A HISTORY OF COMMUNICATIONS

Media and Society from the
Evolution of Speech to the Internet

MARSHALL T. POE

University of Iowa

MEDIA CAUSES AND MEDIA EFFECTS

The premises with which we begin are not arbitrary ones, not dogmas, but real premises from which abstraction can only be made in the imagination. They are the real individuals, their activity and the material circumstances in which they live, both those which they find and those produced by their activity. These premises can thus be verified in a purely empirical way.

      – Karl Marx, *The German Ideology*, 1845[1]

In 1846, Karl Marx surveyed the philosophical scene in Germany. He was not happy with what he saw. The thinkers of his day, he complained, had mistaken speculative philosophy for hard science. They loved to play with ideas, but they never quite got around to testing them in the real world. The result was a thick bramble of vague concepts, imprecise notions, and fuzzy impressions that, while perhaps entertaining, never really added up to a concrete theory of anything. Marx thought these philosophers were doing their countrymen a disservice. Things were changing rapidly, and people needed to understand why. He therefore set about trying to explain these ongoing changes by means of a rigorous, empirically testable theory of history.

A similar situation obtains today in communications studies. The most influential thinkers in the field are, like the philosophers of Marx's day, a bit too fond of high-flown ideas and not fond enough of the solid facts. They propose theories that are at once hard to understand, difficult to test, and sometimes just plain wrong. These deficiencies are unfortunate because, as in Marx's era, things are changing rapidly. In the last quarter century, we have witnessed a rare event in human history: the birth of a new medium, the Internet. Although pundits tend to exaggerate its impact, it is certain that that impact is significant. The

Internet has changed the way we work, what we consume, how we play, whom we interact with, how we find things out, and myriad other details about the way we live. Yet we don't have a good way to understand where the Internet came from and what it is doing to us, so we are to some degree adrift.

This book is intended to help us find our way by means of two theories about the media in general and the Internet in particular. The first endeavors to explain why successive media – speech, writing, print, audiovisual devices, and the Internet – arose when and where they did. The second endeavors to explain what these media did and are doing to the way we organize ourselves and what we believe. In this introductory chapter, we will begin by discussing existing theories of media causes and effects, all of which, save one, are deficient. We will then turn to the single exception, the theory of media genesis and effects propounded by Harold Innis. Finally, building upon Innis's ideas, we will lay out the theories that form the backbone of this book.

MARSHALL McLUHAN

Any discussion of media theory must begin with Marshall McLuhan, if only because he coined its most famous expression – "the medium is the message." Everyone knows this cliché, everyone repeats it, but, alas, few agree on what it means or whether it's true. The same might be said of McLuhan's writings generally: they are widely known, they are widely read, yet they provoke as much head-scratching as comprehension. By all accounts, McLuhan was an adventurous, inventive, and imaginative thinker, but he didn't write very clearly. Here he is, for example, explaining "the medium is the message" in 1964.

In a culture like ours, long accustomed to splitting and dividing all things as a means of control, it is sometimes a bit of a shock to be reminded that, in operational and practical fact, the medium is the message. This is merely to say that the personal and social consequences of any medium – that is, of any extension of ourselves – result from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology.[2]

How should we understand this crucial passage? With a bit of effort, we can find the central hypothesis of all media studies – that media do *something* to us. Here McLuhan says they have "personal and social

consequences," a promising start. You might think that the next sentence – or at least one nearby – would be something like "and those consequences are...," followed by a series of empirical claims. This medium does this, this medium does that, and this medium does the other thing. If you had such an expectation, you would be disappointed. Reading on, however, you would encounter random nuggets like "An abstract painting represents direct manifestation of creative thought processes as they might appear in computer design," and "Alexis de Tocqueville was the first to master the grammar of print and typography."[3] Yet, search as you might, you will find no clear, well-articulated theory linking specific causes – kinds of media – with specific effects – "personal and social consequences." Perhaps such a theory could be constructed out of carefully selected passages in McLuhan's oeuvre, but it would be a bit of a Frankenstein's monster – an unholy composite of parts never intended by their maker to be united in one being.

