The coming of the Mundane Cyborg

La llegada del Ciborg Mundano

Steven Mentor
Evergreen Valley College

ABSTRACT

A number of scholars have attempted to outline both a field of "cyborgology" and a set of dominant concerns and tropes concerning the phenomena of accelerating human-machine hybrids. This article argues that, in contrast to popular conceptions of cyborgs as extreme, posthuman monsters, the cyborg concept can be usefully applied to mundane technologies such as automobiles, and that the proliferation of these "mundane cyborgs" is an important consideration in theorizing the cyborg. The essay offers some definitions and typologies of cyborgs, and applies these to the notion that automobiles are exoskeletons with cyborgian consequences.

KEYWORDS

Cyborgology, cyborg, automobiles.

RESUMEN

Varios estudiosos han perfilado la "ciborgología" como el conjunto de las principales reflexiones sobre el fenómeno de la hibridización acelerada entre humanos y máquinas. Este artículo sostiene que a diferencia de las imágenes populares de los ciborgs, en las que prevalecen represen-

taciones exageradas de monstruos poshumanos, el concepto es extensible a las tecnologías coti-dianas, como los automóviles. También se plantea que la proliferación de estos "ciborgs mundanos" supone un hito de máxima importancia en la propia ciborgología. Para apoyar esta idea propongo algunas definiciones y tipologías de los ciborgs en las que me baso para argumentar que los automóviles, ejemplo de ciborg mundano, son exoesqueletos con consecuencias "ciborgizantes".

PALABRAS CLAVE

Ciborgología, ciborg, automóviles.

The cyborg salon

Come in. Sit down. Imagine this is the cyborg salon; choose a time period! You could select, say, 1991; imagine humans typing away on their boxy tiny screened Mac SE's, watching as text-based multiple user domains (remember LambdaMoo?) allow them to [enter] the bar and have the auto-bartender "offer you a beer." Text based beer is always flat; oh well! Still, the clientele would include the regulars: the Terminator T-100, hopefully clothed in skin; RoboCop, trying to re-member his human past and speaking even more mechanically than Arnold; the Six Million Dollar man, a bargain in current dollars, with his test pilot insouciance all too humanly in place, perhaps chatting up the Bionic Woman.

Or what if we choose another time period; 2000, say, or even the "today" of this writing, September 2010? The place is crowded! And we have to keep our wits about us here. For one thing, many of these cyborgs are still monstrous; for another, many of them are bristling with weapons, or missing key components of the human face or body. To make matters worse, each of these cyborgs is forced, by the nature of the occasion, to carry a heavy load of representational baggage. Besides bearing the marks of their corporate and military parents, they haul about the scars and signs of weighty discourses: gender, race, science, technology, communication, control, the nature of humans and the fate of the posthuman. With all these decals and stickers of dis-course, they look more like racing cars than dinner guests. Some are even rats, or worse, cockroaches.

And there is another worry here, along the lines of the old Woody Allen joke: "I would never belong to a club that would allow people like me in." The cyborg salon, or bar, or hyperclub, still has its media superstars, just more of them: Cyborg from Teen Titans is there (perhaps with a fake ID) hanging out with the T-1000 from Terminator 2, and that bratty cyborg kid Syndrome (from The Incredibles) is talking cyborg bona fides with the guy from Avatar who trades his wheel chair in for a machine that lets him inhabit another body (though it takes old school magic to let him stay in that body). But just outside, beyond the velvet rope policed by cyborg bouncers (picture the jacked up and enhanced muscle boys from the cyborg novels of William Gibson or the paramil-itary cyborg Envoys from Richard Morgan's cyborg trilogy), there's a line of non-A list folks. Should we let them in? What would that do to the way people view the club? And how would Darth Vader (and Luke Skywalker, his cyborg son) react to having a cyberdrink with the Iraqi war veteran walking on carbon legs, with the gaggle of cyberteens glued to their iPhones and texting away, oblivious to the menacing scowls of Claude van Damme's more famous cyborg soldier?

Get used to it, is what I say. The Cyborg Salon has dropped its fiber-optic velvet rope. Say hello to the Mundane Cyborgs.

