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***Angels and Robots:
Bio-extension Revisited in the Age of Communicating Objects***

In the mid-1970s, Marshall McLuhan proposed to revisit his foundational text, *Understanding Media*¹, a decade after he had published it, in order to address the generation that had experienced the transition from visual space to acoustic space. In the resulting book, *The Global Village*, written with Bruce Powers, McLuhan sought to develop the implications of the notion that “the extensions of human conscious were projecting themselves into [a] total world environment via electronics.”² Much of this is familiar from *Understanding Media*; to this material, McLuhan added his increasing interest in theories of left versus right brain hemispheres,³ such that acoustic space is associated with the right hemisphere of the brain, which is the hemisphere that supports synchronic thinking in terms of patterns and configurations, and visual space with the left hemisphere, which is diachronically logical and linear in orientation. McLuhan argues that, with our increasing dependence on media such as computers to do our left brain thinking for us, “knowing itself is being recast and retrieved in acoustic [right brain] form” (*Global Village* 14).⁴ This trajectory of McLuhan’s thought is echoed in current thinking about the effects of the computer on thought patterns. Researchers have suggested that the shift to the creative economy, which is associated with the theories of Richard Florida,⁵

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Left Hemisphere (Right side of body)	Right Hemisphere (Left side of body)
Speech/Verbal	Spatial/Musical
Logical, Mathematical	Holistic
Linear, Detailed	Artistic, Symbolic
Sequential	Simultaneous
Controlled	Emotional
Intellectual	Intuitive, Creative
Dominant	Minor (Quiet)
Worldly	Spiritual
Active	Receptive
Analytic	Synthetic, Gestalt
Reading, Writing, Naming	Facial Recognition
Sequential Ordering	Simultaneous Comprehension
Perception of Significant Order	Perception of Abstract Patterns
Complex Motor Sequences	Recognition of Complex Figures

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¹ McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964).

² McLuhan and Powers, *The Global Village: Transformations in World Life and Media in the 21st Century* (N.Y.: Oxford UP, 1989) vii.

³ McLuhan’s interest in these theories was received with considerable derision at the time, which reflected their reception in the scientific community generally, when neuroscientists Roger Sperry and Michael Gazzaniga proposed their hemispheric theory in 1962. In 1981, when Sperry received the Nobel Prize for his research, he noted that, when he began his research in the 1960s, the right brain was considered to be “not only mute and agraphic but also dyslexic, word-deaf and apraxic, and lacking generally in higher cognitive function.” See Jonah Lehrer’s summary in *Proust was a Neuroscientist* (N.Y.: Houghton Mifflin, 2008) 177-8. Note also “Sensors and Sensitivity” in *The Economist Technology Quarterly* (6 June 2009) which proposes that “Some computer scientists look forward to the day when mobile phones and sensors can provide a central nervous system for the planet” (22); nearly half a century ago, McLuhan had proposed that “electric circuitry [is] an extension of the central nervous system.” See *The Medium is the Massage: An Inventory of Effects* (N.Y.: Bantam, 1967) 40.

⁴ McLuhan’s notion that electronic mediation must be understood in the context of the increasing dominance of the right (non-verbal) hemisphere of the brain emphasizes that he was not seeking to produce a linguistic or language-based theory of mediation as has been suggested by W. Terence Gordon.

⁵ Richard Florida, *The Rise of the Creative Class* (2002); *Cities and the Creative Class* (2005); *The Flight of the Creative Class* (2005).

reflects our increasing reliance on computers to do our left brain functions—the logical, linear half of our brain—freeing us to use the creative side of our brain more fully.

The most important factor in McLuhan’s theory of mediation is that of bio-extension.⁶ media extensions are *embodied*.⁷ McLuhan’s central argument is that electronic mediation has prosthetically extended our body, and thus our consciousness, through the extension of the sensorium⁸, to the point that we live in a totally embodied cosmos, but that by virtue of this extension our bodies are now *outside* us in a way that is mimicked by the current move toward cloud computing,⁹ that is, to a mode of computing whereby the processing activity is outside the individual computer in large, amorphous “clouds” of computers.¹⁰ What is crucial to note here is that computing has extended *itself* through this process in what can only be considered the next stage of bioextension. Computers, in effect, have become the new *bios*.

