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Extrapolating on McLuhan: How Media Environments of the Given, the Represented, and the Induced Shape and Reshape Our Sensorium

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Abstract: The article develops Marshall McLuhan's approach to the interplay between media, the sensorium, and reality. McLuhan's concepts of "acoustic space" and "visual space" are unfolded with regard to the consequences that digital media will have on the human ability to perceive reality. Reality–sensorium interaction is systematized in the article. This systematization includes the environments of the given, the represented, and the induced. These environments are shaped by sequential stages of media evolution, which relate to preliterate media, alphabet-based media, and digital media. Existing and upcoming media technologies are presumed to alter human biology and transcend it. Within the set of media technologies that alter human biology, artificial flavours, electrically induced senses, immersive media, augmented reality, and virtual reality are treated. Within the set of media impacts that will change the human sensorium, the dismissal of gravity (related to the McLuhanian "angelism" of electronic discarnate man), the switch in navigation from biological networking to social networking, the sense of others, and the thirst for response are treated. Plato, Lenin, Wittgenstein, Benveniste, Logan, Carr, Shirky, and other thinkers are employed in the article to support these McLuhanian speculations, and sketch out prospective trends in the evolution of media and the sensorium.

Keywords: Marshall McLuhan; human sensorium; digital media; synesthesia; augmented reality; virtual reality; transhumanism

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1. Introduction

McLuhan's most famous one-liner, "The medium is the message", was once playfully changed for the title of McLuhan and Fiore's book: *The Medium is the Massage* [1]. Such wording leaves a lot of space for interpretations. One interpretation suggests the phrase means that each medium is capable of or even aimed at "massaging" the human sensorium.

Marshall McLuhan made a huge contribution to the exploration of media impacts on society and culture. Methodologically, he explored social and cultural media impacts via the impacts media have on the sensorium. Media impact human life regardless of their content (that is why "the medium is the message"), because they involve one or another part of the human sensorium simply in order to be perceived. In turn, media emphasize a certain part of the sensorium to create specific "spaces" of human thinking and acting. This methodology allowed McLuhan and his followers to study media themselves, not their content, and establish the entire field of media ecology.

McLuhan separated two spaces that are created by media impacts on the sensorium. Preliterate media create "acoustic space", where humans act naturally, in their tribal state, seeing the world syncretically. Literate, alphabet-based media (that is, scribal and print media) use the faculty of vision

to be perceived, hence creating "visual space", which alienates humans from tribal collectivism, creates individualism, rational analytical thinking, nation-states, etc.

When radio and television marched victoriously across the planet, McLuhan noticed that electricity turned us away from "visual space" back to "acoustic space" with its three-dimensional perception of reality. Indeed, turning away from "visual space" and back to "acoustic space" meant that our perception of reality has been returned to the "natural" way of sensation, when the entire sensorium is involved, as it used to be before the alphabet.

But here is a paradox: even though the acoustic, three-dimensional space of electric media simulates the natural perception of reality, the reality of electric media is not natural. It is created, or, better to say, induced. So we apply the natural way of perception to the artificial environment. It is a way of living, not just a form of information consumption. Sensation, not cognition, is the target of oncoming media, be they technologies of augmented reality, virtual reality, immersive media, kinetic interfaces, etc.

We can go even further, and say that the artificial environment of electric media tends to become the natural habitat for us. To achieve this condition, electric and now digital media steadily adjust the environment induced by them for better sensory perception. Such futuristic media technologies are being developed of which even McLuhan had no idea. But absolutely in the spirit of McLuhan's thoughts, humankind develops the more advanced media technologies in order to capture the entire sensorium, and thereafter these technologies reshape our sensorium. To live in the new environment, humans will surely obtain a new sensorium.

How far will humans go in changing their sensorium? Will they still be humans after? Extrapolating McLuhan's approach to the new things that we obtain in the course of media evolution, it is possible to sketch out both future media innovations aimed at capturing the sensorium and changes in the sensorium itself, under the pressure of media innovations.

2. Sensations as Spatial Frame Underlying McLuhan's Contraposition of Visual and Acoustic

Harold Innis established that certain media have certain time-space biases, by means of which they influence the development of certain types of empires.

> The concepts of time and space reflect the significance of media to civilization. Media which emphasize time are those which are durable in character such as parchment, clay, and stone. The heavy materials are suited to the development of architecture and sculpture. Media which emphasize space are apt to be less durable and light in character such as papyrus and paper. The latter are suited to wide areas in administration and trade. The conquest of Egypt by Rome gave access to supplies of papyrus which became the basis of a large administrative empire. Materials which emphasize time favor decentralization and hierarchical types of institutions, while those which emphasize space favor centralization and systems of government less hierarchical in character [2].

Here, Innis points out the capability of media to shape the social environment. Marshall McLuhan developed these ideas by connecting the media capability of shaping environments to certain sensory channels of media perception. According to McLuhan, media shape "spaces", which are characterized either by visual or by acoustic ways of perception and acting. **Acoustic space** is the environment of the spoken word, the preliterate environment, where all things coexist and can be perceived simultaneously. Written language, starting with hieroglyphs, boosted by alphabet and then the printing press, has shaped **visual space**, where all things are linear, organized by means of text, and can be perceived sequentially. Acoustic space had been prevalent in the oral, preliterate age, being the habitat of tribal man. "Until writing was invented, man lived in acoustic space: boundless, directionless, horizonless, in the dark of the mind, in the world of emotion, by primordial intuition, terror", wrote McLuhan [3]. Visual space had dominated in the West from the 15th century to the early part of the 20th century, thanks to printed text coming into place as a main medium. However, things have started changing

with the rise of electric media, which is returning us to a preliterate, tribal, acoustic space, according to McLuhan.

At first glance, the opposition of spaces, which is based on the adjectives "acoustic" and "visual", looks inconsistent, especially as applied to electric media. The most prominent electric medium known at McLuhan's time was television. How could television put humans into acoustic space if it even has the word "vision" in its name?

Here is how McLuhan himself explained these concepts in his famous *Playboy* interview:

> ... Another basic characteristic distinguishing tribal man from his literate successors is that he lived in a world of acoustic space, which gave him a radically different concept of time-space relationships.
>
> PLAYBOY: What do you mean by "acoustic space"?
>
> MCLUHAN: I mean space that has no center and no margin, unlike strictly visual space, which is an extension and intensification of the eye. Acoustic space is organic and integral, perceived through the simultaneous interplay of all the senses; whereas "rational" or pictorial space is uniform, sequential and continuous and creates a closed world with none of the rich resonance of the tribal echoland. Our own Western time-space concepts derive from the environment created by the discovery of phonetic writing, as does our entire concept of Western civilization. The man of the tribal world led a complex, kaleidoscopic life precisely because the ear, unlike the eye, cannot be focused and is synaesthetic rather than analytical and linear. Speech is an utterance, or more precisely, an outering, of all our senses at once; the auditory field is simultaneous, the visual successive [4].

