# Being Mobile: Cognitive Multiplicity

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Being mobile has become crucial for the organization of our everyday work and life. New communications technologies provide the opportunity to organize activities more and more flexibly and effectively. However, this increasing ease of organizational activities has its special price: the traditional division between the different fields of activities – work and spare time, official engagement and privacy – and concomitant scheduling has started to break down. Mobile phones have often been considered devices of disturbance. At the same time, with the collapse of the traditional framework of everyday work and life, cellular phones are becoming indispensable devices to manage exactly these activities.

This apparent contradiction is easily dissolvable by making its roots and workings visible. According to the position I will side with in this paper, the means used to express and disseminate ideas are in close inter-relation with our cognitive capacities. The rapid adaptation of cellular phones indicates that some newly needed cognitive capacities are actually in our possession, ready to be exploited. I will here rely on Merlin Donald's cognitive-evolutionary work on the one hand, and the conclusions of the so-called Toronto School on the other. I would like to propose that aversions to new instruments are rooted in the habits and institutions created by devices of communications we had become accustomed to earlier. First, I will point to some main characteristics of mobile usage, from the specific perspective of the history of communications technologies. I will then analyze the changes indicated above from a cognitive evolutionary perspective. By way of conclusion, I will consider attempts at modelling cognition utilizing the conceptual means of communications technology.

## Using Mobiles – from the Historical Perspective of Communications Technologies

Cellular phones allow us to communicate instantly and comfortably across vast distances. They offer different discreet ways to contact colleagues

and friends. Mobile telephony provides the possibility of "perpetual presence"; we can be reached for whatever purpose and we can keep in touch with others regardless of their local conditions and engagement. This kind of freedom provides a feeling of security: one is always able to ask for help. On the other hand, there arise the difficulties caused by perpetual multitasking, in particular the switch between various physical, psychological, and computational conditions.[1]

The quick adaptation to and the spread of the cellular phone do not mirror these difficulties. Deliberating on the reasons for them, we encounter institutions that have developed during the age of literacy. Describing these institutions, I will first compare the communicational patterns of orality with that of literacy, and then go on to sketch some special characteristics of verbal expression.

In the age of primary orality the only possibility to maintain and preserve knowledge was communicating; that is, sustaining living language – *a storage language*, as Havelock puts it – which was "devised orally for the purpose of survival".[2] Such restriction required a special technology to weave ideas together, and to transmit awareness of the new facts of life. According to this special technology the mode of expression was additive, redundant, and the expressions and words used were very closely embedded in concrete situations. Intercourse was empathetic, participatory and agonistic.[3]

Literacy, due to the invention of alphabetical writing as a new kind of storage system, with its new kinds of limits,[4] created new habits in cognition compared to those of orality. Alphabetical writing reinforced the dominance of verbal expression and created a special one-sidedness in thinking. Verbal face-to-face communication is situational and multime-

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[1] Cf. Joshua S. Rubinstein, David E. Meyer and Jeffrey E. Evans, „Executive Control of Cognitive Processes in Task Switching", *Journal of Experimental Psychology - Human Perception and Performance*, vol. 27, no. 4 (2001). The conclusion of the study is that multitasking may actually take more time in the end, i.e. the outcome regarding efficiency is questionable. Let us note however that, considering the potentials of cognitive evolution and the plasticity of the human brain, the idea of an adaptation to new circumstances is not at all far-fetched.

[2] E. A. Havelock, *The Muse Learns to Write: Reflections on Orality and Literacy from Antiquity to the Present*, New Haven, CT: Yale University Press, 1986, p. 59.

[3] See Walter J. Ong, *Orality and Literacy: The Technologizing of the Word*, London: Methuen, 1982, pp. 36–46.

[4] The holistic perception of situations which is given in live intercourse, here has to be constructed with only the help of written words. The situation, gestures, and mimics have to be substituted by words.

dial, it does not have to be complete in its verbal aspects. Ever since verbally expressed knowledge became recordable in writing, a new way of composing ideas became necessary to compensate for the absence of the living situation. This necessity induced thinking to retire from everyday life: there emerged general subjects, abstract concepts detached from the human life-world, linearly structured arguments, and the linear notion of time.[5] The new means of expressing ideas made it possible to record general and comprehensive statements. The written text became a reliable and effective medium of preserving knowledge. But let us note that during the centuries of literacy, for a long time to come, the same did not hold for the dimension of pictorial representation.

