Media and Cognition:
The Relationship between Thought Structures and Media Structures

Sébastien de la Fosse
Independent Researcher

Abstract: While throughout history, knowledge and information have been mostly bound in language and text, new twenty-first-century media increasingly tend to break with this tradition of linear sequentiality. This paper will present an account of how this development may be explained by a relationship between the use of digital technologies on the one hand, and the (human) user’s cognitive processes on the other. This will be done by, first, outlining two existing conceptions of human cognition and, subsequently, by confronting these with observations in the field of philosophy of media, most prominently the position of Marshall McLuhan.

Key words: cognitive philosophy, Marshall McLuhan, philosophy of media, technological media

1. Introduction

The new media of the twenty-first century have brought about major changes in the manner we human beings experience our surroundings. This is not merely a result of the new capacities such technologies possess, but also—and mainly—of the content structure inherent to these media, i.e., the manner in which the information contained is structured, presented to the user, and experienced by the user. This new appearance of information may impact the relationship between the use of these technologies on the one hand, and the (human) user’s cognitive processes on the other.

In this paper, I shall present an argument for such an interrelationship between human experience and cognition, and how these two factors may influence one another. To this end, two existing conceptions of human cognition will be presented—“language of thought” and “mental models,” respectively—and these
will subsequently be applied to the use and experience of (new) technological media.

Therefore, the main research goal of this study is to investigate to what extent an interrelationship can be identified between (twenty-first-century) media technologies on the one hand, and human cognition in terms of language of thought and mental models on the other hand.

In order to address this issue, this text consists of two main parts. The first of these serves to introduce an account of cognition based on Jerry Fodor’s “language of thought” hypothesis on the one hand and Philip Johnson-Laird’s “mental model” theory on the other, focusing on both conflict and compatibility between these theories.

The second part of this paper further elaborates on philosophy of technology and media. First, a connection is drawn between cognition and media, through the use of Marshall McLuhan’s philosophy of media. This connection is then further elaborated on through discussion of two applied accounts of how cognition and media interact, specifically Jos de Mul’s position on cognitive overload of the human technology user, and Valerie Frissen’s concept of “digital tinkering.”

In the closing section of this paper, conclusions are drawn from this investigation on the influences media technologies may have on human cognition, as an answer to the main research problem.

2. Accounts of Cognition

There are multiple theories for explaining the processes of human thought. For the argument presented in this paper, I shall address two such positions, specifically Jerry Fodor’s “language of thought” hypothesis and Philip Johnson-Laird’s “mental model” theory. Subsequently, I shall argue that these two accounts are compatible, and together may constitute a more complete theory of human thought.

In order to do so, the two aforementioned theories first need to be given an introduction in greater detail. For each of these respective positions, I shall point out that they share certain assumptions concerning human cognition, specifically that the structure of human thought is a representational system of (external) reality, and that these cognitive processes require both a syntax and a semantics in order to function. Subsequently, a conjoined theory of cognition built from these two original theories will be presented and advocated.
2.1 Language of Thought

What is meant by the term “language of thought” is the account on human cognition presented in Fodor (1975), by American philosopher of cognition Jerry Fodor. In the current philosophical debate on human cognition, this position is one of the more prominent ones—if not the single dominant position. Central to this account is the argument that human thought is structured (and limited) in a way similar to language, which entails that human thought processes function similarly enough to a language they they may be treated as one.

This reasoning is based on the observation that human thought is not exclusively causally related to the (physical) external environment, but also possesses an internal causal structure of its own. Regarding this internal structure, Fodor remarks:

1. The only psychological models of cognitive processes that seem even remotely plausible represent such processes as computational.
2. Computation presupposes a medium of computation: a representational system. (Fodor 1975: 27)

In the first of these two statements, Fodor argues that the most plausible explanation of such internal dynamics of thought processes is based on the ability of “computation,” meaning the (inherent) ability to draw inferences from thought content in order to create new thought content. In this sense, this computation ability is a cognitive syntax.

Additionally, Fodor’s second statement points out that such a syntax is only able to function when it is embedded in a “representational system,” meaning a frame of reference that relates thought content to corresponding elements in the environment external to thought, i.e., physical reality. This entails that (physical) reality is represented in human thought by terms that may then be processed by cognitive syntax. In this way, such a system of representation adds meaning to the syntactical processes of thought, and may thus be regarded as a semantics.