⁶ The “extended” (or “wide”) model of human cognition argues that “cognition can and often does depend directly or constitutively on the non-brain body and structures outside the body.” According to this model, “Consciousness is a way of being actively related to the environment; it depends on inner states but is not itself an inner state. Its locus is therefore not the brain, but the body in active engagement with the world.” Thus, “the substrates of consciousness are not exclusively neural, but extend physically and functionally beyond neural systems to include the non-neural body geared into its environment.” The “extended mind theory” was first proposed by Andy Clark and David Chalmers in 1998; it proposes that “cognitive processes can include structures outside the body as proper parts of the information-processing routines undertaken to solve a problem or carry out a cognitive task.” These notions are not universally accepted, especially by those who support a “brainbound” position, leading thus to debates about the degree of embodiment involved in cognition and consciousness. See Evan Thompson, “Sensimotorists,” *Times Literary Supplement* (26 June 2009) 29, reviewing Andy Clark, *Supersizing the Mind: Embodiment, Action, and Cognitive Extension* [Oxford 2009], and Alva Noë, *Out of Our Heads: Why You are Not your Brian and Other Lessons from the Biology of Consciousness* [Hill and Wang, 2009]).

⁷ McLuhan thus anticipates “biomodernity” as it has been developed by such theorists as Foucault and Deleuze and Guattari (who acknowledged that they were influenced in this by McLuhan) as well as, in another register, by Giorgio Agamben in *Homo Sacer: Sovereign Power and Bare Life* (Stanford 1998). In their conception, according to Catherine Ingraham, “the ideological is now holding hands with the biological” (9); this “biotechnical entity is potentially sinister in its ascendancy through science and disregard for protocols and humanities, and yet, also, subject to a provisional political coherence” (11). See “Last Man Standing,” *Log* (Winter 2008) 7-13.

⁸ The extension of the body is an extension of consciousness following generally from theories of right and left hemispherical brain functions and specifically from Damasio’s assertion that consciousness is first of all embodied, rather than secondary to a disembodied process of intellection.

⁹ Nicholas Carr, in *The Big Switch: Rewiring the World, from Edison to Google* (N.Y.: Norton, 2008) describes cloud computing as both the coming together of computers through the internet, and the immense servers maintained by companies such as Google. “Now that data can stream through the Internet at the speed of light, the full power of computers can finally be delivered to users from afar. It doesn’t matter much whether the server computer running your program is in the data center down the hall or in somebody else’s data center on the other side of the country. All the machines are now connected and shared—they’re one machine. As Google’s chief executive, Eric Schmidt, predicted way back in 1993, when he was the chief technology officer with Sun Microsystems, ‘When the network becomes as fast as the processor, the computer hollows out and spreads across the network’” (60). Schmidt in fact coined the phrase “the computer in the cloud” by which he meant that “computing, as we experience it today, no longer takes a fixed, concrete form. It occurs in the Internet’s ever-shifting ‘cloud’ of data, software and devices. Our personal computer, not to mention our BlackBerry, our mobile phone, our gaming console, and any other networked gadget we use, is just another molecule of the cloud, another node in the vast computing network” (Carr 113).

¹⁰ The cloud reference is likewise environmental, as is the current concern that the “world is running out of airwaves for cellphones and devices like the BlackBerry as more and more data fly through the ether, which will lead to battles for the last scraps of space.” This comment, from the front page of *The Globe and Mail: Canada’s National Newspaper* (22 July 2009) duplicates exactly the discourse about the environment that emerges from the ecological movement.