McLuhan, then, was not really a theorist in any straightforward, empirical sense. Nonetheless, we should recognize that he made a crucial contribution to media studies and therefore our project: he focused scholarly attention on the media themselves – talking, writing, printing, electronic signals – as opposed to the information the media convey. He separated the medium from the message and, in so doing, founded the central program of modern media studies, that which attempts to describe and explain the effects of media on the human mind and human groups. Nearly all researchers in media studies pursue some version of this program today. A number of reasonably coherent "schools," however, stand out: the Mentalist, the Marxist, and the Matrixist.

THE MENTALISTS, THE MARXISTS, AND THE MATRIXISTS

The Mentalists – Walter Ong, Eric Havelock, and Jack Goody being the best-known among them – are united in the conviction that media in general and literacy in particular make people think differently.[4] Learning to read and write, they propose, rewires the brain and enables new cognitive abilities. This was and remains a sensible, sexy hypothesis. We know that the brain undergoes radical changes during maturation, and as it does, new mental capacities emerge. Children can't talk and then they can. They can't reason and then they can. They can't do arithmetic and then they can. Learning to read and write – and by extension

learning to use any other medium – must do something to our minds. It's true, it must. The difficulty is discovering just what that may be. If media are the cause, then what are the cognitive effects? The answer would seem to be simple enough: new modes of thought. But what are these "modes of thought"? How many are there? And what exactly differentiates them? The Mentalists often answer this question by positing dichotomies: "civilized" versus "savage" thought, "rational" versus "irrational" thought, "logical" versus "illogical" thought. These dualities are not very specific, but they do have the virtue of being real and therefore observable. Take the last of them, logical versus illogical. There is indeed something very specific called "logic"; it is used by the human mind to think; and it is unevenly distributed among humans – some people reason logically and some don't.

Logic, then, presents a clear test of the Mentalists' thesis that media change the way people think. If literacy causes logic, then the Mentalists are right; if not, they are wrong, at least as far as the impact of literacy is concerned. Careful anthropologists have run this test in the field and the results are definitive: there is no direct, causal relationship between learning to read and write and the cognitive capacity to think logically.[5] Teaching people to read and write has a significant impact on their ability to read and write, but not necessarily on their ability to reason. This result, of course, doesn't mean the Mentalists are incorrect on all counts. We may yet find ways in which media mold the mind. At present, however, we don't know of any.

While the Mentalists pursue the cognitive side of McLuhan's program, the Marxists and their modern followers, the Critical Theorists, investigate the macro-political side. The founders of this line of inquiry – Theodor Adorno, Max Horkheimer, Herbert Marcuse[6] – were practitioners of "media studies" *avant le lettre* and *avant* McLuhan. They were interested in a lot of different things, but one of their central concerns was to explain the persistence of capitalism long after Marx predicted it would collapse. Their disciples are still mining this vein.[7] The *marxisant* Critical Theorists are much less focused, though it would be fair to say that they are concerned with comprehending the way capitalist mass media engender and maintain various forms of illusion, alienation, and oppression.[8] The idea of a "Culture Industry" is central to the Marxists and Critical Theorists. Simply stated, the Culture Industry thesis holds that the late capitalist mass media turn people into

obedient consumers, making them willing victims of exploitation, and thereby ensuring the survival of capitalism itself. In Marx's day, religion was the opiate of the masses; in our day, the Marxists and Critical Theorists claim, it's the mass media.

Like the Mentalists' literacy thesis, the Culture Industry thesis has the cardinal virtue of being testable. If we find that the presence of mass media hinders the development of socialist (or, generally, noncapitalist) institutions, then they are right; if not, they are wrong. Over the past half century this test has been run all over the world, and again the results are unmistakable: the presence of mass media has no discernable impact on the likelihood that a region will drift to the left. After World War II, Western Europe evolved a sort of free-market socialism; the United States did not. Since both had robust Culture Industries, we can conclude that the mass media had no determinative effect.[9] The Marxists and Critical Theorists are certainly correct that the media affect society. It's just that their theory is unable to describe or explain those effects.

The third school might be called "Postmodernist" or "Poststructuralist," but those tags are too broad. A more telegraphic tag would be the "Matrixist School," after the popular 1999 science fiction film *The Matrix*. The film portrays a universe comprised of a real part (the earth) and a computer-simulated part (the Matrix). Humans actually exist in the real part in life-support pods. They, however, don't know this. As far as they're concerned they live in a modern city circa 2000. But their city is only a very sophisticated representation. In short, the "residents" of the Matrix are brains in vats. The writings of Jean Baudrillard in some measure inspired the film.[10] In essence, Baudrillard argues that modern media have produced something like the Matrix.[11] Thanks to mass communications, Baudrillard says, we no longer live in a real world where representations refer to realities. Rather, we live in a media-created world where representations only refer to other representations. Of course, like the people in the fictional Matrix, we don't realize we are brains in vats. Thus, Baudrillard overturns McLuhan: the medium is no longer the message, but instead the technology that obscures all *real* messages.