Considering the representational frameworks of verbal versus pictorial expression, we can see that verbal representation demands a certain re-structuring of any phenomenon. In the case of pictorial representations, we can capture the whole as well as the details of an image to gain a holistic view of the given phenomenon. By contrast, words can represent a given phenomenon only re-structured: general features, circumstances, details, modalities, etc. have to be described as being ordered according to certain priorities. In live intercourse, the particular situation furnishes some components or parts of the information, but in the case of verbal expression, there is a certain degree of generality. Moreover, as William M. Ivins, Jr. put it: "All that words can deal with … are similarities. The simple reason for all this is that words, with the exception of proper names, relation words, and syntactical devices, are mere conventional symbols for similarities." Differences, Ivins suggests, are just as perceptible as similarities; however, words are not able to cope with them.[6]

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[5] See Ong, *Orality and Literacy*, esp. pp. 31–57, 103–112, and regarding linearity, p. 143; E. A. Havelock, *The Greek Concept of Justice: From its Shadow in Homer to Its Substance in Plato*, Cambridge, MA: Harvard University Press, 1978; E. A. Havelock, *The Muse Learns to Write*; and Peter Gendolla, "Punktzeit: Zur Erfahrung in der Informationsgesellschaft", in R. Wendorff (ed.), *Im Netz der Zeit*, Stuttgart: Hirzel, 1989.

[6] "But that these differences are not statable in words does not mean that they are ineffable, for they are clearly communicable in non-verbal ways" (William M. Ivins, Jr., *Prints and Visual Communication*, Cambridge, MA: Harvard University Press, 1953, p. 139). Ivins offers considerations about Western thinking as the outcome of a special technological inability: "I have a notion that much of the philosophical theory of the past can eventually be traced back to the fact that, whereas it was possible after a fashion to describe or define objects by the use of arbitrary and exactly repeatable word symbols addressed, mediately or immediately, to the ear, it was not possible to describe or define them by exactly repeatable images addressed to the eye" (*ibid.*, p. 62). Cf. also Merlin Donald's emphasis on differences between pictorial and verbal representation. This suggests that pic-

This structure of verbal representation creates a certain distance from the phenomena by adapting to the possibilities and limitations created by the use of words. Being able to represent something via words is tantamount to being able to think according to structured priorities. The use of words, i.e. verbal representation in a given situation, requires a special point of view, a special perspective, to use the terminology of Michael Tomasello.[7] Accordingly, in everyday practice intentions and perspectives will dominate verbal expression, as opposed to the holistic grasp of the world which is mirrored by pictorial representation.

This tendency became stronger due to the invention of external storage systems whose most effective version was phonetic writing. However, replacing the live situation with mute words required considerable cognitive and intellectual effort and caused difficulties. Epistemology as formed during the centuries of fully developed literacy is determined by the dualism of the knowing subject opposed to the object to be known. Moreover, the subject is considered to be an individual mind which can gain knowledge about the external world by its own cognitive efforts and/or private experiences.[8] Written texts and the concomitant activities created the basis for the conviction that it is systematic individual effort which can yield true value. Still, language, the main tool to express ideas, became an object of criticism because it often proved insufficient for the purpose of rational argumentation, exact description and regulation. Language was increasingly considered to be the means of rational thinking which is to be improved.

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torial representation might be more direct and less mediated than verbal representation. Donald differentiates between three kinds of visual symbolic innovation: pictorial, ideographic, and phonological. The main difference between them is that "writing generally does not depend upon perceptual isomorphisms and metaphors, whereas the pictorial modes does. The pictorial mode is primarily dependent upon visual norms and does not necessarily engage linguistic structures" (Merlin Donald, *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*, Cambridge, MA: Harvard University Press, 1991, p. 278), and words "must have been inherently general-purpose constructs from the start" (*ibid.*, p. 252).

[7] See Michael Tomasello, *The Cultural Origins of Human Cognition*, Cambridge, MA: Harvard University Press, 1999.

[8] Cf. Ernest Gellner: "there is atomistic individualism, which sees the individual building his cognitive world (and indeed any other) by orderly, step-by-step, individual effort, possibly maintaining cooperative relationships with others similarly engaged, but without this fundamentally affecting the nature of the enterprise, which in the end is solitary" (E. Gellner, *Language and Solitude: Wittgenstein, Malinowski and the Habsburg Dilemma*, Cambridge: Cambridge University Press, 1998, p. 181).