What do we talk about when we talk about cyborgs?

As a literary critic (though that is only one of my hats, I promise!), I approach texts like the Terminator films, television like the Six Million dollar man or Mann and Machine, and cyborg novels like Altered Carbon and George Alec Effinger's When Gravity Fails in the same way I read Superman comics: part escapist entertainment (what if I could fly and wear colorful spandex?), part indirect reflection on contemporary human concerns (even I/Superman could die from cancer/Kryptonite, no matter how much more super my health care plan and contemporary science/superpowers are than my father's/grandfather's time). Mary Shelley's Frankenstein is after all a novel about what happens when fathers abandon their children (we know this partly because she said so) as much as it is a novel about a world where technoscience can create living beings. That the sciences might develop in the years following her Gothic page turner to literally enable the creation of new living things out of bits of organic material (Dolly the cloned sheep, pharm-goats that manufacture insulin along with goat's milk, genetically engineered name-living-thing-here) was not high on her novelist's radar, though we've come to see that fiction allows for the exploration of possibilities and concerns regarding technologies, and thus is a resource for approaching the actual deployment of things like killer drones, neural remote controls for Parkinson's patients, and In Vitro Fertilization techniques.

So when we move from the cyborgs with star status, to the "cyborgs" in daily life (both its extremes, as in Iraq war amputees with prosthetics, and its utterly mundane elements, me with my Blue Ant bluetooth, Iphone with video camera and SMS text capability, driving myself and my trusty laptop sidekick to the café for a date with a wireless network), we can ask: what is the connection? Do these fictional and speculative cyborgs help us in any real way deal with "actual" human-machine combinations? And conversely: to what extent are we blinded by the clichés of these more famous cyborgs, so that we miss cyborg narratives and trends right under our noses (or ears)?

A number of scholars have attempted to outline both a field of 'cyborgology' and a set of dominant concerns and tropes concerning the phenomena of accelerating human-machine hybrids. Chris Gray, Heidi Figueroa-Sarriera and I, in the introduction to The Cyborg Handbook, coin the term cyborgology as a way to bring into one space a wide range of texts and theorists, many of whom don't use the specific term cyborg. Of course this move is not "natural" in any way, but instead an implicit argument for the relevance and utility of the cyborg figure. The very act of asserting and constructing a body of thought related to cyborgs is itself hybrid, radically fictional and at the same time performative. Much of the writing on cyborgology in this and other collections repeats tropes of definition, typology, and cause-effect arguments.

Definition

The simplest definition of cyborg is a cybernetic organism, the melding of the organic and the machinic. This definition presumably rules out the study of things that have no organic components (for example, robots), and allows the crucial inclusion of nonhuman organisms, especially animals such as rats and lampreys, both currently important cyborg beings. The word cyborg was coined fifty years ago in 1960 by Manfred Clynes and Nathan Kline, in an article in Astronautics called "Cyborgs and Space." Rather than depend on creating artificial atmospheres in space, they argue for using cybernetic notions of human homeostasis to alter human bodily functions such as breathing. Imagine an internal osmotic pump to detect radiation and automatically inject protective drugs; psychic energizer drugs for wakefulness; an altered pituitary gland for hibernation effects; internal of fecal matter and intragastric feeding to reduce or eliminate waste. In each case the human - machine boundary would be seamless and unconscious, acting just as biological homeostatic systems do.

This first, ostensive definition of the cyborg as a technique for radically reconstructing humans to operate in unfriendly environs is one that allows the cyborg to include a number of human-machine hybrids also being developed in the early postwar world, those included in the field of bionics as articulated by Jack Steele (1960) among others. Steele's work on applying biological principles to machine design implies that at some future point, technologies will not simply appear to be alive, but the line between their agency and that of humans may become illegible. And another text well within the scope of the cyborg, "Teleoperators and Human Augmentation," uses the term teleoperator for a particular man-machine system with cybernetic feedback as its central design element (Johnsen & Corliss, 1967).