Therefore, Fodor argues that human thought must be structured in such a way that it has an internal computational structure, in which (syntactical) operations may be performed on mental content that (semantically) represents external reality. This coincides with two key properties of language, which leads Fodor to the conclusion that human thought functions in a way greatly similar to language:
It will have occurred to the reader that what I am proposing to do is resurrect the traditional notion that there is a ‘language of thought’ and that characterizing that language is a good part of what a theory of the mind needs to do. (Fodor 1975: 33)

It is important to note, however, that Fodor does not consider the structure of thought to be an actual (natural) language, but rather that thought processes merely operate approximately in the same manner as languages do. What this implies is that, according to Fodor, thought processes possess syntax and semantics just like (natural) languages, but unlike these languages, thought processes do not possess actual verbal grammar or vocabulary, but rather purely cognitive equivalents. Still, Fodor concludes that this functional similarity is sufficient for human thought to be approached in the same manner as a language on a conceptual level. Fodor acknowledges that this language of thought (which he dubs “Mentalese”) is a non-natural, innate, private language, and as such of an entirely different category than natural languages such as English, French or Dutch, which are learned rather than innate, and are shared rather than private.

Additionally, Fodor does not forward the claim that thought processes conceived in this way are a formal, deductive system of logic. His reasoning for this, though, is his conscious focus on the conceptual aspects of his “language of thought” hypothesis, and that he will leave the specific applications and empirical support of his theory to the field of empirical psychology.¹

What can be seen from this brief overview of Fodor’s “language of thought” hypothesis is that it conceives of human cognition as a representational system, i.e., that it represents external reality within an internal structure, and that it explains the functioning of human cognition through the ascription of syntax and semantics in a manner similar to how natural language functions. It should also be noted that in Fodor’s account, the syntax of this “language of thought” follows similar computational patterns as a linguistic grammar system.

2.2 Mental Models

A theory of human cognition that is less prominent than the aforementioned “language of thought” hypothesis is the “mental model” theory. While the central elements of this account were originally developed by British psychologist Kenneth Craik (Craik 1943), and thus predate Fodor’s “language of thought,” it only gained greater attention after American psychologist Philip Johnson-Laird expanded on Craik’s work and presented it as an alternative to Fodor’s “language of thought” hypothesis, with the name “mental models” theory (Johnson-Laird 1983).²
The earliest statement that may be interpreted as a definition of a “mental model” conception of human cognition can be found in a posthumous publication of British mathematician and philosopher Frank Ramsey: “[Belief is] a map of neighbouring space by which we steer” (Ramsey 1931: 238). What is meant by this statement is the thought that human beliefs are a representation or model of spatial reality (or in Descartes’s terms: *res extensa*), on which our decisions are based.

This line of thought is further developed by Craik, who attempts to explain the relation between human thought and external reality. Initially, Craik’s position regarding the functioning of thought processes as representations of external reality matches Fodor’s later views (Craik 1943: 50–51). However, Craik also argues that thought content in this representational process should be conceived as models of external reality, where he defines the term “model” as follows:

> By a model we thus mean any physical or chemical system which has a similar relation-structure to that of the process it imitates. By ‘relation-structure’ I do not mean some obscure non-physical entity which attends the model, but the fact that it is a physical working model which works in the same way as the process it parallels, in the aspects under consideration at any moment. (Craik 1943: 51)

Therefore, a (mental) model is a representation of external reality that adopts the relation-structure of external reality, and transposes this into the structure of internal cognitive (thought) processes. More recent interpretations of Craik’s work juxtapose this analogue relation-structure against Fodor’s linguistic syntactical structure of thought. What is argued from these comparisons is that, as a relation-structure, Fodor’s conception of thought is an abstraction from external reality—and therefore artificial or digital—rather than an analogue model of external reality that reflects the relation-structure in the outside world, as is the case in Craik’s account.

Johnson-Laird (1983) not only readdressed Craik’s thoughts on cognition and presented these as an alternative to Fodor’s cognitive psychology, but he also expanded on Craik’s conception of human thought processes in an attempt to explain both conscious thoughts and subconscious cognitive processes, a project that has been named “mental model theory.” This theory is based on a distinction between “explicit” and “implicit” inferences, the former of which may be incorporated in linguistic structures, while the latter cannot (and can thus only be incorporated in an analogue relation-structure that models external reality).
(Johnson-Laird 1983: 127–33). Furthermore, Johnson-Laird argues that explicit inferences are constructed from (multitudes of) implicit inferences, which leads him to conclude that, within human cognition, analogue relation-structures precede digital relation-structures, and therefore that any mental logic cannot be the primary structure of thought.

This short overview of the “mental model” theory and its precursors emphasizes that this theory is also founded on the representational stance; the position that internal human cognition represents (elements of) external reality in its internal processes. In addition, Johnson-Laird’s theory also incorporates a syntax, in the form of the account of explicit and implicit inferences, and it possesses a semantic system in its analogue model-structure.

2.3 A Dual Theory of Cognition

Based on the above reviews of the “language of thought” and “mental models” accounts, an account of human cognition may be sketched that is a combination of these two. This combined account may then serve as the basis for confronting cognition with theories of media.

In order to do so, however, what needs to be shown first is that the “language of thought” and “mental model” theories are compatible. This requires that they share sufficient premises and do not conflict on any essential points.

A core premise that is indeed shared between the two accounts of cognition is the representational stance—the position that internal mental processes consist of representations of external reality. Additionally, the two theories share the position that cognition consists of both these actual representations (or semantics), and the ability to process or manipulate these (or syntax). These similarities offer sufficient grounds to investigate complementarity further.