The 20th century was a "language-textured" age,[9] which is not really surprising. Since grasping reality and language are hardly separable as long as the main representational framework is provided by language, metaphysics and the philosophy of language overlapped. This overlap became very conspicuous by the 20th century. Surprisingly, or perhaps not so surprisingly, that century, in its later decades, came to labelled as the age of "secondary orality". During this period several inventions occurred in communications technology: photography, film, gramophone, radio were introduced into everyday life. As the details and elements of day-to-day activities became easily communicable, philosophical reflection, which hitherto had been bound up with texts, turned to phenomena not previously transmittable. With particular, everyday, details of life appearing on the horizon of philosophical meditations, unexpected anomalies occurred within the texture of traditional philosophy.

The development described above can be considered as a change in the framework of cognitive and social activities. Accordingly, at first, individuals communal and communicative, then atomistic and rational, and recently, re-integrated into communities, were the order of day. In what follows, I will now bring into the picture the cognitive evolutionary theory of Merlin Donald.

## Morals from Cognitive Evolution

Donald summed up the changes in cognitive skills during the last two millennia as a development leading to "a new human representational apparatus". As he writes: "The entire theoretic complex of visual symbolic devices, memory management skills, and related metalinguistic skills was completely novel."[10] The steps towards this new representational apparatus presuppose the existence of certain "external devices" which "allow an iterative, interactive thought process to operate repetitively on its own products; and, more importantly, the thought process itself can be largely externalized and institutionalized. Since external memory devices can provide a linkage to all preceding levels of cognitive evolu-

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[9] Cf. e.g. George F. Sefler, *Language and the World: A Methodological Synthesis Within the Writings of Martin Heidegger and Ludwig Wittgenstein*, Atlantic Highlands, NJ: Humanities Press, 1974, p. 195. See also Ernest Gellner's observations on the so-called linguistic turn, that is, how language became the focus of philosophy. (Ernest Gellner, "The Crisis in the Humanities and the Mainstream of Philosophy", in J. H. Plumb, ed., *Crisis in the Humanities*, Harmondworth, Middlesex: Penguin Books, 1964.)

[10] Donald, *op. cit.*, p. 358.

tion, they also serve in the construction of an integrative field, where the products of various types of thinking can be juxtaposed and combined."[11]

The development of external memory[12] was a long-term evolution of representational skills which were in close relation to social intelligence.[13] Donald emphasizes that "it is clear that language was the final step, and that presymbolic forms of social intelligence must have been its foundation".[14] Donald distinguishes three main transitions in human cognitive evolution: a shift from episodic to mimetic, then to mythical, and finally to theoretical culture. Each of these changes means the emergence of a new kind of representation as well as an increasing load on biological memory.[15] Episodic memory supplemented with mimetic representation created community with special habits and organization, conferring a sense of identity on the members of the community. Verbal representation built upon the mimetic one was the first such stage when mythical constructions playing the role of orienting world-views and structures emerged. The transition from mythical to theoretical culture presupposes the existence of an effective external storage system. "[T]he first two evolutionary transitions would have greatly increased the load on biological memory. However, the final step in this tremendous cognitive expansion might

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[11] *Ibid.*

[12] I would like to emphasize that verbal and pictorial representation from a cognitive-evolutionary point of view seem to bear different functions. Although both of them have special importance in the maintenance of social cohesion, it was pictorial representation that first provided the opportunity to bridge the gap between, on the one hand, internally processed knowledge and experience, and, on the other, a kind of external storage system. Donald supposes that pictorial representations emerged in the framework of oral-mythical culture and he considers pictorial representation as the first step towards an external storage system. As he puts it: „the first pictorial images themselves were also external representations. They existed outside of the individual, rather than in visual memory. Therefore a technological bridge was under construction that would eventually connect the biological individual with an external memory architecture" (Donald, *op. cit.*, p. 284).

[13] Regarding social intelligence Donald relies on the investigations of Robin I. M. Dunbar. See Donald, *op. cit.*, pp. 10 and 137.

[14] Donald, *op. cit.*, p. 137.