McLuhan's concepts of visual space and acoustic space obviously refer to the sphere of sensations. But also important is that McLuhan used the word "space", not "sense". It is not about senses of vision or hearing directly. Many prominent media ecologists have paid attention to this distinction between "space" and "sense". In his *McLuhan Misunderstood: Setting the Record Straight*, Robert Logan suggests a good explanation of McLuhan's use of the terms "visual" and "acoustic" as applied to the idea of space, not sense:

> McLuhan considered two different and opposing states of the sensorium, which he characterized as visual space and acoustic space, where the latter was sometimes referred to as audile-tactile space. He believed that the sensorium of preliterate or oral cultures was dominated by the audile-tactile sense in which information is processed simultaneously in real time. Literate societies in which information is acquired by use of the visual faculty to read develop a visual bias in which information is processed in a linear sequential manner, one item at a time, the same pattern as that of the written word. As a result, literate man operates in visual space [5].

Further, Logan [5] (Kindle Locations 975–976) lists characteristics immanent to acoustic space and visual space:

> McLuhan characterized the difference between visual and acoustic space with the terms in the following table, which I compiled and shared with Gordon Gow, who quoted them in his paper, "Making Sense of McLuhan Space" (2004).

Visual	Acoustic
sequential	simultaneous
asynchronous	synchronous
static	dynamic
vertical	horizontal
left-brain	right-brain
figure	ground
specialism	holism/generalism
tonal	atonal
isotropic	anisotropic
container	network
mechanical	electrical
particle	field, resonance

It is important to note that most of these characteristics are, in essence, spatial.

Paul Levinson writes in his *Digital McLuhan* about the detachment of vision from other senses in the process of developing a phonetic alphabet as a medium. Levinson underlines that, for McLuhan, visibility is more a trait of space created by a medium than a part of the sensorium, even though (or because) this space was created, technically, via visual perception:

> The paper makes a startling point: what we consider normal or natural visual space is actually a technological artifact—a result of perceptual habits created by reading and writing with a phonetic alphabet. Or as McLuhan put it, much later, in two books posthumously published, "when the consonant was invented as a meaningless abstraction, vision detached itself from the other senses and visual space began to form" (M. McLuhan & E. McLuhan, 1988, p. 13) ... Thus, McLuhan ... is consistent in his view that what we take for granted in the shapes and organization of our external visual world is actually a consequence of the technological lenses through which many of us for the past 2500 years of Western history have been inclined to regard the world—specifically, the prism of the linear, connected alphabet [6].

The same goes for the audibility of acoustic space: it is more a spatial property than a sensory one, even though it refers somehow to the sense of hearing. The word "tactile" in McLuhan's definition of "audile-tactile", for space created by electric media, is particularly important. It is tactility that allows people to interact with the physical environment, using data of all other senses. That is why McLuhan specified that "tactility is the interplay of the senses" [7]. With that, he referred to the ability of electric media to recreate the natural, biological way of human perception of the surrounding reality. Through the interaction between media and the human sensorium, McLuhan meant something deeper than just the stimulation of receptors.

Here is the clue: for McLuhan, sensations were just a way to distinguish spatial characteristics of the media environments (alphabet-based and electricity-based). The visual (in the context of print media), for McLuhan, was a space of linear perception, while the acoustic was a space of simultaneous perception. Although these time-biased specifications of different types of media are represented via sensational characteristics, they in fact reflect an environmental approach on McLuhan's part. The linear, one-dimensional (unfolding in time) environment of cognition is opposed to the simultaneous, three-dimensional (unfolding in space) environment of sensations.

Substantial for McLuhan's theory of "detachment of vision from the other senses", mentioned by Levinson, is, in fact, the evidence of shaping some inner vision, which is a phenomenon that is not sensory but rather intelligible. This inner vision appeared thanks to the written/printed representation of reality, which shape a uniformed picture of reality, and put it in the human mind. Not without reason, McLuhan describes visual space as "'rational' or pictorial space" in the given *Playboy* interview quote above.

Thus, opposing the audile-tactile space inherent to the oral, preliterate age, and the visual space shaped in the literate age, we enter the territory of the longest philosophical discussion about the cognition of the ideal and the material, a tradition that can be traced down through the millennia to Plato's famous Cave metaphor.

2.1. McLuhan, Plato, and Lenin

Plato's allegory of the Cave laid the foundation for a system of philosophy later known as Plato's objective idealism. Plato wanted to emphasize the illusiveness of sensations against the true reality of the "ideal" essences of things.

But what is more important, Plato's Cave started a long discussion about the dualistic nature of reality in the human perception. For Plato, sensed things of this world were just the shadows: the vague representations of the real, pure ideas of things that, to him, were the only things truly real.

> The lower portion of the lower or visible sphere will consist of shadows and reflections, and its upper and smaller portion will contain real objects in the world of nature or of art [8].

Such an approach allowed only philosophers to be capable of seeing the real world in the light of supreme knowledge, beyond the reach of mere mortals (prisoners of reality) who experienced the world in sensations, i.e., vulgarly and biologically.

We can easily paraphrase Plato's allegory in McLuhan's terms. Cave prisoners are the "tribal men" of the oral age, who live in the "lower sphere" of the physical reality, which is audile-tactile space. In these conditions, only philosophers are capable of looking up at the source of the light, to see the essences of things, which are ideal—the ideas. With the advent of scribed and then printed media, many people have become capable of "philosophizing", abstract thinking, and picturing the world in their minds.

For Plato, only the ideal world was real and true. With the development of the natural sciences and materialistic views, positioning turned upside-down. The sensible world of physical nature was found to be the primary, the real one, while the world of ideas became the realm of intellectual representations and speculations. But the very dichotomy introduced by Plato has remained in play throughout the entire course of history. Thanks to Plato, though in contrast to his personal preferences, human thinking has gotten a notion of a distinction between the world given to us in sensation, directly, immediately, and the world that is represented to us in ideas, mentally.

Interestingly, "given in sensation" is a direct quote from Vladimir Lenin. Developing the materialistic, Marxist approach, Lenin wrote in his basic philosophical paper, *Materialism and Empirio-criticism*: "matter is that which, acting upon our sense-organs, produces sensation; matter is the **objective reality given to us in sensation** [9]." (Bolded by author.)

McLuhan was unlikely familiar with Lenin's philosophical legacy, but he very likely could deem audile-tactile space as the "reality given to us in sensation". While audile-tactile space is perceived by people directly, visual space is the "rational, pictorial" representation of reality, which has become accessible to all of society, thanks to scribed/printed text. Thus, via McLuhanian bridge between Plato and Lenin, we have approached the dichotomy of the given and the represented.