The position I choose is the possibility that “language of thought” and “mental models” can co-exist within human cognition, and that they may jointly function as a two-pronged foundation for human thought. What this position implies for how our thought processes work is that human thinkers all possess these two representational methods for making sense of the world and processing thoughts. While some people may develop a strong predilection towards one or the other, and others may utilize both methods of thought more or less equally (and perhaps interchangeably)—giving rise to a great degree of mental idiosyncracies—ultimately, both talents are required for full mental functioning.

I offer two prime arguments supporting such co-existence. The first of these consists of the observation that, on the one hand, Fodor’s “language of thought”
presents a syntax of thought processes without elaborating further on the foundation of a semantics of thought (other than that it is innate), while on the other hand Craik’s model structure of thought provides a semantics of thought without elaborating further on the specifics of a syntax of thought processes. While Johnson-Laird does make an attempt to explicate syntax (or “explicit inference”) as a construction of various non-linguistic semantical elements (or “implicit inferences”), he does not provide any insight into how exactly such construction would work, nor of the specific workings of implicit inference. Combining these two approaches towards the structure of human thought into a single account—where an individual may conceive any thought with either (linguistic) syntax or (analogue) semantics as a mental starting point—would allow the explanatory strengths of the two respective theories to compensate for (and perhaps even eliminate) their respective explanatory weaknesses. This has the added benefit of defusing the as yet unresolved (and perhaps unresolvable) debate in cognitive philosophy of whether syntax precedes semantics, or vice versa.

The second argument supporting the complementarity of “language of thought” and “mental models” can be found in the extent to which it may satisfactorily explain human thought processes. It is noteworthy that both “language of thought” and “mental models” have significant limitations in this respect. Fodor’s “language of thought” hypothesis provides a syntax that functions like linguistic grammar, and that is thus primarily linear and sequential as a result. On the one hand, this provides an explanation for the human ability for abstract, formal (deductive) reasoning, but not for the ability to process visual, multi-dimensional (often spatial) information, such as images and pictures, as well as issues of vagueness and (visual) resemblance. By contrast, Craik’s and Johnson-Laird’s theories of mental modelling show the inverse of this explanatory problem: because model-based representation is based on copying visual and spatial structures in external reality, mental models offer an explanation for the human ability to process visual information, and to reach conclusions without explicit inferences (which is often called “intuition” in folk psychology). Conversely, however, “mental model” theory has difficulty in explaining linear, sequential structures of thought that are not spatially mirrored in external reality, including abstract concepts. A two-pronged approach of human thought processes based on both of these accounts, however, may explain not only each of these two sets of mental abilities (sequential and spatial) separately, but also accounts for a wide variety of proficiency in these two different sets of thought processing skills between individual persons. As such, the sum is even slightly greater than its parts.
However, one could perceive three obstacles to an integration of the two theories of “language of thought” and “mental models.” First, the two positions disagree strongly in their conceptions of how thought processes are structured. Additionally, followers of both theories have argued that there is an incompatibility between these two theories. And finally, both theories claim empirical evidence in the cognitive and behavioural sciences exclusively supports their respective position. I shall deal with each of these challenges in order.

The issue of “language of thought” and “mental models” differing strongly in their accounts of the structure of thought has already been addressed by presenting the combination of both theories as a two-pronged approach that treats the linear, sequential account of thought (adapted from “language of thought”) and the visual, spatial account of thought (adapted from “mental models”) as two separate mental skill sets possessed by every individual. As this position does not conceive of a single account of the structure of human thought, the differences between the respective constituting theories do not challenge the combination theory.

Regarding the claim of incompatibility expressed by proponents of both respective cognitive theories, it should be noted that these claims mostly invoke Occam’s razor, arguing that the simpler theory with the greater explanatory power tends to be the correct one. However, since the conjoined theory of dual thought structure presented here has a greater explanatory power of human thought processes than either Fodor’s “language of thought” hypothesis or Johnson-Laird’s “mental model” theory separately, this may easily compensate for its relative lack of simplicity.

Finally, on the issue of empirical evidence, the fact that both the “language of thought” and the “mental model” account are supported by empirical studies actually strengthens the position of a theory that is a conjunction of these two accounts. Furthermore, the combination theory of cognition can also claim its own support from empirical research in cognitive and behavioural science. However, since conclusive evidence proving or disproving any position in this debate has yet to be presented, it is perhaps best to refrain from drawing conclusions from current data.

As has been shown, Fodor’s “language of thought” hypothesis and Craik’s and Johnson-Laird’s “mental model” theories may be combined into a two-pronged theory of thought structures that has greater explanatory strength than either of its two constituting elements, and may additionally be applied to explain cognitive differences in human thought. The remainder of this paper will be an application
of the latter, through confronting this account of cognition with various accounts of the cognitive impact of technological media.