[15] „Human memory had, from its inception, expanded the range of primate memory. The earliest form of hominid culture, mimetic culture, depended on an expansion in the self-representational systems of the brain and created the initial base for semantic memory storage, which consisted initially of representational action scenarios reflected in mime, gesture, craft, and skill. With the evolution of speech and narrative ability, there were even greater increases in the load on biological memory, adding not only the storage networks for phonological rules and the lexicon in its entirety but also a very large store of narrative conceptual knowledge", *ibid.*, p. 319.

have *reduced* the load on some aspects of biological memory, by gradually shifting many storage tasks onto the newly developed E[xternal]S[ymbolic] S[torage System]. At the very least, the existence of the ESS must have forced a great change in priorities and memory organization."[16]

Donald's reconstruction of cognitive evolution and the argumentation for it clearly reveal

> that the evolution of cognitive structure *at the modular level* might have continued well beyond the point at which physical evolution had stopped. Cultures restructure the mind, not only in terms of its specific contents, which are obviously culture-bound, but also in terms of its fundamental neurological organization. Whether the organization is vested in a parallel set of specific brain adaptations or not (and obviously at times it is not), the brain sets fewer constraints than formerly thought on the process of cognitive evolution. Culture can literally reconfigure the use patterns of the brain; and it is probably a safe inference from our current knowledge of cerebral plasticity that those patterns of use determine much about how the exceptionally plastic human central nervous system is ultimately organized, in terms of cognitive structure.[17]

Donald realizes the difficulties regarding the cognitive function of external memory. Reckoning with the fact that "our view of humanity is evolving alongside the machinery of our minds",[18] he tries to make its function clear with the help of metaphors. He uses the metaphor of computer R[andom]A[ccess]M[emory] which is supplemented by an external memory for the purpose of expanding the computer's capabilities. Donald stresses that though the capability of RAM can be increased, it has physical limits just as in the case of biological memory. The other metaphor he uses is also from the realm of computer science. As he puts it: "External memory is best defined in functional terms: it is the *exact* external analog of internal, or biological memory, namely, a storage and retrieval system that allows humans to accumulate experience and knowledge. We do not possess any ready theoretical frameworks in psychology from which to view external memory. Fortunately, there is an excellent point of comparison in the field of computing science: networks."[19] Networks can be seen as the society of computers. Connectedness provides the possibility

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[16] *Ibid.* p. 320.

[17] *Ibid.* p. 14.

[18] *Ibid.* p. 382.

[19] *Ibid.* p. 309.

that computers do not have to retain the same "cognitive"/computational abilities. They can use "the resources of the system … shared, and the system functions as a unit larger than any of its individual components."[20] Of course the emergence a functioning network presupposes definite structural changes as well. Being equipped with an interface is necessary for the use of external memory and external capabilities. However, "once plugged in [humans'] skills are determined by both the network and their own biological inheritance".[21]

The cognitive evolutionary point of view sheds light on the modifications of cognitive structure. It provides solid background for the cultural-historical observations of the scholar. The development of social organization and regulation and, last but not least, the history of philosophy can be easily considered to be attempts at solving difficulties raised by the limitations of the dominant representational framework of the time.[22]

## Modelling Cognition

Attempts to describe human understanding have deep roots in Western metaphysics and epistemology. Recent investigations in different fields like psychology, artificial intelligence, neurobiology and cognitive science reveal that the traditional metaphysical model of the human mind is mistaken. Let us note that contemporary scientific research aiming at modelling cognition merits philosophical consideration not only in its achievements, but also in its failures. The consequences and force of the traditional notion of dualism − *res extensa* and *res cogitans* − and the limitations of the literate and rational mind can be highlighted by reflecting upon insufficiencies emerging in the framework of cognitive science.

One main branch of cognitive science is classical cognitivism, to use the term by Andy Clark.[23] Classical cognitivism considers the mind to be a calculating and symbol-manipulating machinery, i.e. it approaches the mind in the spirit of Cartesian dualism and focusses on abilities which

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[20] *Ibid.*, p. 310.

[21] *Ibid.*, p. 311.

[22] Think of the dominance of the general over the particular due to the dominance of verbal expression. Think, also, of the dilemma of the precision vs. richness of an expression, reflecting the role of tacit knowledge in language as well as in scientific rationality. On these issues see Zsuzsanna Kondor, „Changing Media: A Perennial Challenge for Philosophy", in Kristóf Nyíri (ed.), *Mobile Learning: Essays on Philosophy, Psychology and Education*, Vienna: Passagen Verlag, 2003, pp. 77 f.