From the very start, the ostensive definition of a cyborg runs into trouble, and this definitional issue has continued to both hinder and enhance the field of cyborgology. In Johnsen and Corliss, the emphasis is on human control: "A teleoperator, in contrast, always has man in the control loop," unlike the astronautic cyborgs, whose surgically altered bodies render much of their actions unconscious (Johnsen & Corliss, 1967: 85). Other definitional conflicts include:

a) The notion of permanent connections of human and machinic/prosthetic, versus temporary or intermittent connections. Opening up the cyborg to the latter definitions leads to...

b) The problem of defining cyborgs minimally or maximally. That is, restricting the field of cyborgs to those human-machine constructs that have appeared since the inception of cybernetics itself (say, the late 1940's to present) and to those constructs that are permanent or semi-permanent, tends to emphasize the revolutionary nature of the cyborg and its liminal status. Widening the definition of cyborg to include the myriad ways in which, say, humans interact cybernetically with their nonattached tools, emphasizes the continuity of the cyborg as a figure

in human evolution, and at the same time threatens to occlude what is truly new and different about postwar technologies and their intimate effects on humans. Can someone with eyeglasses be a cyborg? Can someone using a pencil be a cyborg? If we assert that tool use is a two way street, and that tools are not simply "used" by humans but also shape the humans who use them, then this repertoire of effects between machine and organism certainly fall into the realm of cybernetic organisms.

c) The cyborg figure is often seen as a figure of prosthesis; that is, organic bodies are seen as platforms for additions, or growths. Yet both in science fiction and in cyborgology, this can lead to definitions that conflict. For example, the cyborg anthropologist Jennifer Gonzales and the science fiction writer Bruce Sterling both weigh in on what Sterling calls the "Shaper-Mechanist" debate. Sterling writes an entire novel (Schismatrix) and several short cyberpunk stories (themselves called the "Shaper-Mechanist" stories) in which the future of human beings diverge into either Shapers (those genetically altered and constructed) or Mechanists (those whose organic bodies become the hosts of a multitude of technical interfaces and machines). Gonzales (1995) investigates this phenomenon in history, distinguishing between transgenic cyborgs and machine cyborgs. And of course Clynes and Kline imagined both shaper and mechanist elements in their original cyborg.

Given the historical moment of cyborgology, postmodernity, it comes as no surprise that authors rarely fight over the one true definition of a cyborg. Instead, among those who see the cyborg figure as productive, it is typical to see references to previous incarnations of the human-machine, human-as-machine and machine-as-human. Short histories of the automaton and European fascination with such can be found in otherwise dry engineering proposals (the Teleoperators paper), in Bruce Mazlish's *The Fourth Discontinuity*, in Gonzalez, in Gray's *Cyborg Citizen* (2002). This rhetorical move of "listing" precursors and establishing a family tree of precursors is practically ubiquitous, a legitimizing move meant to simultaneously assert a slow evolution of techno-humans over time, and to paradoxically invoke the punctuation of this evolutionary equilibrium by contemporary cyborgs. In addition to citing automata, writers spanning six decades establish the following families: families of scientists in various disciplines whose work merges in bioengineering and cyborg technologies; families of "actual" cyborgs in different arenas that asserts both the reality of the cyborg as artifact and the coming age of cyborgs; families of human-machine systems in different institutions (military, education, medicine, education) that share key qualities, rhetorics, and conditions of production.[1]

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[1] One defining characteristic of Norbert Wiener's work is that he weaves all three of these strategies into a genealogy of cybernetics, thus legitimizing a "new" science, establishing a host of "fathers," producing continuity between far-flung types of technologies, and consistently connecting rhetorics typically reserved for humans or machines to their opposite category, resulting in vital machines and abject humans.