3. Technology and Media

Cognition and media (technology) have a complex relationship. In order to examine media technologies’ influence on the account of human cognitive structures presented in the preceding section, first an attempt must be made to elaborate on this relationship in more detail. This will be done through a review of Marshall McLuhan’s thoughts on media and subsequently relating these to the aforementioned dual theory of human cognitive structure. Additionally, a similar comparison will be made in a review of more recent observations on twenty-first-century media technologies by Jos de Mul and Valerie Frissen. It will be shown not only that these more recent accounts are in line with McLuhan’s mid-twentieth-century media theories, but also that they share similar views on cognition in terms of linguistic versus model-based structures.

3.1 “The Medium Is the Message”

Canadian philosopher Marshall McLuhan introduces a central element to his position on media through the famous phrase “the medium is the message” (McLuhan 1964). By this, McLuhan refers to a classic distinction that exists in communication science, between the “message,” or content of any communication on the one hand, and the “medium,” or the means through which the message is transferred from sender to recipient on the other hand (Berlo 1960).

This statement “the medium is the message” expresses McLuhan’s resistance to this sharp contrast, as he points out that, rather, every medium is itself a message. Furthermore, he also argues that every technology is a medium, even if it does not contain an explicit or intended message; after all, it is itself the message. As an example, McLuhan presents the lightbulb as a medium that is its own message (McLuhan 1964: 8): while the light emitted by the lightbulb does not contain any explicit message, the very fact that this light is present does impact our thoughts and acts. More specifically, the light (as a message without content) realizes a well-lit environment independently from the time of day, and this environment may in turn become a medium for various (human) activities and messages.

McLuhan illustrates this elusive nature of the distinction between medium and message with a second example: that of written text. This is accompanied by a remarkable statement that touches on philosophy of cognition:
The content of writing is speech, just as the written word is the content of print, and print is the content of the telegraph. If it is asked, ‘What is the content of speech?’, it is necessary to say, ‘It is an actual process of thought, which is in itself nonverbal.’ (McLuhan 1964: 8)

This may lead one to conclude that, as thought processes are non-linguistic in McLuhan’s opinion, McLuhan’s position is incompatible with Fodor’s “language of thought” hypothesis, especially since McLuhan appears to claim that words are the medium for thoughts. However, such a conclusion is incorrect, as Fodor claims that thought processes have a structure that is similar to the structure of language, and not that thinking actually is a language. According to Fodor, a thought does not consist of words, but rather of representations of (external) reality that fulfil the function of words in the structure of the thought process. This entails that Fodor’s and McLuhan’s positions on the structure of thought are not incompatible in the manner suggested.

Furthermore, the quoted statement is not even primarily meant as a direct statement on human cognition; rather, McLuhan uses it to argue the more indirect point that every medium has the property of determining and controlling the scale and shape of human associations and behaviour to some extent (McLuhan 1964: 9). For this reason, it is not so much the sender’s message contained in a medium that influences the recipient, but rather the nature or structure of the medium itself. As such, the manner in which the recipient is influenced is not so much in his or her thought content, but rather in his or her thought structure.

In this influencing of thought structure by medium structures, McLuhan discerns a development away from a linear structure of thought, and towards a more multidimensional structure. The first major revolution he identifies coincides with the introduction of electricity in nineteenth-century society, which was characterized by its high presence of mechanization:

[M]echanization is achieved by fragmentation of any process and by putting the fragmented parts in a series. Yet, . . . . [t]hat one thing follows another accounts for nothing. Nothing accounts from following, except change. So the greatest of reversals occurred with electricity, that ended sequence by making things instant. (McLuhan 1964: 11–12)

The integration of electricity-based technologies into society has thus brought about a change in the thought patterns of individuals living in this society: no longer are thought processes primarily structured along (mechanical) sequential lines, but rather they increasingly function through a structure of immediacy and
parallel simultaneity (similar to the workings of electrical circuits). According to McLuhan, this explains that the medium of film is less linear than the medium of books, as the narrative of the latter is fully structured in a linear sequence of descriptive text, while the narrative of the former is a series of images, each of which separately presents a multitude of simultaneous descriptions (McLuhan 1964: 12).

What McLuhan describes is the gradual rise of a new set of technologies that not only has a more spatial, multi-dimensional structure than existing technologies with a primarily linear and sequential structure, but that also gradually replaces these older technologies. Due to the inherent interrelatedness McLuhan identified between media and thought processes, it can also be argued that this technological shift—away from linear, sequential structures and towards immediate, spatial ones—is accompanied by a similar cognitive shift in human thought patterns. Thus, McLuhan’s thesis that the introduction of new media vis-à-vis existing media (e.g., the introduction of movies vis-à-vis books) requires human users to experience media contents (“messages”) less sequentially and more simultaneously, may be reformulated (in terms of the position of the theory of a dual human cognitive structure outlined in the first part of this paper) as the claim that these new media require human users to not only apply their cognitive faculties in an exclusively sequential or linguistic manner, but rather to also be able to acquire a simultaneous overview of a multitude of data at a single glance.