It's hard to know what to make of Baudrillard's theory. It rests on a solid empirical foundation: people are sometimes fooled into thinking that representations are real. But, like the Marxists, the Matrixists seem

to go too far.[12] Media are powerful, but they are not all-powerful. Most people have no difficulty distinguishing reality from representation, even when the latter is presented by fancy modern devices. Is there anyone who thinks that "Reality TV," for example, is reality in the full-blooded sense? Moreover, most people realize that the media can be used to trick them. Everyone knows not to "believe the hype" produced by the media. Hollywood is the "Dream Factory," not the "Reality Factory." The key question, empirically speaking, is this: How effective are different media *qua* media at deceiving people, or rather, at prompting them to confuse representation and reality? The Matrixists never pose this question, so they never answer it.

HAROLD INNIS

McLuhan pointed media studies in the right direction by telling us that media themselves – not the information they convey – do something to us, but he refused to be specific. The Mentalist, Marxist, and Matrix schools are specific, but their theories are empirically unsatisfying. If we desire a convincing theory of media effects, one that will explain the impact of media generally, then we will have to look elsewhere.

Fortunately, there is someplace promising to look, namely, to the neglected work of Harold Allen Innis. Innis was a peculiar figure.[13] He worked as an economic historian at the University of Toronto, where McLuhan was a student and later a professor. All of his early writings suggest a cast of mind that was profoundly different from McLuhan's. The titles of Innis's early monographs tell us much of the man: *A History of the Canadian Pacific Railroad* (1923), *Fur Trade in Canada: An Introduction to Canadian Economic History* (1930), *Cod Fisheries: The History of an International Economy* (1940).[14] These works were exercises in economic empiricism, not abstract engagements in high-flying theory. Believe it or not, they turned Innis into an academic celebrity. He was perhaps the most respected scholar in Canada in the prewar years, the celebrated founder of what is still known as the "Staples Theory" of Canadian economic development. In the early 1940s, Innis began – predictably enough – to study another staple of the Canadian economy, pulp and paper. This research, however, led him in a new and unforeseen direction.

Although all of Innis's writing had focused on Canadian economic history, he was an admirer of grand historical thinkers such as Oswald Spengler, Arnold Toynbee, Alfred Kroeber, and Pitrim Sorokin, all of whom had written well-received books charting the rise and fall of civilizations.[15] By a peculiar connection, pulp and paper gave Innis the opportunity to try his hand at this sort of universal narrative. In the 1930s, two Classics scholars, Milman Parry and Albert Lord, set about trying to prove, *horribile dictu*, that the works of beloved Homer were first sung by ancient, pre-literate bards and only much later written down.[16] To demonstrate this outrageous thesis, they needed to show that something of Homeric complexity, beauty, and length could be composed and vocalized by unlettered minstrels. So they traveled to the Balkans to record singers who, so it was said, still sang long heroic tales. Sing they did, and Parry and Lord rocked the world of Classical scholarship by demonstrating that "Homer" might have been an oral tradition rather than a great writer. The traces of what came to be known as "orality," they showed, were evident in the written versions of the *Iliad* and the *Odyssey*. The buzz about Parry and Lord's research could be heard in Classics departments all over the world, including that at the University of Toronto. Innis knew people there, and knew them well. Whether Professors Charles N. Cockrane or Edmund T. Owen introduced Innis to Parry and Lord's revolutionary work is not known, but they are credited by Innis himself with stimulating his "interest in the general problem" of communications history.[17]

Whatever the source, Innis realized that Parry and Lord's primary theoretical finding might be fruitfully extended: communications technologies might not only shape content, as orality had shaped the *Iliad* and *Odyssey*, but they might also mold the societies in which they were deployed. Over the next few years before his tragic death from cancer in 1952, Innis explored this hypothesis with respect to two questions: (1) How do new media arise? and (2) What do different media do?[18] His answers, we hope to show, were in the main correct.