2.2. The Given and the Represented: How a Word Doubles the World

The dichotomy of "the given in sensation" and "the represented in ideas" is substantial for philosophical, linguistic, and psychological comprehension of the human interaction with reality. Philosopher Ludwig Wittgenstein, turning Plato's view upside-down but retaining its duality, coined in his famous *The Tractatus Logico-Philosophicus*:

2.063 The total reality is the world.
2.1 We make to ourselves pictures of facts. < . . . >
2.12 The picture is a model of reality [10].

For linguists, the dichotomy of the given and the represented reflects the representative nature of language and speech. Émile Benveniste, a structural linguist, wrote in his *Problems in General Linguistics:*

> Thought is nothing other than the power to construct representations of things and to operate on these representations. It is in essence symbolic. The symbolic transformation of the elements of reality or experience into concepts is the method by which the rationalizing power of the mind is brought about. Thought is not a simple reflection of the world; it categorizes reality . . . [11]

It even can be said that, dealing with language as a categorizing and depicting intermediary between the human mind and the external environment, most linguists after Ferdinand de Saussure were spontaneous media ecologists. For instance, Gustave Guillaume in his *Foundations for a Science of Language* wrote:

> We see the external universe only through the medium of the universe-view we carry in our minds. This medium is part and parcel of the human outlook. A properly human view of the universe is the outcome of our ability to deal with the universe within us [12].

It is interesting that Guillaume supported a quite radical view on "the given and the represented" duality.

> I never see anything but mental inwardness realized mentally. If instead of this view of what is realized mentally—a view excluding any other—I had a direct view of the real, I would not be a human being. To do away with a human being's view of reality through the compulsory medium of the image of reality that he carries within him would be to do away with the human being, to descend from the human to the animal. To replace an animal's direct view of reality by a view which is the result of treating an image of reality carried within, would be to promote the animal to the condition of man, in other words, to deprive it of its immediate view of the universe and substitute a mediate view through the channel of a prior mental representation. Possessing one state entails losing the other . . . [12] (p. 142)

Therefore, amplifying in his way the Platonic view, Guillaume states that reality exists for humans only mentally, and it is an essential human property, distinguishing them from animals, who are unable to mediate nature and have to interact with it immediately. (Subjective idealism would be an interesting prism for media ecology's exploration of the digital world.)

Yet many other thinkers have contributed to the definition of this "the given and the represented" dichotomy. Perhaps, a quote by Alexander Luria, a Soviet neuropsychologist and a leader of the Vygotsky Circle, can summarize well these efforts of collective thought:

> The huge benefit of humans' possession of developed language relates to the doubling of their world. Without word, humans would be able to deal only with those things that they can see directly, and which they could personally manipulate . . . Word doubles the world, and allows a human to operate with things mentally, even in the absence of the things [13].

Thus, the symbolizing capacity of thought/word creates a second world, in addition to the natural, sensible one. The materialists and the idealists argue over which one is real or primary above the other. For media ecology, as well as for the developing of McLuhan's prompts, it is more substantial to differentiate these two worlds, the given and the represented, as two environments for human habitat, or, in the words of McLuhan, two "spaces".

It is worth noting that the idea of doubling the world by means of the word (alphabet) was expressed also by McLuhan himself. And he did that precisely in the area of psychology, and even psychiatry. In *Gutenberg Galaxy*, in a chapter titled "Schizophrenia may be a necessary consequence of literacy", McLuhan stated that the introduction of the alphabet provided an ancient literate man with

the ability to create the other world, and afterwards such a man became "divided" and "schizophrenic". Marshall McLuhan wrote:

> From that magical resonating world of simultaneous relations that is the oral and acoustic space there is only one route to the freedom and independence of detribalized man. That route is via the phonetic alphabet, which lands men at once in varying degrees of dualistic schizophrenia [14].

In his *Playboy* interview, McLuhan returns to this idea with a small addition:

> When tribal man becomes phonetically literate, he may have an improved abstract intellectual grasp of the world, but most of the deeply emotional corporate family feeling is excised from his relationship with his social milieu. This division of sight and sound and meaning causes deep psychological effects, and he suffers a corresponding separation and impoverishment of his imaginative, emotional and sensory life. He begins reasoning in a sequential linear fashion; he begins categorizing and classifying data. < . . . > Schizophrenia and alienation may be the inevitable consequences of phonetic literacy [4].

The development of the inner vision, on the base of the alphabet, has pulled humans out of the audile-tactile space of oral culture and placed them in visual space. The represented has not killed the given but overshadowed it. Although different views on the concurrency of the given and the represented exist, the most common approach sees the given, the physical reality of nature, as the basic, primary habitat of humans, while the represented, the ideal "visual space" of culture, is seen as the secondary space of the higher level; as such it has been the historical sequence of things.

Not without reason being called a futurist, McLuhan discerned new tectonic shifts related to the advent of electric media. He described this movement as the returning of humans from visual into audile-tactile space, to the tribal state. Signs of this returning are obvious and well known; however, it is also clear that the new space, shaped by electric and now digital media, will not be the good old physical reality. This movement is spiral, and goes rather forward to some new state than backward to what has already once passed.

From the reality of **the represented**, humans are moving to a reality that is very similar to **the given**, except it is not natural. It is artificial, developed out of the represented. It is **the induced**; the next stage of the evolution of the interplay of reality, media, and the sensorium.

2.3. Synesthesia and the Induced Reality

In his article "Hypermedia and Synesthesia", James Morrison wrote,

> " . . . it is clear that McLuhan (1964) saw the connection between digital representations of reality and a heightened ability to involve all the senses, but in a way that returns modern consciousness to a preliterate mode of awareness" [15].

Electric media, as McLuhan put it, returns us from the visual space to the audile-tactile space, that is to say, from mainly cognitive perception to mainly sensory perception. However, the reality of digital media is absolutely virtual and by itself has nothing in common with the primary physical reality. The internet is still perceived mostly visually, though it obviously shapes the audile-tactile-like space of panoramic simultaneity.

The capability of electric media to induce audile-tactile space relates to the phenomenon of **synesthesia**, which plays a significant part in McLuhan's theory. As James Morrison also wrote,

> Synesthesia is a central conception in Marshall McLuhan's exploration of the relationship between media, culture, and the human sensorium . . . McLuhan's notion of synesthesia as the simultaneous interplay of the senses in a ratio fostered by the particular medium or media involved is missing in the theoretics of hypermedia, which relegates all sensory

> phenomena to visual terms and overlooks the interplay between orality and literacy. Research into synesthesia in art, culture, language, and cognition supports McLuhan's conception of it as the normal process by which the brain reaches a new equilibrium when one of its functions is outered in a technology [15].