These observations by McLuhan date back to the middle of the twentieth century, and actually predate both Fodor’s “language of thought” hypothesis and Johnson-Laird’s reintroduction of “mental model” theory as an alternative to Fodor. Since that era, however, there have been all new technological developments that have been introduced into society’s day-to-day functioning, and that have delivered their own structure as a message to this society. The rise of twenty-first-century media technologies and their possible impact on human cognition will be discussed in the following sections, through a review of research by more recent philosophers of media.

3.2 Information Overload and Multitasking

An approach closer to the present than McLuhan’s position can be seen in the observations by Dutch philosopher Jos de Mul, who explores the role information (management) has in the lives of twenty-first-century humans (De Mul 2008). His main emphasis is on the topic of mental overload and overstimulation by such information, as well as the existing concerns for possible negative influences by media technologies (regardless of their content) on human mental health. This per-
Revised danger to mental health inherent in the new media clearly reflects McLuhan’s thesis that the nature of the medium is more important than its contents, and in this respect the debate to which De Mul contributes is a continuation of McLuhan’s observations.

The connection between attention disorders and prolonged exposure to the intensity of twenty-first-century media that De Mul discusses, may also be a parallel to McLuhan, specifically to the aforementioned shift from sequential to parallel thought processes as a result of the introduction of electronic (visual media) technologies. This alleged influence media technologies may have on human cognition is even referred to by De Mul as one of the accusations against present-day intensive media use:

The shift from sequential mono-tasking (i.e., executing a number of tasks one by one) towards multitasking (i.e., executing multiple tasks simultaneously) is also often perceived as a danger. Multitasking may allegedly harm the quality of learning and advance stress and burn-out. Furthermore, multitasking . . . may allegedly have a connection to . . . disorders such as ADHD . . . chronic fatigue syndrome (CFS) and various types of autistic and pervasive developmental disorders. (De Mul 2008: 170)

However, De Mul himself only partly agrees with these opinions, specifically to the extent that while he claims that causal relations between such mental or cognitive disorders and intensive use of new media have not been proven, he also accepts the possibility of some correlation between these facts. De Mul distances himself, though, from the criticisms against media in his valuation of said disorders. While the societal accusation against intensive use of media primarily regards ADHD, CFS and similar mental states as disorders or illnesses, De Mul argues that these phenomena may not be disorders, as much as they may be cognitive attitudes that may be valuable in their own right.

His chief argument supporting this position goes back to the Neolithic era, when the first human settlements were founded (De Mul 2008: 176–77). De Mul argues that this was an important turning point in the development of not merely human culture and civilization, but also of the development of the human cognitive information processing faculties. In this shift away from hunter-gatherers towards an agricultural lifestyle, more information had to be stored than the oral tradition could process, which (among other factors) led to the invention of writing. In this sense, writing should be regarded as an outsourcing of the cognitive memory function. However, here De Mul remarks that this development requires an adaptation
of human cognitive structure; in order to access writing cognitively, the human brain has to acquire a set of cognitive skills that are structured as linearly as the written text itself: reading and writing (De Mul 2008: 176–77).

Since this revolution in human culture and cognition, the quantity of information the human mind has had to process has increased significantly—mostly as a result of new possibilities offered by the invention of writing—up to the point where the limits of this cognitive processing ability have been reached. De Mul argues that for this reason, a further outsourcing of human cognitive processes has become necessary, a development that has become available since the introduction of computer technology: just as writing has been an extension of the human memory capability, so the computer has become an extension of various other cognitive processes (such as calculation, data analysis, information filtering), as well as memory. Thanks to the computer, humans no longer need to process large amounts of data by themselves. According to De Mul, this is a second technology-mediated turning point in humankind’s cognitive history, not only because of this greater degree of cognitive outsourcing, but also because of the cognitive adaptations required of the human brain as a result of this second innovation. Managing computer technologies requires not merely a linear text structure, but also other cognitive capacities: since computers serve to partially replace the human user’s cognitive (thought) processes, the user also needs to be able to maintain the big picture of both all outsourced computer-run processes, and the cognitive tasks executed by the user himself or herself. This requires not so much a sequential pattern of thought, but rather a multidimensional, parallel thought structure. In other words, the computer user has to be able to multitask intensively (De Mul 2008: 177).