These strategies are productive; they cut and paste from standard histories of science and technology to produce an alternative history, one with implicit narrative drive (the coming of the cyborg as a replacement of the human, as symptom of the postmodern condition, as accelerating trend in many, perhaps all walks of life) and mimicking the exciting new cut-up contexts of modernist collage and photomontage. Consider: a veteran with a prosthetic leg; a robot attached to a sea lamprey's brain; a woman on dialysis; a commuter driving a car while talking on the phone to a machine recording a message which can be accessed at any time by another commuter; a pharmgoat that produces expensive drugs in its milk; a family looking at a picture of a fetus on a screen; a rat genetically designed to get cancer more easily; a doctor performing surgery while thousands of miles from the patient into whom he is cutting. Pulled from their normative contexts and narratives into a strange and compelling family, they jolt one into considering their resemblances. Epic lists like this can be made easily. This in fact is a key strategy of popularizers like D.S. Halacy and David Rorvik. And the rhetorical effect is similar to that of collage, where the framing device is both challenged (is this a unity? Even when pieces of paper break the two-dimensional plane or images bleed over the frame?) and installed (this collage is a unified work of art; it all 'goes together' and produces a coherent and meaningful set of meanings).

In fact, it is this generative element to the cyborg as a discursive unit that helps it escape the generic orbit of so many other scientific objects spinning in popular discourse, and allows readers a glimpse at what lies beyond the veil of technological determinism, autonomous technological drift, and pessimism at the ability of humans to ever control and actively design their (increasingly powerful and thus dangerous) systems. The cyborg is a monster, and at the same time heartbreakingly banal, a soldier with a backpack full of sensors and smart weapons driving the citizens of the undeveloped world before him, and a woman attached to machines that help her midwives assess whether she can avoid a Caesarean section, or whether her baby's fetal heart rate is dangerously low. At least some of the technology in the above two situations is undoubtedly the same, and leads to a cyborg insight: the exact same techniques can produce horror and beauty. The gene technique that can restore a human to "normal" can be used to produce "monstrous" augmented or deformed humans. Of all the boundaries which cyborg technologies render useless, the imagined boundary between humane and inhumane technologies is perhaps central.

The mundane cyborg

In 2006 I began thinking through the difference between the vivid examples of monstrous cyborgs (RoboCop, Terminator, the Borg) and the other examples of human-machines that are less extreme, but perhaps more potent for changing human nature in their ubiquity, distribution, normality, and slow steady increase in importance.[2]

When I read about cyborgs in the course of my research, I am often confronted by extreme versions of human-machine integration and hybridity. RoboCop, Terminator, the Six Million Dollar Man and the Bionic Woman, all represent "the" cyborg in some important sense: the cyborg is humanity placed in extremis, as the machinic or cybernetic takes over more and more of what was originally organic in a human body. This seems like the future, or a future, and often it feels like someone hit the fast forward button on participant evolution.

And of course there is a reason for this. Where are we headed? People want to know, to anticipate, to imagine. And so the Frankensteinian narrative of creating "life" in a godlike way but without godlike powers of vision is resurrected in these monsters of technological power. To read this like an English professor, there is a huge traumatic gap between the normal human and the cyborg marked by a violence of some kind. So the future promises - in these stories - to be a scary living out of this violent shift from recognizable human to monstrous cyborg.

I want to suggest a complementary way to view the notion of human-machines, one that allows a slightly different set of emotions and causalities to emerge. That is the notion of the mundane cyborg. The mundane cyborg, I argue, is all around us, and we enact this kind of pint-sized monster all the time. We are often mundane cyborgs, and as we grow more accustomed to our various prosthetics - cell phones, iPods and MP3 players, laptops, Blackberries, automobiles, remote controls, Bluetooth sets, televisions and GPS units in SUVs and mini vans - we move closer and closer to the extremity of the monstrous cyborgs of science fiction. Like other organisms adapting to multiple changes in environment, we aren't often conscious of the way these prosthetics affect our perceptions. But affect us they do, and it is this effect that I want to sketch out in the essay below.