Robert Logan also underlines that synesthesia (a concept introduced by McLuhan under the influence of symbolists' poetry) allows electric media to engage the entire sensorium:

> According to McLuhan all of the effects of the Gutenberg press reverse with electric media as we return to an emphasis on the audile-tactile part of our sensorium that he suggests involves the interplay of all our senses. McLuhan is suggesting that with electric media one has an experience of synesthesia [5] (Kindle Locations 522–525).

In fact, the capacity of the senses to induce each other is augmented by the capacity of the cognitive pathways of perceptions to induce senses, when "the mind coordinates the interplay of the senses", as Morrison put it [15].

The ability of symbolic representation to evoke senses gave the ground for Dr. Danko Nikolic of the Max Planck Institute for Brain Research in Frankfurt to develop the concept of **ideasthesia**:

> We have conducted a number of studies conjointly indicating that synesthesia is not a sensory-sensory phenomenon, as it has been largely held. Instead, this is a semantic-sensory phenomenon in which the meaning of the stimulus induces perception-like experiences. Hence, I proposed that a more accurate name for the phenomenon is ideasthesia, which is Greek for "sensing concepts". The theory of ideasthesia is based on arguments for introducing semantic component and on a proposal how the semantic system contributes to the phenomenon [16].

The symbolic representations substitute and at the same time enforce (McLuhan would say "extend") the sensory perceptions of the world. Thanks to print media, humans have obtained an environment that is expanded far beyond their physical surroundings. (As Clay Shirky wrote in his *Cognitive Surplus*, "Media is how you know about anything more than ten yards away" [17].) This environment, which is a media environment, has overlaid the physical surroundings in terms of its significance for everyday life. The media environment is filled with symbolic representations no less than with sensory stimulations. It is the phenomenon of ideasthesia that "helps" humans to experience the media environment almost physically. In his *The Shallows* . . . , Nicholas Carr, quoting Elizabeth Eisenstein, writes:

> It's no exaggeration to say that the writing and reading of books enhanced and refined people's experience of life and of nature. "The remarkable virtuosity displayed by new literary artists who managed to counterfeit taste, touch, smell, or sound in mere words required a heightened awareness and closer observation of sensory experience that was passed on in turn to the reader," writes Eisenstein. Like painters and composers, writers were able "to alter perception" in a way "that enriched rather than stunted sensuous response to external stimuli, expanded rather than contracted sympathetic response to the varieties of human experience." The words in books didn't just strengthen people's ability to think abstractly; they enriched people's experience . . . [18]

The phenomenon of ideasthesia/synesthesia is obviously related to the phenomenon of **neuroplasticity**. Introducing the concept of neuroplasticity in media research, Nicholas Carr demonstrates that the impacts of digital media are not limited by merely a changing of habits. It is about the physiological rebuilding of brains:

> Neuroplasticity provides the missing link to our understanding of how informational media and other intellectual technologies have exerted their influence over the development of civilization and helped to guide, at a biological level, the history of human consciousness [18] (p. 44).

Thanks to the physiological compensatory mechanism of neuroplasticity, the human brain is capable of accepting any reality, "as given to us in sensation". Ideasthesia and synesthesia unfold neuroplasticity at the level of emotions and sensations; they represent **the plasticity of sensorium**. Ideasthesia enables all-senses engagement in the media environment, based on symbolic representation (McLuhan's "visual space"). Synesthesia enables all-senses engagement in the electric and now digital media environment (McLuhan's "audile-tactile space").

The ideasthesia/synesthesia digression is called on to illustrate how the media environment can compensate for its lack of physiological stimuli. Thanks to synesthesia, electric media are capable of inducing a natural-like reality, which is fully artificial and has nothing to do (so far) with the physiological stimulation of body sensors.

3. Altering Human Biology

By shaping the media environment, media are able to tune the human sensorium according to their "bias". Equipped with ideasthesia/synesthesia, the sensorium follows the environment. In its turn, thanks to neuroplasticity (and ideasthesia/synesthesia), the sensorium is able to adapt humans to any media environment. Media always probe the sensorium; the sensorium always adjusts in order to unfold all capacity of media, and reach their limits and their demand for new experience. This interplay between the sensorium and media lies in the foundation of media evolution. In the process of adaptation, for the sake of better experience, the sensorium sooner or later employs all capacity of any new media.

The ideas of evolving of media environment were expressed by McLuhan, for example, in John Culkin's famous paraphrase, "We shape our tools, and thereafter our tools shape us." The very formulation of McLuhan's Laws of Media, that he and his son Eric McLuhan call the Tetrads, as well as the terms "new medium" and "old medium", also represent the idea of the media environment's dynamics.

The evolutionary approach to media ecology gives us an opportunity to speculate about contemporary trends in the interplay between the sensorium and media, and to chart these trends ahead in the future.

If the represented reality (visual space) compensates for the lack of physiological sensory stimulation by engaging ideasthesia, the induced reality has to develop new senses, since this reality does not represent the reality given to us in sensation, but creates a new reality in a new, virtual space.

In the beginning, the induced reality follows the norms of the physical reality, "after the image and likeness", since the creator just does not have any other reality to have experienced. But afterward, the induced reality may and has to transcend the rules and establishments of the physical reality. Indeed, why should the digitally induced reality have to be a double of the physical world, if digital media creates its own space, which has no physical limits?

The represented reality of literate media has already freed human beings from physical reality, yet just symbolically, in human imagination. The induced reality can capture humans without any use of their imagination, literally, as a surrounding environment.

On its way from the given to the represented and then to the induced, media evolution has to modify the sensorium, first on the foundation of "likeness", then, in some other way, under its own laws. In this context, we can search for some indications of enhancing "natural" senses and then of transcending them (as this metaphor was used by Ray Kurzweil in the title of his book *The Singularity Is Near: When Humans Transcend Biology*).

Here is a possible list of such improvements of the sensorium by technologies. The list is not complete, but is indicative.

Signs of altering of the human sensorium

- ✔ Artificial flavours
- ✔ Augmented senses
- ✔ Immersive media
- ✔ Augmented reality
- ✔ Virtual reality

Signs (or predictions) of transcending of the human sensorium

- ✔ Angelism and dismissal of gravity
- ✔ Navigation in the digital space: from physical to social dimensions
- ✔ Social dimension: the sense of others
- ✔ Social dimension: the thirst for response

3.1. Artificial Tastes, Artificial Smells, Artificial Sounds

Technologies in culinary work, perfumery, and music have aimed to evoke enhanced sensations. Any attempts to improve natural sensation, in fact, have been leading to the creation of artificial substitutes. Certain logic can be found in such a tendency. Natural tastes, smells, or sounds are too regular, too indistinguishable for distinctive sensory experience (that most often can be described as pleasure) to be had. Strange as it may seem, purification of sensations has always had to do with artificial stimuli.