Therefore, De Mul argues that the occurrence of a correlation between such intensive multitasking and a (temporary or otherwise) diminished ability to concentrate on linear mental tasks should be seen less as a risk factor for a mental illness or disorder, and more as a shift in emphasis towards different cognitive skills, which De Mul relates to American philosopher Thom Hartmann’s “hunter versus farmer” theory (Hartmann 1997):

According to [Hartmann], people gifted with ADD are, in fact, hunters in a world of farmers. *Homo sapiens* has developed from hunter-gatherers into agriculturists during the Neolithic Age. . . . Whoever hunts, will need to ‘be on their toes’ during short periods of time in order to concentrate on their prey. Farmers, on the other hand, place more value in the ability to set long-term goals. Whoever sows land, will need to plan far ahead. The
dominant type of human ever since the Neolithic Age has been the farmer. Conversely, the current ADD individual with their short-term attention span appears to be more of a hunter-gatherer. (De Mul 2008: 183)

Based on this, De Mul concludes that the computer age may mean the end of the dominance of the writing-based “farmer”-thinking, and that “hunter”-thinking, far from being a remnant of the past in the cognitive and cultural development of humankind, may hold the key to the next step in this evolution.

De Mul’s analysis appears to carry the same message as McLuhan’s half a century earlier. According to De Mul, the human being has first outsourced the cognitive function of memory through the technology of writing, and is currently in the process of outsourcing deeper information-processing faculties to computer technologies. This first relocation of cognitive faculties requires sequential coding and decoding mechanisms, which take shape as the skills of writing and reading (serving to literally translate thoughts to writings and vice versa), while the second kind of outsourcing requires an entirely different cognitive mechanism, specifically the ability to multitask, i.e., to manage multiple simultaneous processes. Put in terms of linguistic-based and model-based patterns of cognition, De Mul’s argument can be interpreted as explaining the dominance of linguistic-based cognition (or “farmer thinking” in Hartmann’s terminology) as a reaction to the introduction and proliferation of writing, while the introduction and proliferation of computer technologies over the past thirty years has resulted in a renewed rise of model-based cognition patterns (or “hunter thinking”).

3.3 Engineers and Tinkerers

Similarly to McLuhan and De Mul, Dutch philosopher Valerie Frissen has also presented an account of two types of thought in relation to new technological media (Frissen 2008); specifically, she describes two separate methods of innovation in information and communication technology applications, based on Claude Lévi-Strauss’s classic work The Savage Mind (1962). What I shall argue is that a parallel can be drawn between the dichotomy discussed by Lévi-Strauss and applied by Frissen on the one hand, and the two-pronged theory of cognition based on both “language of thought” and “mental models” on the other hand.

Lévi-Strauss distinguishes between two types of mental structure: these are the methodology of modern science (or ingénieur-thought) on the one hand, and the methodology of the science of the concrete (or bricoleur-thought) on the other. Frissen explains that “modern science” in this respect should be understood as
“working with a preconceived plan or design, oftentimes using new materials or concepts, as well as aiming for an abstraction as a goal to work towards” (Frissen 2008: 22).9 An agent who thinks and acts according to this method, may be termed an ingénieur or engineer in Lévi-Strauss’s model. The engineer’s counterpart is the bricoleur, which Frissen translates as “tinkerer.”10 Such a tinkerer “makes optimal use of the things he or she encounters more or less by chance in the practice of everyday life” (Frissen 2008: 22).

The main opposition that both Lévi-Strauss and Frissen recognize between the ingénieur and the bricoleur is the fact that on the one hand, the tinkerer focuses on concrete, tangible presences and freely generates associations between these items without a preconceived plan, while on the other hand, the engineer abstracts from the immediacy of the here and now, and instead focuses on a theoretical design or ideal (Frissen 2008: 22–23). What this means is that while the modern scientist mostly works towards a preconceived goal—which may I realize X?—the tinkerer is mostly lead by the (contingent) presence of that which is in front of her or him, and strives towards creating something new from that—What would happen if I combined this A with that B?

Lévi-Strauss’s distinction between ingénieur and bricoleur mindsets strongly resembles the distinction between linguistic-based cognition of “language of thought” and model-based cognition of “mental models” discussed in the first part of this paper. After all, the position that the engineer’s mindset is predominantly focused on a logical, rational and abstract approach to reality, while the tinkerer’s mindset approaches reality in an expressly associative, magical and concrete manner by contrast. On the one hand, the logical abstraction performed by the engineer is a syntax-based structure of thought, which reduces reality to abstract code before it can be understood, which is indicative of “language of thought.” And on the other hand, the tinkerer’s approach is primarily semantic, since in order to derive meaning from reality, concrete reality (in its original and contingent state) is mirrored (or modelled) by the human tinkerer’s mental processes, which is a defining trait of “mental models.”

Lévi-Strauss mostly sees bricoleur-thought in the knowledge base of “primitive” cultures and peoples, since such knowledge is primarily aimed at explanations and applications of everyday phenomena. This encompasses not only tangible and detailed uses for flora and fauna, but also extensive mythologies that serve as magical explanations for such concrete phenomena (Lévi-Strauss 1962). For this reason, he also indicates this manner of thought and knowledge acquisition as the “savage mind.” Conversely, the era in which we currently live is mostly character-
ized by ingénieur-thought. Frissen emphasizes that Lévi-Strauss does not use this contrast to conclude that the tinkerer’s mindset is an older, inferior, and outdated form of processing reality, but rather that this “savage” thought is merely a radically different approach to reality, which is in itself just as viable as the modern engineer’s mindset (Frissen 2008: 21).