But first, try this thought experiment: choose one or two of your precious devices (assuming of course that you have one; if not, then you are now the control population against which the mundane cyborg can be measured!). Your car, let's say, and your cell phone. Your digital camera and your GPS unit. Now, consider how using these devices alter two things: your sense of time, and your sense of space. Does the phone alter your way of using time, say, in your car? Does the

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[2] Full disclosure: after I wrote this, another writer wrote a piece on mundane cyborgs. The citation is: Convergence: The International Journal of Research into New Media Technologies, Vol. 13, No. 1, 79-91 (2007) Mundane Cyborg Practice: Material Aspects of Broadband Internet Use Søren Mørk Petersen IT-University of Copenhagen, Denmark.]

phone put you more and more in situations in which you are having a conversation about one thing while in a completely different context? And if so, how does this affect the way we view "where we really are"? If you are on the phone to one client after the next while your son and wife walk 30 paces ahead of you at Disneyland (as was true for my cousin in Los Angeles, much to his wife's dismay), where are you? And how are you experiencing the physical context or 'real' in which you are walking?

It may well be that this is an excellent time to consider these things, since I come from a generation that did not have cell phones, or most wireless devices for that matter, and so have some sense of what came before, what life before ubiquitous cell phoning or computing became a kind of norm. My students on the other hand (I teach at a community college in Silicon Valley) have not known a time when cell phones were not, and much more than I, they are natives to the Digital nation. I am more of an immigrant, though like many immigrants, I assimilated quickly and brought other perspectives to this Digital nation.

Cars, automobiles, exoskeletons, oh my!

Humans are endoskeletal; we don't carry our houses or our armor on the outside. Of course we've always covered our nakedness, shameful or otherwise, with clothing, including protective gear like helmets, shields, gloves, jackboots, and so on. But with the emergence of cyborg-enabling technologies, especially those that allow integration of the nervous system with the machinic controls, the dream of powerful exoskeletons augmenting human powers has become a present reality.

Again, the extreme versions of this cyborg technology are everywhere: Gundams, for example, are huge battle-exoskeletons piloted or driven by humans. Many of my students smile in recognition when they see the Gundam poster in my office, and know hundreds of episodes via manga and anime. These Gundam fight in a post-nuclear future; Earth has been ravaged by wars and radiation, and corporate entities merge weirdly with nation state and military structures to produce a hybrid political entity. It is a world at once horrifyingly stark, and completely recognizable "inside" the bridges of spaceships and offices in skyscrapers, as wide eyed young Japanese men and women live out the same old story, a fight for love and glory, the eternal tragicomic human drives colliding and resolving and colliding again. The premise of these cartoons is absolutely contradictory: outside everything has changed due to technologies like Gundam, and inside we maintain "human" characteristics, as though the outside had no effect on the inside.

There are so many of these exoskeletons in cartoons, and yet very few in mainstream sci-fi or film. This is partly because the mundane cyborg version of the exoskeleton, the automobile, is so completely accepted as inevitable and real by most 21st Century humans. I drive my car; it gets me there. End of story. Or – boys love their toys, and cars are the ur-toy to many grown up boys. Cars as toys, cars as sex objects, cars as racing devices, cars to have midlife crises in or transport kids en masse, cars as status symbols: the stories we tell about cars eclipse their role as exoskeletons for the most part. Cars are normal, domesticated technologies.

So let's tell the story a bit differently. You are a human being sitting behind the wheel of a modern automobile, one going let's say 80 miles per hour. You are hurtling through space in a human-machine system, a metal exoskeleton weighing thousands of pounds. This exoskeleton changes your sense of speed and time. You translate space into time. Yosemite isn't x miles away from my home in Santa Cruz; it is y hours. Your personal body space is massively extended; at a moment's notice, you can be traveling in hours to a place that in previous cultures would have taken days or weeks. So we think of a huge number of places as within a day of us, as within our mundane sphere. Our sense of space is wildly expanded; at the same time, we scream past much of what is between here and there, so that it might as well be outer space for all the detail we are experiencing. Thus we have more space, but arguably less space, less specific details about the spaces that constitute the area between here and there of our destination.

We all know this feeling, perhaps. We drive for six hours from the Pacific ocean to the mountains, and the reality of what we pass blurs and diminishes; it is simply landscape, mostly uninteresting or not beautiful or ugly enough to capture our attention, which is on driving (or on the phone call we are making, or the iPod playlist we are scrolling, or the interactions between passengers within the speeding bubble of the car). We get something, and we lose something; often we drive six hours to get the thing that we lose in the driving: the specificity of the landscape, the scents of the air, the physical interaction with the slow land and its fauna and flora.