The history of nutrition gives us a good example. People are capable of processing food before digesting. The ability to cook is one of the traits that differentiates humans from animals. Throughout the entire course of history, by purifying the taste sensation, humankind has been trying to obtain flavours that do not exist in nature. Flavour additives and enhancers also make food cheaper and more storable. But initially, they aimed to make food tastier. Historically, salt and sugar, along with a huge variety of spices and condiments, played precisely the same role as contemporary artificial flavours: to improve and enrich the taste qualities of food, simultaneously having made it, in fact, unnatural.

Media ecologists should pay particular attention to the phenomenon of artificial flavours. "Old" and "new" flavours invisibly reshape the environment pretty much in the same way that media do. For example, a marketing trick with "tomato-flavoured potato chips" aims to recall the natural taste of tomatoes as something valued. It makes sense for those familiar with the original tomatoes' taste, but makes no sense for the many children who have simply not been made familiar with the taste of real tomatoes. Moreover, if they happened to try a real tomato, they would recognize its taste only because they are familiar with an artificial tomato flavour. The taste enhancer absolutely detaches the reality given to us in *induced sensation* from "the reality given to us in *sensation*". Only one question remains: why do we still need tomatoes? The enhanced taste still relates to the natural environment, but with decreasing necessity.

Same analysis can be applied to the millennial efforts of people to purify, enrich, and enhance smells. Fragrances of all sorts and fresheners of all sorts aim to improve the perception of surroundings. They act absolutely similarly to artificial flavours: being in essence unnatural, they fake some natural properties and eventually withdraw the human sensorium from the natural environment into the "better", induced environment.

The development of the "use" of other senses can be analyzed in the same media-ecological way. For example, all smartphones are designed to produce a clicking sound when taking a photo. This sound obviously imitates the noise of the mechanical shutter in the old types of camera. The clicking smartphone is a "mechanically flavoured" digital device. However, today's majority of smartphone users have never used a camera with an actual mechanical shutter. For them, this sound means nothing except the sound of a smartphone taking a picture. This is another example of the continuing detachment of our sensorium from a "natural" environment.

In a certain meaning, similar to artificial flavours, music and poetry have been developed to purify specific human sensations. In this case, it is the sensation of the others, experienced via sounds. Primitive rhythms were used to coordinate people's locations in space and people's collective efforts in time in the era of hunting-gathering. Rhythm lies in the foundation of group cohesion. It is not for nothing that McLuhan, when speaking about the capacity of radio to reverse humans from individualism to collectivism, compared radio to the "tribal drum" [7] (Chapter Radio: "The Tribal Drum").

Nowadays, precisely like artificial flavours, most sounds produced by people and sensations induced by these sounds have little to do with the natural environment. People now live in a constantly collapsing audile space, whose implosion shapes a sound cocoon around everyone. The state of alienation experienced by an individual with ears corked by earphones makes this audile cocoon almost visible. Earphones drastically increase the amount of time spent by one in the induced sound environment, which aims both to alienate and to please. Another significant trait: while detaching people from the physical surroundings, the audile cocoons attach their inhabitants to one another in the induced reality of music, radio, and phone conversations. The reality of an individual cocooned by earphones is a space that is physically individual but virtually shared.

It is quite safe to say that humankind has always been seeking ways to induce better sensations. The contemporary trends of consumption of organic or natural goods reflect some fears and some resentment, but in general, the induced has always been perceived as something more valuable (enhanced) than the given. Such speculation may be concluded with the thesis that our entire civilization is the movement from the natural to the artificial, which means from the given to the induced. This movement was drastically boosted by the introduction of electricity, which promised to become the main supplier of sensation.

3.2. Augmented Sensorium: Artificial Senses

During World War II, the Soviet neurolinguist Alexander Luria was the head of a neurosurgery evacuation hospital. He treated hundreds of brain-injured soldiers. In particular, he was working to invent a method of rehabilitating patients with dynamic aphasia, who were unable to deliver utterances sequentially. Luria forced them to pick up cards sequentially, which through exercise gradually restored their speech ability [19]. This method shows how a verbal function that is lost because of injury to one brain region can be compensated for and then restored by the training of another brain region, which is thought to be initially responsible for physical, not verbal, activity.

Luria's invention shows that disrupted brain abilities can be compensated for by the activity in other brain regions. The same is applied to "disrupted" senses. This is the gift of neuroplasticity represented, at the level of the sensorium, by synesthesia. As Nicholas Carr put it,

> Thanks to the ready adaptability of neurons, the senses of hearing and touch can grow sharper to mitigate the effects of the loss of sight. Similar alterations happen in the brains of people who go deaf: their other senses strengthen to help make up for the loss of hearing. The area in the brain that processes peripheral vision, for example, grows larger, enabling them to see what they once would have heard [18] (p. 25).

Today, gadget developers try to exploit the phenomenon of synesthesia in order to help people with disabilities. For example, for visually impaired people, a device has been developed that can transmit the spectrum of colors and lighting around a person, along with spatial orientation, into the mouth cavity, by means of a lollipop-shaped device, and using slight electric stimulation [20].

Slight electric stimulation can be used not only for compensation of impaired senses but also for inducing senses that we are not certain are or were inherent to human beings. German scientists have developed a new device, the feel-space belt, which allows the wearer to feel the Earth's magnetic field and be oriented in the four winds, just like birds and bats are [21].

In another case, a Spanish avant-garde artist, Moon Ribas, has gotten a subdermal cybernetic implant that allows her "to feel" every earthquake on Earth in real time. In fact, the implanted device just receives "data from a custom iPhone app that aggregates seismic activity from geological monitors around the world. She describes the physical sensation as akin to having a phone vibrate in your pocket. The stronger the quake, the stronger the vibration", the report says. Ribas' new ability is called "the seismic sense" [22].

So far, such manipulations with the sensorium do not amount to a truly new sense. The feel-space belt just transforms the magnetic currents into vibrations that the body can easily perceive; the seismic implant does the same. In reality, the devices produce just a cognitive effect induced by the physical impact on receptors of the "old" sense, which is tactility. It is safe to say that this transition of meaning of one "sense" via the other sense is symbolical. It requires time and effort to recognize and learn the "content" of the signals, while the real, natural senses are immediate for perception, as they require no symbolic interpretation.

More interestingly, these experiments allegedly restore to humans the senses of the magnetic field and seismic activity that are presumably inherent to biological beings. These sensorium augmentations just improve human physiology (the report calls Ribas' new seismic-feeling ability "a superpower").