The “involving” aspect of this production model of mediation signals the re-calibration of the sensorium from the visual dominance imposed by print media, with tactility functionalizing the recalibration of the sensorium, and this provides a basis for understanding the explosion of growth in handheld devices such as the mobile phone. The mobility of these devices can be understood bio-extensively: they facilitate the movement of the *people* who hold them and the information they access. And their “phonic” dimension relates to acoustic *space*: increasingly these devices (and smartphones paradigmatically) are used to communicate with other devices and applications in non-Euclidean (local / global) space¹¹, and not primarily to facilitate communication with other people.¹²

The environment as bio-technological extension presents for McLuhan the notion of an embodied mediation. If this bio-technological extension, this environment, is understood as cultural, rather than natural, then its effect is to promote the notion of culture as a *continuation* of nature, rather than its overcoming. This position has gained increasing validity within biological theory.¹³ Freeman Dyson writes, in “Our Biotech Future” (2007),¹⁴ that “the domestication of high technology ... [will] soon be extended from physical technology to biotechnology” (4), and he predicts that “the domestication of biotechnology will dominate our lives during the next fifty years at least as much as the domestication of computers has dominated our lives during the previous fifty years” (4).¹⁵ In the future that Dyson predicts, “Designing genomes will be a personal thing, a new art form as creative as painting or sculpture” (4). Cultural evolution, in this modeling, has replaced biological evolution as the main driving force of change. Cultural

¹¹ The current shift toward “long-term evolution” (LTE) is meant both to enable the downloading of immense quantities of data faster than ever before and to bring the world together on a single mobile standard. According to Motorola executives, “not only will access to all multimedia content and applications be available anywhere, but the wall between wired and wireless will come down” (quoted in David Ebner, “Gold in the Rubble: Even as Nortel’s business model imploded, the company remained on the cusp of the wireless revolution,” *The Globe and Mail* (25 July 2009) B4. The metaphor of the “wall” has a significant resonance in McLuhan’s work; McLuhan was struck by André Malraux’s notion of the artbook as a “museum without walls” because it encapsulated the immense reconfiguration of space that electronic mediation was making. In its most extreme form, this reconfiguration was the “global village,” which implied for McLuhan an oscillation between local and global that was at once dynamic and horrific. As he put, “EVERY-WHERE IS NOW-HERE” (*Take Today: The Executive as Dropout*, with Barrington Nevitt [Toronto: Longman, 1972] 297). The fact that the notion of communication without walls arises from an art historical treatise emphasizes not only that the pre-history of media studies is to be found in art history (where the notion of the “medium” has a long pedigree), but also that electronic mediation was, in McLuhan’s understanding, addressing one of the oldest quests of art itself, which was the verisimilar reproduction of reality. Electronic media, according to his theories, have created a vast artifact which we now call “nature” and in which we now find our being. I develop these notions in the chapter “Art Without Walls,” in *McLuhan in Space* (170-196) and in “McLuhan Motion e-Motion,” paper delivered at the conference “Media in Motion,” University of Potsdam, 23 May 2009.

¹² The fact that there are currently 65,000 applications available for the iPhone emphasizes the informational function of these mobile technologies.

¹³ Here I draw on my chapter “McLuhan and the Body as Medium,” in *Sk-interfaces: Exploding Borders—Creating Membranes in Art, Technology and Society*, ed. Jens Hauser (Liverpool UP and FACT Gallery, 2008): 32-41.

¹⁴ Freeman Dyson, “Our Biotech Future,” *New York Review* (19 July 2007): 4-8.

¹⁵ This view is shared by Robin Milner: “Such [communication] systems will ... contain natural organisms. [W]e already mentioned people with phones, and we should also include more elementary biological entities. We should seek to model not only interactive behaviour among artificial agents, but also interaction with and among natural agents. Ultimately our informatics modeling should merge with, and enrich, natural science” (*Space and Motion* [Cambridge UP, 2009] viii). The founders of Google likewise evince a desire to achieve the “melding of their technology with the human brain itself” (Carr, 211-2). As I argue herein, however, that achievement would simply be a refinement of what has already been attained through cloud computing, which has facilitated the extension of computers themselves. To put it another way: the point is not the *intelligence* of computing systems but their ability to *reproduce*. The fact that intelligence is invoked repeatedly as the sign of progress or of danger emphasizes that the Cartesian or left brain model is alive and well in artificial intelligence [sic] circles.

evolution is not Darwinian. Cultures spread by horizontal transfer of ideas more than by genetic inheritance. Cultural evolution is running a thousand times faster than Darwinian evolution, taking us into a new era that will be characterized by the cultural interdependence of biology and technology.