Furthermore, Frissen supports this point by providing a more current argument supporting it; she witnesses that bricoleur-thought has been gaining ground in the twenty-first century, specifically in the development of new applications of information technology in the form of the so-called “web 2.0.” This web 2.0 is an internet environment that is characterized by interactivity; users insert themselves into a network of relations and therefore become a part of not only their own network of relations, but also join the networks of others, including those they do not know, as nearly every contribution that a user gives to such a web 2.0 environment may be added to by others through reactions and comments, which invite their own reactions and comments in turn. In fact, even a “personal” website or profile page may be determined by the contributions of others to a significant degree.

Her point is that this multitude of information is very well suited for a bricoleur-mindset:

The modern tinkerer—with web 2.0 as their toolbox—therefore has access to a near-inexhaustible multitude of débris, as Lévi-Strauss calls it: bits and pieces of lived-through material with which [the tinkerer] may and must shape (and continually reshape) their own world.

This large quantity of ‘raw material,’ which we as internet users encounter both continuously and coincidentally, irrevocably forces the immediately perceivable onto [the forefront of our minds]. (Frissen 2008: 24–25)

Here, Frissen creates a connection between the fragmented quantity of data that web 2.0 users project into the ether on the one hand, and the concrete facts that Lévi-Strauss’s bricoleur is confronted with and that lend themselves for combinatoric experimentation leading to new creations, on the other. Furthermore, she argues that such a tinkerer’s approach is not only an obvious method for dealing with the information cloud intrinsic to the web 2.0 environment, but also a necessary one. This is caused by the web 2.0 environment’s hyper-dynamic nature, which is brought about by its users’ continuously adding new information, causing older contributions to be automatically shifted to archives in turn, resulting in a state of continuous change; just as in the ancient Greek philosopher Heraclitus’s words a
man never steps into the same river twice, no internet surfer will ever download the same webpage twice. Frissen concludes from this argument that “[t]he science of the concrete . . . is essentially the only way to overcome and process this overdose of impressions, experiences and concrete observations” (Frissen 2008: 25). In drawing this conclusion, she implicitly subscribes—similarly to Jos de Mul—to Marshall McLuhan’s statement that the medium is the message.

Even though all these internet technologies are still provided by ingénieurs, and modern science and the engineer’s mindset still have full control over the production processes through which new technologies are realized, this mindset can no longer dictate the method in which the technologies produced are applied. In fact, Frissen claims that “at the beginning of the twenty-first century, the instrumentalist and rationalist engineer’s mindset that characterized the twentieth century has been surpassed by the savage mind and logic of the tinkerer” (Frissen 2008: 23). In marketing terminology, a shift appears to have occurred from “technology-push” towards “demand-pull.” This is partly supported by Dutch sociologist Dirk Stemerding, who observed that while developers of technologies could initially fully determine the design and functionality of new technologies, the technology user has gradually become an equal partner in the design process (Stemerding 1995). However, Frissen’s argument some thirteen years later takes this observed development a step further, as she argues that the user/tinkerer’s influence on this design process has not merely matched that of the manufacturer/engineer, but has rather fully exceeded it.

While this observation may be noteworthy in itself, a more fundamental conclusion can be drawn from it. The dichotomy between the engineer and the tinkerer in the development of new media applications observed by Frissen expresses a similar line of thought as those seen with both McLuhan and De Mul, considering that Frissen’s use of Lévi-Strauss’s distinction between engineers and tinkerers shows a strong parallel to the distinction between theories of linguistic and model-based cognition. Furthermore, in light of Frissen’s argument that the development of new media technologies and their applications are increasingly being influenced by such tinkerers (and decreasingly by “engineers”), this may indicate that a visual-spatial cognitive structure has become more prevalent in media users relative to a linguistic-sequential cognitive structure—in line with both McLuhan’s and De Mul’s respective accounts.
4. Conclusion

The three positions presented by McLuhan, De Mul and Frissen, respectively, each signal a shift from one cognitive paradigm to another. I have also argued that the observations by each of these three philosophers of media—each from their own chosen approach—can be rephrased in terms of the cognitive account of dual thought structures presented in the first part of this paper, and that each of McLuhan’s, De Mul’s and Frissen’s account thus describes one and the same development, specifically a shift in human cognitive functioning away from a sequential, linguistic and abstract structure of thought, and towards a more simultaneous, multitasking, reality-centric thought structure, in parallel with a similar shift in the structure of technological media. After all, despite the great differences in these three positions’ approach, and despite the generational gap between McLuhan on the one hand and De Mul and Frissen on the other, the similarities predominate between their respective positions on the relationship between human and media—or rather on the relationship between human cognitive structures and technological media structures.