So as we walk down the sidewalk we have this exoskeleton waiting for us, this power that we break out when needed. We are Superman, mild mannered, or Peter Parker, alert to the sense that tells us we need our more than human powers, right now, at once, all at once. And if we do not own a car, can't participate in the general experience of more than human, we are less than human, with all that entails. At least that is how it often feels in peak oil America. Of course I am overstating the case here, but my point is, the exoskeleton changes our feeling about space much the same way that airplanes do if we are affluent enough to take them; far away is near, as it is for the young man in the fabled Seven League Boots.

If our sense of space is changed, our sense of time is changed even more. Once again, I am in my car, behind the wheel. I go slowly out the driveway and merge into the great metal salmon run of cars; I thread the other cyborgs as we zip on surface streets. When we see a sign posting legal speed limits, we instantly add numbers to it; these speed limits are made by non-drivers, and we are drivers; 15 miles per hour is 25 at least, unless we see a cop or kids milling in the street; 25 is 34, 45 is 59, 65 is 75, 70 is 80, unless there is a highway patrol officer visible. This is cyborg translation. Going 15 miles an hour for even a quarter mile feels like we are crawling, doesn't it? Going 55 on a highway for many of us is like the forced slowness we must achieve as we walk down the aisle at weddings; it feels unnatural, exaggeratedly slow. It may call to mind funeral processions of cars as they drive at a dignified pace down the right side of the highway, ponderously and slowly flying by at speeds much faster than most humans can run for even a short distance.

In many places in the US and around the world, humans are less important than cars, and streets are killing strips not only for four legged animals. Pedestrians hurry across roads, their shoulders often hunched subconsciously, offering a nonthreatening aspect to the metal cyborg monsters coming at them from all directions. Meanwhile, a transformation has taken place inside the exoskeleton; the human is now fully engaged in cyborg time perception. Fly down the highway at 80, then get off at the exit, which banks so that you are forced to slow against what feels natural now; then zip up to the stop sign, as pedestrians wait to cross. They are not you; they are a different species. They often move so slowly, it feels like time has stopped; they are in your way, a nuisance of unevolved bipedalism. If they happen to be old, it is as if someone is torturing you; against your will, you are being held to a pace that is glacial. Or a fellow cyborg stops at a light and doesn't punch the gas when the green light blinks on; or a cat or a dog wanders across the as-

phalt, describing a nonlinear path that seems designed to frustrate the natural acceleration into the next two minutes. Or, as happened to me today, a road is littered with humans and machines digging up the road, paving the road, widening the road; this is all "for" my cyborg exoskeleton, and yet waiting as a little backhoe digs and then drops its pittance of rock elicits bitterly critical comments from the passengers in my car. We wait perhaps four minutes, which is later reported at 10 minutes, in a tone that suggests that these 10 minutes have the subjective feel of a two-year stint in the county jail.

I try to write about this with some humor because it is funny; it is the human response to many technologies or augmenting devices. The man on horseback looked down, literally and figuratively, on foot soldiers. But I want to make a larger point: technologies like cars change our perception and our proprioception. We are moving at the speed of the machine, merged with that speed, exulting in it, subject to it; this doesn't simply go away when we disengage from the exoskeleton. In fact, when we do disengage and return to unaugmented bipedalism, we are in the subject position of the pedestrian: less powerful, more in the way, slow, unevolved. Not the windshield; the bug.

Cars are wonder-full, full of wonders of speed and grace that still thrill me at the advanced age of 55. Cars are terrible in the old sense of that word; we are certainly destroying huge amounts of our planet in their service, and we regularly sacrifice thousands of our citizens to them each year, like a cyborg Aztec ritual.[3] (A ritual that appears to most analysts avoidable and also systemic, involving not just cars or drivers but roads and cultures and cell phones). Cars are mundane cyborgs in their dependence on huge networks, so that a car implies mind numbing combinations of factories, oil pipelines, refineries, shipping, parts, tires, marketing, advertising, pollutants, laws, regulations, architectural and cultural adjustments. So they don't just change our individual perception of time and space; they also exert a massive pull on our collective notions of space and time.

