: Communication and cultural transformations in early-modern Europe. Cambridge University Press.

Eisenstein, E. L. (1983). The printing revolution in early modern Europe. Cambridge University Press.

Freudenthal, G. (1986). Science and social labour. (An introduction to a Marxist theory of science). Leaflet, (in Hebrew). Hamidrasha Le-mahashava Socialistit, Tel-Aviv.

Goody, J. (1977). The domestication of the savage mind. Cambridge University Press.

Goody, J. (1986). The logic of writing and the organization of society. Cambridge University Press.

Goody, J. (1987). The interface between the written and the oral. Cambridge University Press.

Goody, J., and Watt, I. (1968). The consequences of literacy. In Literacy in traditional societies. (ed. J. Goody), pp. 27-68. Cambridge University Press.

Havelock, E. A. (1963). Preface to Plato. Belknap Press of Harvard University Press.

Havelock, E. A. (1982). The literate revolution in Greece and its cultural consequences. Princeton University Press, New Jersey.

Havelock, E. A. (1986). The Muse learns to write: Reflections on orality and literacy from antiquity to the present. Yale University Press, New Haven.

Horton, R. (1993). Patterns of thought in Africa and the West: Essays on magic, religion and science, pp. 197-258. Cambridge University Press.

Lloyd, G. E. R. (1990). Demystifying mentalities. Cambridge University Press.

Luria, A. R. (1976). Cognitive development: Its cultural and social foundations, (trans. M. Lopez-Morillas and L. Solotaroff, ed. M. Cole). Harvard University Press.

Luria, A. R. (1979). Cultural differences in thinking. In The making of mind: A personal account of Soviet psychology, (ed. M. Cole, and S. Cole), pp. 58-80. Harvard University Press.

Olson, D. (1994). The world on paper: The conceptual and cognitive implications of writing and reading. Cambridge University Press.

Olson, D. (1995). Writing and the mind. In Sociocultural studies of mind, (ed. J. V. Wertch, P. Del Rio and A. Alvarez), pp. 95-123. Cambridge University Press.

Olson, D. R., and Torrance, N. (ed.) (1991). Literacy and orality. Cambridge University Press.

Ong, W. J. (1982). Orality and literacy: The technologizing of the word. Routledge, London and New York.

Shweder, R. A. (1990). Cultural psychology – What is it? In Cultural psychology: Essays in comparative human development, (ed. J. W. Stigler, R. A. Shweder, and G. Herdt), pp. 1-43. Cambridge University Press.

Thomas, R. (1992). Literacy and orality in Ancient Greek. Cambridge University Press.

Tufte, E. R. (1983). The visual display of quantitative information. Graphics Press, Cheshire, Connecticut.

Tufte, E. R. (1990). Envisioning information. Graphics Press, Cheshire, Connecticut.

Tufte, E. R. (1997). Visual explanations: Images and quantities, evidence and narrative. Graphics Press, Cheshire, Connecticut.

Vygotsky, L. (1986). Thought and language, (trans., and ed. A. Kozulin). MIT Press.

Vygotsky, L. S. (1997). Development of written language. In The collected works of L. S. Vygotsky: The history of the development of higher mental functions. Vol. 4. (trans. M. J. Hall, ed. R. W. Rieber), pp. 131-48. Plenum, New York.