Based on these three separate accounts, the conclusion may be reached that both twentieth-century and twenty-first-century media increasingly appeal to different human cognitive faculties than the “older” media they replace or supplement: cognitive structures based on sequential, linguistic processes with abstract goals prove to be no longer primary in media use, and appear instead to be replaced by (or supplemented with) cognitive structures based on simultaneous, multitasking processes aimed at concrete, immediately available objects. In other words, the dominance of a “language of thought” account of cognition appears to be broken in favour of a “mental model” approach.

Furthermore, McLuhan, Frissen, and De Mul also assert that this shift in cognitive preferences is correlated with a similar shift in media structures, where this development in media structures is presented as an explanation for the cognitive development. It would go too far, however, to claim a causal connection between these two phenomena, not only because no empirical evidence supporting such a claim is available at this time, but also since—as McLuhan rightly points out—David Hume already observed that our concept of causality is supported by tacit intuitions of sequentiality (McLuhan 1964: 12), and that it therefore presupposes an account of cognition as (more or less) language-based. For this reason, it is difficult (and perhaps impossible) to apply the concept of causality to a phenomenon
involving a model-based account of cognition without implicitly subordinating such a model approach to a language-based account.

In answer to the main question addressed in this essay—to investigate to what extent an interrelationship can be identified between (twenty-first-century) media technologies on the one hand, and human cognition in terms of language of thought and mental models on the other hand—I can therefore conclude that twenty-first-century media and human cognition are correlated to the extent that a parallel can be identified between a shift in human cognitive structures from a predominantly syntactical structure (which may be characterized as language-based) towards a more semantic structure (which may be characterized as model-based) on the one hand, and a similar shift in the structures of twenty-first-century technological media on the other hand. This development in media structures may also serve as a reasonable explanation (though not necessarily a causal one) of the aforementioned development in cognitive structures, in view of McLuhan’s thesis “the medium is the message.”

This dual trend represents a breach of the dominance of language-based cognitive processes in favor of model-based cognitive processes. However, whether this would lead to a hegemony of model-based cognitive functions over language-based ones, or whether a more balanced middle ground between the two types of cognitive functionality would emerge, remains unclear at this point. All that may be observed from the accounts presented in this study is that while McLuhan identifies the start of a fundamental shift away from the dominance of linear, sequential structures towards parallel, simultaneous ones, both De Mul’s and Frissen’s observations, made five decades later, describe the latter structures to have surpassed the former in prominence to some degree, which suggests that this development has progressed over the intermediate period. My own intuition favours a more balanced equilibrium between the two, as the position of the dual foundation of cognition I defend would suggest that neither one nor the other cognitive structure could or should be fully eliminated or obsolesced, as both are equally essential to the functioning of human cognition.

Still, since this paradigm shift in cognition progresses quite slowly indeed, no definitive answer can be given to the question how it will develop in the future. Perhaps a next generation will be able to provide further insights into the direction of this trend at some point halfway through the twenty-first century.
Notes

An earlier, shorter version of this paper was presented at the “McLuhan’s Philosophy of Media Centennial Conference—Contact Forum,” which took place in Brussels, Belgium, on 26–28 October 2011. This conference contribution has been published in Y. Van Den Eede et al., editors, Proceedings of “McLuhan’s Philosophy of Media”—Centennial Conference / Contact Forum, 26–28 October 2011 (Brussels: Royal Flemish Academy of Belgium for Science and the Arts, 2013), 99–105.

1. For this reason, it is unsurprising that followers of Fodor’s position have indeed propagated such a position of “mental logic.” One of the prominent champions of such a view is American psychologist Lance Rips, who explicitly conceives of thought processes in terms of formal logic, and has even modelled a logic heuristics in order to explain the workings of human reasoning (Rips 1994).

2. It should be noted that the two theories of “language of thought” and “mental models” have been developed in isolation from one another. Craik’s position preceded Fodor’s by decades, but fell into obscurity after Craik’s untimely death in 1945. It was not until Johnson-Laird reintroduced Craik’s theory—with his own additions—under the title of “mental model theory” as an alternative to Fodor’s “language of thought hypothesis” that philosophical debate between these respective positions emerged.


4. This argument is explicated in McGinn 1989: 178ff.


6. Both Rips and Johnson-Laird (as well as their respective followers) claim to find support for their respective positions from recent empirical research. However, the limited scope of this paper does not allow for a full discussion of this topic.

7. For example, John Hughlings Jackson—a pioneer in the field of neurophysiology—assigns the linguistic faculties to the left hemisphere of the human brain, while those faculties aimed at (visual) modeling structures are assigned to the right hemisphere (Taylor 1958). A more recent example in the applied discipline of educational psychology can be found in Silverman 2002.

8. All translations from the Dutch are my own.

De Mul mentions two publications as examples of this position, Postman 1985 and Committee on Public Education of the American Academy of Pediatrics 1999.

9. All translations from the Dutch are my own.

10. The original Dutch term used is knutselaar, which translates to “tinkerer” in English.
The Relationship between Thought Structures and Media Structures

References