[23] Andy Clark, *Microcognition: Philosophy, Cognitive Science, and Parallel Distributed Processing*, Cambridge, MA: MIT Press, 1989, ch. 1.1.1.

are amenable through language. The other main branch of cognitive science is connectionism which is built on the model of the neural network of the brain. This is clearly a useful approach, but the question of choice regarding the necessary input remains rather artificial, since connectionist models can best work in the framework of restricted, well-designed, micro-worlds.

The tendency to focus on only restricted areas of the external world is an obvious consequence of the dualistic approach. A similar, earlier consequence was the Cartesian ego, isolated, and supposed to follow its systematically constructed set of rules. The dualism of the knowing subject and the object to be known suggests that the connection between the two poles is one-sided. The subject wants to gain information about the world as it is in order to gain true knowledge and to find general rules of nature. Moreover, this subject is considered to be individual, general in its functioning, and independent of its circumstances. Accordingly, modelling cognition easily tends to be restricted to a special problem, and of course cognition is easily identifiable with symbol-manipulation driven by certain algorithms, i.e. a kind of calculation. Andy Clark points out some other difficulties arising from the traditional approach. As he puts it:

> In fact, the methodology of rational reconstruction can mislead in several crucial ways. First, the immediate replacement of real physical quantities with symbolic items can obscure opportunistic strategies that involve acting upon or otherwise exploiting the real world as an aid to problem solving. (Recall the 007 principle.) Second, conceptualizing the problem in terms of an input-output mapping likewise invites a view of cognition as *passive computation*. That is, it depicts the output phase as the rehearsal of problem solution.[24]

Considering cognition as symbol-manipulation is only apparently obvious. Language is the main forum of formulating and disseminating ideas. Due to the institutions developed during the high tide of literacy, and, in particular, due to the philosophical delusions arising from the former, language is considered to be insufficient for the purpose of rational, i.e. clear-cut and exact thinking: additional means of logic seem to be necessary in order to improve the workings of language. From the perspective of writing – which is actually a manipulation of arbitrary signs while

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[24] Andrew J. Clark, *Being There: Putting Brain, Body, and World Together Again*, Cambridge, MA: MIT Press, 1997, p. 81. Regarding the 007 principle see *ibid.*, p. 46.

serving the technical means of rationality[25] – and that of logic, symbol-manipulation seems to be the only effective way by which to describe cognition. However, the results of developmental psychology and evolutionary surveys suggest quite a different concept of cognition.

Andy Clark calls attention to the fact that the gradually evolved structure of different biological and cognitive functions is hardly understandable from a teleological perspective. He further refers to certain achievements of developmental psychology, and, finally, to cases which reveal how the external world provides an orientational potential. With the help of this array of references Clark shows that cognition is not isolated from its environment and is indeed biologically, socially, and culturally embedded. Clark's famous concept of the *extended mind* is built upon the expedient scaffolding which can be found in the functioning of the simplest as well as the most complicated biological organisms. "We build 'designer environments' in which human reason is able to far outstrip the computational ambit of the unaugmented biological brain. Advanced reason is thus above all the realm of the *scaffolded* brain: the brain in its bodily context, interacting with a complex world of physical and social structures."[26]

Although Clark refers to Donald's theory,[27] he does not exploit its argumentative potential. The reconstruction of the evolution of representational abilities is, I believe, convincing enough not to question the importance of external structures and institutions.[28] Modifications in the way humans handle and grasp their world as it is revealed from the perspec-

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[25] Cf. István Hajnal's views on literacy: "Things, that had earlier happened instinctively in the human being's inner and outer life, started to turn conscious with the appearance of literacy. This sphere of life becomes objectified and abstracted; the human being projects this sphere in front of himself, and examines it consciously and from the outside. There arises the possibility for methodical purposefulness, for the conscious handling of concepts and for combinational and complicated working." (From the posthumous collection of essays by István Hajnal, *Technika, művelődés: Tanulmányok* ["Technology, Education: Essays], Budapest: História, 1993, p. 18, quoted in Zsuzsanna Kondor, „Objectivational Process or Spiritual Involvement?", in Peter Fleissner and Kristóf Nyíri (eds.), *Philosophy of Culture and the Politics of Electronic Networking*, vol. 1: *Austria and Hungary: Historical Roots and Present Developments*, Innsbruck: Studienverlag / Budapest: Áron Kiadó, 1999, p. 47.)

[26] Clark, *Being There*, p. 191.

[27] *Ibid.*, pp. 206 and 210. See also Andy Clark, *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence*, Oxford: Oxford University Press, 2003, p. 79.