However, electricity allows a pushing of the boundaries of the human sensorium, or even an exceeding of them. An electronic bracelet called the Pavlok punishes the wearer with a slight electric shock (they call it a "zap") in case the wearer passes a deadline, or smokes when having pledged to quit, or breaks some other rules established by themselves (so far just by themselves). The device is designed to facilitate the fight against bad habits [23].

In fact, these slight irritants induce a fear of punishment that fosters a sense of guilt. Maybe this can be described as a new type of synesthesia, something opposite to ideasthesia, because in this case the sensory stimuli evoke cognitive experience. For now, the punishing bracelet has been being programmed by the owner for certain displays of bad behaviour to get a negative reaction. Becoming more sophisticated, such a device could take upon itself more responsibility in making decisions on what is bad and good for a human, finally ending up in violation of Asimov's First Law; the subjugation of humans for the sake of their well-being is one of the alleged scenarios of the rebellion of the machines.

The electrical extension of the sensorium cannot but will go further. Moscow engineer Vlad Zaitcev has inserted a payment chip under his skin to pay subway fare. He also was reported to be planning to insert a bank card chip into his other hand [24]. Zaitcev has become one of the hundreds of today's real cyborgs [25]. Sooner or later, the development of payment implants has to bring to bionic people the sensory perception of a bank balance. Heating or vibration could indicate the state of account, similarly to what the feel-space belt does. Then, thanks to synesthesia or because of the development of cognitive interfaces, people may learn direct, not just symbolical ways of experiencing their financial state (or whatever will exist in place of finances).

The acquisition of this *financial sense* would well correspond to the logic of media evolution. It is the same for other, for now unknown senses, which still have to appear in order to further extend the sensorium in the digital environment.

3.3. Immersive Media

In August 2015, the beer company Stella Artois constructed "a big white dome" named "Sensorium" in downtown Toronto. Here is a description of the project:

> A multi-course dining experience with beer and food pairings where each dish will be inspired by one of the five senses—sight, sound, taste, touch & aroma. Within our sensorial dome, guests will be immersed in a 360 degree experience, surrounded by video and interactive elements that will engage and amplify all of the senses throughout the night [26].

Brands and entertainers seek to immerse consumers in the experience of artificial reality entirely. Today, 4D and 5D movie theatres (even 7D movie theatres exist) offer an almost full package of sensorium stimulation. "Spectators" are being shaken, touched, blown with hot or flavoured air, poured on or sprayed with water, and moved down and up according to what is going on onscreen. Artfully combined and synchronized, these impacts together create the effect of being present in an imaginary world created by the movie. The effect of presence or co-sensation—this is what arts, or literature, or movies, or media have always been seeking to achieve.

However, 3D, 7D—or speaking precisely, 5-Senses (5S) simulation—is just an exercise in shifting human perception from the real world to an artificial one. This exercise is in an interim stage, which nevertheless shows the direction of media evolution. The 5S simulation still uses the physical stimulation of nerve endings. It is still as biological as in the real world, even though the reality of 5S immersive media is artificially induced. Observing other oncoming digital media technologies, we can say that the time is coming for the stimulation of nerve "beginnings", not just endings.

3.4. Augmented Reality

Improvement of the "natural" sensations, followed by an augmenting of the sensorium with new electrically induced senses, logically leads to the development of the phenomenon of augmented reality. From enhancing and augmenting senses, media evolution has to move toward enhancing and augmenting surroundings. The trend is obvious—creation of a new capacity of the body is not enough, since the creation of the entire world in the digital space has become affordable. Instead of representation of reality in the human mind, media evolution leads to the representation of the human mind in the induced reality. Video games and social media have paved the way. They insert "a representative" of the user into the reality of the game or social interaction. The augmented reality technologies facilitate this process at the level of the sensorium. As *Wikipedia* puts it,

> Augmented reality is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data [27].

For a McLuhanist, augmented reality can be seen as the further extension of the central nervous system, but with a new, significant trait. For the first time in the entire evolution of sensations' mediation, the improvement has neither been done on the side of human, nor been attached to a certain sense. With augmented reality technologies, the improvement entirely occurs "on the side" of the reality (or at least somewhere between the sensorium and reality). McLuhan's extension of the human body starts transcending the bounds of body and transiting into the surroundings. Everything described before has related to the augmented sensorium; now it comes to augmentation of reality itself.

According to McLuhan, Innis, and other media determinists (even if they rejected this title), any media (better to say *mediums*) are able to shape environment, but they do this just metaphorically or via some physiological, social, or cultural impacts. With augmented reality, media starts shaping environment literally, directly, and immediately. At today's stage, this is just the addition of some induced objects or data into the picture of the surroundings. The next stage of media evolution, the technologies of virtual reality, combine the immersive media idea of full sensational immersion with the augmented reality idea of digitally shaped reality.

3.5. Virtual Reality

Media evolution leads us to gradual resettling from the physical world to the "best" one, which is the virtual one; **from the given, through the represented, to the induced**. Along the way, media evolution sentences us to be entirely immersed into this new environment with all our five (or more) senses, just as we have existed in the real world, until now.

In the present day, the most advanced technologies that can implement these ideas are technologies of virtual reality. They are already capable of resettling us into the induced world without any real world "earthing". As *Wikipedia* puts it,

> Virtual reality, also known as immersive multimedia or computer-simulated reality, is a computer technology that replicates an environment, real or imagined, and simulates a user's physical presence and environment in a way that allows the user to interact with it. Virtual realities artificially create sensory experience, which can include sight, touch, hearing, and smell [28].

Interestingly, classical dictionaries fail to define fast-emerging phenomena of this kind, relinquishing this function to *Wikipedia*. People who develop the technologies also hardly worry about solid definitions. But even *Wikipedia*, that tremendous enterprise of collective thought, is not able to cope with the nuances of newly arising technologies. Thus, *Wikipedia* tries to present the concepts of virtual reality and immersive multimedia as synonymic, which is obviously not the case. Immersive media (or multimedia), such as the Stella Artois sensorium dome or 5D movie theatres, clearly differ from such technologies as virtual reality headsets. To distinguish immersive media from virtual reality, it may be said that the immersive media technologies create the induced reality **for the human body**, while the virtual reality technologies create the induced reality **for the human mind**. Indeed, immersive media together with all previous technologies of enhancing sensations induce new sensations of reality by stimulating nerve endings, while virtual reality induces an altered reality by stimulating nerve "beginnings" (almost; the full effect will come into play after a cognitive interface is developed as part of the achievement of a direct mind-machine wiring).

Virtual reality is most often used for play or training. Both of these sorts of activities are aimed at simulating a new reality for which humans should be prepared. In a more abstract and philosophical sense, the virtual reality technologies offer humans training for resettlement into an induced world.