WHY MEDIA ARISE

Innis proposed that new media were "pulled" into broad use by rising demand, not driven by rising supply. Demand comes first and supply follows. This theory has been validated by scholars studying the more

general process of technical innovation, adoption, and dissemination.[19] Thanks to their work, we know what might be called the "rules" governing the discovery of a new tool, its initial use, and its spread through a population. As we will see, new media follow these rules rather exactly.

Rule 1: Groups of tinkerers discover new technologies. How are new technologies conceived? We sometimes say that protean geniuses – your da Vincis, Edisons, and Oppenheimers – come up with them, but that's wrong. These folks were smart and creative, but they had a lot of help.[20] Others were on the "trail of discovery," and some were quite close to the end when *the* discovery was made. Alas, we forget about them in our haste to create idols. We also sometimes say that "necessity is the mother of invention," but that's wrong too. Clearly, something impels people to create, but we know it's not necessity.[21] For the first 170,000 years of human existence we lived under dire necessity – thirst, hunger, disease – yet we invented almost nothing. Alas, we seem to have forgotten that as well. What the record shows is that groups of interested people – tinkerers – almost always stand behind the discovery of new technologies. Tinkerers do not work alone, and they do not work because they must. They work together with others on problems that may or may not be "objectively" important.

Rule 2: Tinkerers can only discover the technologies in their technome. We like to talk about technological "leaps," moments at which we jump from now into the future. This is a flattering metaphor, but it's inaccurate. Like evolutionary change, technological change is almost always incremental. Darwin said *natura non facit saltum*; we should say *technologia non facit saltum*. Indeed, the parallel is quite close. One of the principles of biological evolution is that the potential of a species to evolve new traits is constrained by its genome, that is, the set of genes it has available. It might be evolutionarily advantageous for your progeny to have wings, but it's simply not possible given the genes *Homo sapiens* has to work with. The same principle holds for technological progress: the potential of tinkerers to invent new technologies is constrained by their "technome," that is, the set of technologies (in the broad sense) available to them. Leonardo and his colleagues probably would have been pretty excited about building an A-bomb, but the technome they were tinkering with didn't have the technologies needed for them to conceive, let alone build one. As in all things, you can only do what you can do.

Rule 3: Technological supply does not produce technological demand. We generally say that new technologies are invented because people find them useful. That, however, is not quite right. If it were, then we wouldn't find that the supply of useful tools almost always outstrips demand for useful

tools. For most of our history we've had what amounts to excess technical capacity: we can build more tools than we can use. The reason is that tinkerers do not always – or even very often before modern times – produce new technologies because they think anyone will use them. They know that if you build it, sometimes they will come and sometimes they won't. But they build it anyway, creating the aforementioned excess capacity.

Rule 4: Technological demand, if unfocused, does not produce technological supply. We generally say that new technologies enter mass use because a lot of people want them. That, however, isn't quite right either. If it were, then we would find that mass demand for useful tools always translates into mass supply, and it doesn't. That's because technological demand is often unfocused. For a whole variety of reasons, new tools generally cost more and are worth less when they first appear than once they have been adopted en masse.[22] This is another way of saying that the barrier to early adoption is higher than the barrier to late adoption. The problem is that the barrier to early adoption is often too high for individuals, even if there are a large number of them. Thus, for want of early adopters, the new tool never enters mass use.

Rule 5: Only organized interests can produce the demand necessary to "pull" a new technology into mass use. We live in an individualistic age and therefore think individuals make history. They don't – at least not technological history. Only what we will call "organized interests" can make technological history because only they can overcome the barriers to early adoption mentioned above. Individuals are too poor to accomplish this feat, and so are disorganized masses of individuals. Organized interests, however, can "get the ball rolling" because they are coordinated and have a common purpose. They can create, gather, and pool resources; compel their members and others to do their bidding; and focus their power on specific goals – such as engineering and adopting a new technology. Organized interests can take many forms and pursue many purposes. As a general rule, however, we can identify three main types: economic organizations (businesses, industries, classes), political organizations (functionaries, leaders, castes), and religious organizations (believers, priests, orders).[23] Almost whenever and everywhere we find complex society, we find these sorts of organizations. Clearly there is something essential about them, though just what it is extends far beyond our present concerns.