[28] Consider e.g. the following passage: „The regions of the brain that are most characteristically human – especially the great expanses of the frontal and anterior temporal lobes – are likely to be the most malleable neurological structures in nature, taking on many forms. They are configurable and reconfigurable to a remarkable degree, because their recourses are allocated on a *competitive* basis to the many input paths impinging on them.

tive of communications technologies suggest accepting external institutions as important organizers of cognition.

## Conclusion

As Clark points out: "Mind cannot usefully be extended willy-nilly into the world. … But the overall picture is of a rather special kind of user/artifact relationship – one in which the artifact is reliably present, frequently used, personally 'tailored', and deeply trusted."[29]

Just like in the case of mobile phones. Indeed, cellular phones are conducive to the above conditions. Judging by the widespread use of mobile telephony, one can hardly question that it is becoming an important part of our everyday life. The use of mobile phones caused perceptible modifications in the structure of everyday activities as it became an essential element of the institutional framework of communication. These modifications and the quick adaptation reveal ancient capacities which were concealed by the institutions of literacy. Currently we create external structures which require exactly those patterns of behaviour which were buried by the institutions that emerged as answers to the demands of literacy. Shifting the emphasis let me quote Kristóf Nyíri: a "mobile phone is … a machine which corresponds to deep, primordial human communicational urges".[30]

Finally, I would like to focus briefly on the work of István Hajnal, the Hungarian scholar whose basic contribution was a theory of objectification. Hajnal points out that humans tend to create a structure of "scaffolding", both material and institutional. This is the process of objectification; it causes experiences, emotions and skills to become visible, manifest. To make them manifest means to detach them from the natural ground they originate from. Hence they can serve as a support for, as well as a limitation of, our activities. He claims that from the perspective of the social sciences, the process of objectification renders the general structure of a community or society and the particularities of its every-

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In effect, *the physical structure of mind has become less and less fixed as neocortical evolution has progressed.* This leaves room not only for the kinds of radical reconfiguration introduced by literacy but also (presumably) for larger differences between the brains of individual human beings than are possible in primates. It also leaves room for further cognitive restructuring, possibly in fundamental ways" (Donald, *op. cit.*, pp. 380 f.).

[29] Clark, *Being There*, p. 217.

[30] Kristóf Nyíri, "Introduction: From the Information Society to Knowledge Communities", in Kristóf Nyíri (ed.), *Mobile Communication: Essays on Cognition and Community*, Vienna: Passagen Verlag, 2003, p. 12.

day life manageable in a single coherent theoretical framework.

Hajnal's concept of literacy defines a special culture which becomes possible due to the technical-practical invention of alphabetical writing, and leads to ways of thinking and cognition never before possible. The invention of a new recording system of alphabetical writing has created the demand for novel ways of thinking and, accordingly, new cognitive skills. The mere technical means of writing was able to affect human intelligence so deeply simply because it was a special kind of objectification, a kind of material support for the thought process.

Clark's emphasis is quite similar even though he looks at the matter from a very different point of view. He refers to an important distinction in Donald's theory. Donald differentiates mythic from theoretic culture and, as Clark stresses, the necessary conditions of the latter were not simply symbolic invention, but "[it was] the *process* of externally encoded cognitive change and discovery".[31] Clark speaks about "objectification" with regard to language. As he puts it: "The cultural tool of public language gives us not just labels but whole, structured, recursive *systems* for the encoding, objectification, and communication of thoughts and ideas."[32]

If one considers Hajnal's comprehensive theory (especially his concept of literacy), Donald's reconstruction of cognitive evolution, and the Toronto School's findings as to the impact of various technological means of communication on everyday activity, as well as on intellectual disposition and cognitive capacity, Clark's theory is not really ground-breaking. The three former theories attempt to clarify the close inter-relatedness of the individual with its environment, while Clark takes this idea further by focusing on the fact that the individual cannot be detached from its (technical-technological, institutional, and cultural) environment. The concept of the extended mind is in harmony with some main tendencies occurring in twentieth-century philosophy (recall Heidegger, recall Wittgenstein) and it has scientific support as well. This is clearly a significant step towards a holistic grasp of cognition, as opposed to a dualistic one. Epistemology seems well on its way to leave behind the bogus idea of the immanence of the individual mind.

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[31] Clark, *Natural-Born Cyborgs*, p. 79, quoting Donald, *Origins of the Modern Mind*, p. 343.
[32] *Ibid.*, p. 72.