4. Transcending Human Biology

People still act in virtual reality in a mostly natural way, as "physical beings", which is obviously predefined by their (our) previous experience. Moreover, the content of the virtual reality is still physical reality.

This reflects McLuhanian ideas of interplay between the new and older media. "The content of any medium is an older medium", as Eric McLuhan put it in the preface to his and Marshall McLuhan's *Laws of Media: The New Science* [29]. Marshall McLuhan himself declared that, "The content of the press is literary statement, as the content of the book is speech, and the content of the movie is the novel" [7] (p. 267). Similarly, in the chapter devoted to the development of the phonograph, in *Understanding Media*, McLuhan described the expectations related to the phonograph in the late 19th century:

> It was conceived as a form of auditory writing (gramma—letters). It was also called "graphophone," with the needle in the role of pen. The idea of it as a "talking machine" was especially popular. Edison was delayed in his approach to the solution of its problems by considering it at first as a "telephone repeater"; that is, a storehouse of data from the telephone . . . [7] (p. 305)

But afterwards, the phonograph ceased to be providing just an enhanced version of something performed by the older media. Developing this line of McLuhan's thought, we can assume that it was the phonograph and its descendants (the tape recorder, etc.) that created the sound-recording industry, making their contribution to the emergence of show business and the entire pop culture with its cult of celebrity, which in turn changed culture, social life, and politics, as is masterfully exposed by Neil Postman in his *Amusing Ourselves to Death: Public Discourse in the Age of Show Business* (1985). (In the same chapter about the phonograph, McLuhan wrote: " . . . entertainment pushed to an extreme becomes the main form of business and politics" [7] (p. 306), as Donald Trump has demonstrated.)

Starting with satisfaction of old needs, a new medium creates a new environment that unfolds media capacity, which is authentic specifically to this new medium. The environment always pays back. As for digital reality, inhabitants create a habitat and thereafter the habitat recreates its inhabitants, to make them compatible. It is not an opportunity, but a necessity.

Applying such McLuhanian speculations to the self-evolving interplay between media and the sensorium, we will come with necessity to the question: which new properties of the new environment will reshape which properties of human beings, how, and with what outcome? Thus, the McLuhanian approach allows us not just to explore but also explain and predict possible (in fact, inevitable) changes in the human sensorium. What ultimate conditions of the environment are thinkable, if this environment is "enhanced" so far that it can entirely and controllably be recreated in the digital "space"?

Answering these questions, we will get a notion of the future human being. After all, it is not that difficult, since we already can trace existing and oncoming properties of the digital world. In terms of their impacts on humans, they lead to:

- escape from the given reality and, as a consequence, the abandonment of the body;
- transition from biological networking to social networking and development of the social sensorium instead of the biological one;
- escape from the "physical" time-space continuum, followed by the full liberation of time-space navigation.

Which possible, or, better to say, required properties of the sensorium can and have to support these conditions and requirements of the digital reality, if a person gets immersed in there entirely? What changes in senses may and have to happen? These questions also relate to the media and therefore belong to the set of questions that need to be answered " . . . in order to understand how and why it is metamorphosing man", as McLuhan said in the *Playboy* interview about media impacts in general [4].

4.1. Angelism and Dismissal of Gravity

While media have had to do with the given reality, they have been expected to enhance the body's perception of physical surroundings, as the feel-space belt does. But "electronic man has no physical body", as McLuhan put it [30]. In an interview to Father Patrick Peyton in 1971, McLuhan said,

> <Electric media> give you a sort of dimension of an angel, an almost supernatural being, a disembodied spirit. In the electric age, man becomes a kind of disembodied spirit [31].

This angelic condition of the digital human being, in fact, has to undermine this world's physical basics, such as gravity, for example.

The absence of gravity is not unfamiliar to people, thanks to space exploration. However, the absence of gravity also can be created in the digitally induced reality of video games. After playing a 3D-flying shooter game for a long enough time, gamers may experience a sense of flight, as though it were real. In digital reality, the "movement" up and down has to be as easy as any horizontal movement.

The transfer of the gravity concept to the digital world still reflects the habits of physical beings and will be overcome completely, sooner or later. As physical weight is irrelevant in digital reality, gravity will not just be overcome—it will be completely dismissed.

In parallel, it is interesting to watch what happens to the metaphor of gravity in social relations. The "social gravity" of the pre-digital society created the structure of relations describable through the concept of a pyramid: the massive bottom, the authoritative top, somehow equalizing each other. The vertical, offline organization of authority clashes with the horizontal online organization of authority on the Internet, which again still reflects the "gravitational bias" of physical being. In fact, the Net shapes not the horizontal but the cloud-like structures of authority, with its heavy centers and

dispersed peripheries. In the digital world, social coherence will be run by peer-to-peer authoritative gravitation, not by top-down authoritarian gravity.

4.2. Navigation in the Digital Space: From Physical to the Social Dimension

The digital space is filled not with physical objects but rather with humans themselves (and also with algorithms, many of which seek to act like humans). That is why digital reality will gradually have ceased attempts to simulate physical reality, and will develop its own characteristics; not time-space ones, but rather timing-spatial ones. It goes well for the concepts of gravity, of distance, of direction, of duration and timespans.

In digital reality, distance, directions, duration, and timespan turn from physical characteristics to social characteristics; they represent the distance between people (or their utterances), directions toward others or crowds, time passed after someone's actions, etc.

It is interesting to note that the sense of the Net tends to be rather more temporal than spatial. The nearer one is to the source of significant information, the more efficiently one will get responses (in the form of shares, comments, etc.) Time is becoming a category of distance. Earlier means closer. Everyone has to share significant items as early as possible in order to be a part of society. Acting in this way, people socialize themselves and at the same time serve each other. Digital tools very much facilitate this human need, which is placed on the very top of Maslow's pyramid.

Human perception of the digital space is mediated by other humans and algorithms. Being put into the digital space completely, the augmented reality turns into the augmented humanity, which is a nice term coined by Google CEO Eric Schmidt [32].

Not without reason, speaking of the "angelism" of humans in the electric environment, Marshall McLuhan related this angelism to humans' shared omnipresence: "I don't think our institutions have any way of coping with this new dimension of man . . . the angelic discarnate man of the electric age who is always in the presence of all the other men in the world" [31].

Paraphrasing other utterance of McLuhan's, we can say that the best, ultimate extension of man is another man (until algorithms, on behalf of man, intervene and capture this function). In digital reality, humans are the best media for each other: *homo homini media est*. That is why the sensation of physical objects has to be replaced with the sensation of others of our kind in the environment that tends to be purely social, not physical. This is what has to reshape the human sensorium completely.