Cyborgs coming to consciousness: what would that mean? I guess it would mean humans coming to terms with how specifically they have become human-machines, and then shaping that reality. That would mean understanding how the systems a cyborg depends on actually work. It also means understanding how those systems affect and specifically degrade other systems we

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[3] 34,172 persons dies in automobile accidents in the United States in 2008, down from the high of 39,252 in 2005. Another mind numbing cyborg figure: 2,974 billion miles were driven in that year by human-machine exoskeletons. That is 12.31 per 100,000 people living in the United States. On average in 2009, 93 people were killed on the roadways of the U.S. each day. But then consider this: The number of deaths – and deaths relative to the total population – have declined over the last two decades. From 1979 to 2005, the number of deaths per year decreased 14.97% while the number of deaths per capita decreased by 35.46%. If we shift the cyborg camera-eye to the world, we find that "worldwide it was estimated in 2004 that 1.2 million people were killed (2.2% of all deaths) and 50 million more were injured in motor vehicle collisions. This makes motor vehicle collisions the leading cause of death among children worldwide 10 – 19 years old (260,000 children die a year, 10 million are injured) and the sixth leading preventable cause of death in the United States (Traffic Collision). See also Hallmark (2002).

might call "organic." And finally, it means that if we do want to be as gods…if we do want all that the machinic and all that the organic can offer us as conscious cyborgs…then we need to understand what the machinic gives and what it takes away. Cars augment our legs massively, so that we have seven league boots; but they also amputate our legs, paralyze them, so that we use them in very constricted spaces as determined by the design of the car. Drive more, and you may use your legs less and less, so that at a certain point, you no longer have your legs in the same way. And then we need to drive to nice places to run, or drive to the gym to ride stationary bicycles to make up for the sacrifice of our legs to the machine.

Let's reconsider the car as exoskeletal human-machine system, with enormous power and enormous danger, as opposed to "driving a car" which is not only mundane but utterly domesticated and unmarked as a discourse category. When we view cars as tools, and necessary ones at that, we can't really understand (or grok) the massive costs to operating them, or imagine ways to exert more competent control over our powerful prosthetics. But when you read the same materials from the point of view of epidemiology, you find an analysis that invokes both the cyborg and the early indications of actor-network theory:

In the United States, some 30 years ago, William Haddon Jr. described road transport as an ill-designed "man-machine" system needing comprehensive systemic treatment (WHO, 2004). He produced what is now known as the Haddon Matrix, illustrating the interaction of three factors – human, vehicle and environment – during three phases of a crash event: pre-crash, crash and post-crash. The resulting nine-cell Haddon matrix models the dynamic system, with each cell of the matrix allowing opportunities for intervention to reduce road crash injury. This work led to substantial advances in the understanding of the behavioral, road-related and vehicle-related factors that affect the number and severity of casualties in road traffic.

The solution to the problem of the mundane cyborg with non-mundane effects is partly to recast the problem and partly to analyze the problem as a human-machine complex, which Haddon and many later analysts have done.

Take a mundane cyborg technology, and play around with it. Bring it up to consciousness. What does it offer, and how does that affect your experience of time and/or space? What does it perhaps take away from you? Could you imagine a way of using/being this human-machine differently, so that it took into account what is given and what is taken away? And finally, are we fish trying to imagine the water that is our prosthetic technological present? Can we alter our relationship to our prosthetics to take into account both natural and human ecologies?

This of course would mean seeing a huge range of technologies as prosthetics. It would mean understanding the amount those with extensive experience with prosthetics – including the disabled, or differently abled – have to teach us about what is means to negotiate a prosthesis, or two

or several. And it would mean seeing the connection between apparently paradoxical connection between mundane cyborg prosthetics, like laptops, blueteeth, and cell phones, and non-mundane, massive technologies that enable these mundane technologies: backbone systems, satellites, wired and wireless communications networks, transnational corporate structures able to enforce or flout standards, and the literally fantastic set of narratives that promote and normalize these mundane cyborgs.

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