4.3. Social Dimension: The Sense of the Others

In the blogosphere and social media, we almost already experience a sense of social gravitation. This observation brings us to the conclusion that with the transfer from the given reality (through the represented reality) to the induced reality, we inevitably have to switch from the biologically-based sensorium to the socially-based sensorium.

In the digital reality, the need for social cohesion will provide people with a sense of social gravitation, by means of which they will learn how to sense the direction toward each other (or out of each other) in the socially networked space. Connecting to the social network, we will have to experience "sensually" the distance to those speaking or the currency of what is said. We will have to sensually perceive the massiveness, or virality, of a topic. We almost already can feel it now, looking at the number of likes and reposts, but in the future, it will have to be a particular sense, similar to how we feel the crowd at a stadium or in a subway; or how we feel the emptiness of an empty room. Such indicators as numbers of likes, shares, and reposts may turn to the sensors of the new, social-based sensorium.

The sense of social coherence will enhance the social–spatial orientation, but also will nurture the sense of social resonance, which will be subordinated to the timing of wave-shaped social activities. By the way, this wave-looking pattern of activity will form a "digital calendar" to replace the solar–lunar calendar (which has already been very much spoiled by electricity).

The transformation of the biological sensorium into the social sensorium is worth additional exploration. In the context of this paper, it is important to chart this tendency as a continuing and inevitable way for the sensorium to be adapted into the realm of digitally induced reality.

4.4. Social Dimension: The Thirst for Response

Marshall McLuhan used the myth of Narcissus to explain humans' addiction to media. According to him, "men at once become fascinated by any extension of themselves in any material other than themselves" [7] (p. 45).

As has already been said above, the best, ultimate material for man's "extension" is another man. Many researchers note, for example, the narcissistic nature of the selfie, which looks very similar to the original myth. But in fact, the most important aspect of taking selfies is the subsequent sharing of it in the hope of getting responses from others. The phenomenon of the selfie does not exist without its publication. Reflection in others, not just on the screen of a smartphone—this is what the selfie is, in essence.

Any human interaction may have its certain purpose, but interaction itself is not achievable without the exchange of reactions. Reacting to each other's signals is essential for human enrolment, as well as being the basis for both individual and group survival. For the sake of socialization, people seek response and spend their talents, time, and effort in pursuit of better responses. This thirst for response helps human beings to be social beings [33].

The thirst for response is the same driving force that Hegel called the "struggle for recognition". In order to get a response, people choose to share the best of what they come across. It may be said that people experience the thirst for response on a sensual level. It is the sixth sense—the social sense. Sufficient or insufficient satiation of this thirst can prompt action and bring people stress or pleasure. The Internet provides new, quick, and inexpensive opportunities to satisfy this thirst. However, it is a thirst that is never fully satiated, because socialization is not a product, but a process.

If the sense of others allows the "feeling" of digital distance and direction toward significant people and events, i.e., allows orientation in the digital–social space, the thirst for response is a sort of inducement for people to act in induced reality.

5. Conclusions

By advancing the concepts of visual space and audile-tactile space, Marshal McLuhan created an intellectual space for explorations, probes, and speculations about the interaction between humans and media. Being sharp, sometimes controversial, sometimes provocative, and always thought-provoking, his ideas resonate with a huge number of theories in many others areas of human thinking.

As mass media, to use a metaphor from Clay Shirky, is "the connective tissue of society" [17] (p. 54), media in general have been the connective tissue for civilizations throughout time, space, and cultures. The history of humankind can be seen as a big journey along the waves of media technologies. The McLuhanian approach allows for a fuller study of this journey, and even a description of its future. Many arriving media technologies justify what McLuhan witnessed, despite his having barely caught the first personal computers.

Now media are not seen just as information carriers. Contemporary media literally create reality. They demonstrate this "assignment" unabashedly, even in name, as *immersive* media, or augmented *reality*, or virtual *reality*. McLuhan described this phenomenon when it was not so obvious.

Tracing the trends noticed by McLuhan into the future, we can separate several important areas of future research. The list of these, of course, is indicative, but not complete.

5.1. The Resettlement into the Digital World

As McLuhan stated, electric media return humans into the preliterate state of being within a natural-like environment. The trick is, it is not the natural environment; so, in fact, humankind moves to some next stage of media evolution. The reality of electronic media is not given. It is the

induced reality, the digital world, in which humans are about to resettle completely. Thus, any media exploration, being done fairly enough and far enough, with necessity leads to the ideas of mind uploading, Transhumanism, and the Singularity [34].

The great resettlement, or the new exodus, hovers behind any media study, be it devoted to the decline of newspapers, or media impacts, or media literacy. The acceptance of this seemingly provocative thesis helps to explore and develop any media phenomena in the right light. The resettlement will be followed by drastic changes to human and social natures; among them the change of the sensorium represents only a tiny part of what is coming up. (An important note: any upcoming iteration of the future has to be linked to its time horizon. Things have to happen in the right order, timely, and should be perceived so, for the sake of psycho-hygiene. Realizing proper sequences for the future can help prevent future shock, which is about the inevitable, due to increasingly accelerating historical time.)

5.2. Time-Managing Sensorium

Time is one-dimensional for a biological being, for whom it exists only in the form of "now". The sensorium has had to do with space mostly. Humans have had a notion of time projections of the past and the future, but these projections have all the same been represented only in the "now"—by means of the arts, imagination, memory, and grammar.

As any time is "now" for the biological being, any space is "here" for the digital being. Moreover, time has to be manageable for the digital being in the same way as space is manageable for the biological being.

Humankind has already developed some capacity to make time more elastic: art, medicine, education, cosmetic surgery, finances (loans and derivatives), the entire subculture around aging, etc. But the real notion of manageable time has come with digital media, particularly video games. They do not just already dismiss gravity; they also are able to speed up, slow down, reverse, stop, skip, and repeat time. Of course, these properties of video games obviously link to the ideas of angelism and discarnate man, expressed by McLuhan in the 60 s. Electrical man has already achieved the God-like ability of omnipresence.

The sensorium must perform this flip-flop soon, with the implosion of the spatial "everywhere" into "here" and the explosion of the temporal "now" into several time dimensions, with the different characteristics of velocity, flow, continuity, direction, etc. We are somewhere at the very beginning of this incredible shift.

It is still hard to imagine what kind of adaptation will happen to the sensorium to fit the new time dimensions. But this is not about the far futuristic future; some things are already occurring. Time (attention span) already is the measure of value in the digital realm. The currency of future digital economics will be clearly related to time-spending. Time compression, or extension, or repeating, or stopping, or reversing, or skipping will be the main goods in such an economy.

Preliterate media are space-biased and time-ignorant. Alphabet-based media are time-space biased. Digital media are time-biased and space-ignorant. These traits of theirs, by the way, are already causing not just changes in the sensorium, but also social unrest and intercultural clashes around the world [35].

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