Rule 6: When it comes to technological adoption, organized interests are reactive and not proactive. We tend to think of organizations – outside ones like revolutionary political parties – as conservative: they generally don't fix things that aren't manifestly broken. That's exactly right as it concerns

the history of technology. Historically speaking, organized interests have not adopted new tools in anticipation of some *future* change in conditions. Rather, they have adopted new tools in response to some *ongoing* change in conditions, particularly one that makes them unable to do something they want to do. When these conditions arise, organized interests begin to search for, engineer, and adopt new tools. More likely than not, those tools will already be available in prototypical form because of excess technical capacity (see Rule 3).

Rule 7: Organized interests are most likely to adopt new tools in response to fundamentally new economic conditions. We find it very easy to say that Marx was "wrong." But in fact he was right, at least about the long-term driver of technological development. There have been five fundamental shifts in the way humans make their livings: the Behavioral Revolution (40,000 BC), the Agricultural Revolution (10,000 BC), the Capitalist Revolution (AD 1200), the Industrial Revolution (AD 1760), and the Information Revolution (AD 1940). During each of these shifts, there was an upsurge in innovation, adoption, and dissemination of new tools. It's not hard to understand why: the old tools, while still useful, didn't work well under new conditions, so new tools had to be brought into play. By Rules 1, 2, and 3 we know that the prototypes of these tools were available because of excess capacity; by Rules 4, 5, and 6 we know that organized interests under pressure to adapt to new conditions engineered, adopted, and spread them.

Together these rules suggest the following "pull" theory of media adoption: "New Economic Conditions → Technical Insufficiency → Increased Demand from Organized Interests → New Media Technology." This theory, however, is not quite complete. As we hinted previously, there are two additional factors that affect the adoption process: the timing of adoption and the nature of the technology adopted. As to timing, there can be no doubt that the rate of adoption has been increasing rapidly for at least the last 40,000 years. To take a pertinent example, it took several thousand years for writing to go from idea to widely used implement; it took only several decades for the personal computer to do the same. The rate of adoption, therefore, is a function of time. As to the nature of the technology adopted, there can be no doubt that some tools are naturally more appealing than others. To take another pertinent example, it took more than four centuries following the introduction of the printing press for mass literacy to develop in Europe; it took only a few decades for television to become a staple of everyday life. Reading is hard and not much fun; watching is easy

and fun. The rate of adoption, then, is also a clear function of natural ease-of-use and enjoyment.

WHAT MEDIA DO

Innis argued that the physical attributes of media "push" societies and ideas in new directions. This theory is largely correct, but needs expansion and refinement. We will re-formulate it as follows: "Medium Attributes → Network Attributes → Social Practices and Values." We will argue that media, networks, and cultures each have their own type-specific attributes and that these attributes are causally related one to the other. Let's describe each set of attributes and the relationships between them in turn.

Medium Attributes

Innis proposed a typology of medium attributes based on weight and durability. This classification has the virtue of simplicity, but it sacrifices too much in terms of depth. We need something more complete. In order to get it, we should put ourselves in the shoes of those who use media and ask what really matters to them. Most basically, a medium is a tool for sending, receiving, storing, and retrieving information. Given these fundamental uses, what attributes would make a medium really handy?

A handy medium would be inexpensive to obtain and easy to use. A medium you can't afford or don't know how to operate is a bad medium, or rather no medium at all as far as you're concerned. For most of us, television stations fall into this category – we can't afford them (only Rupert Murdoch can) and we don't have the technical know-how to operate them (only engineers do). A handy medium would be private, or at least have a private mode. A medium that identifies you and what you've communicated as soon as you use it has drawbacks, especially if you want to blow the whistle on some malefactor or subscribe to risqué magazines. Sometimes you *don't* want everyone to know your name or what you're reading. A handy medium would have high fidelity, meaning that the signal you want to send is the same as the signal received. Speech, for example, does not have high fidelity when it comes to visual perceptions. If you see a white swan and then say to someone,

"I saw a white swan," the person who hears you won't *see* a white swan. Rather, they will *hear* some words that indicate you saw a white swan. Photography has higher fidelity in this regard. If you see a white swan, take a picture of it, and then hand the snapshot to someone, they will *see* an image of the very same white swan you saw. A handy medium would convey information in high volumes. With information, more capacity – or, to use the obvious metaphor, "bandwidth" – is generally better than less. You don't really need to know *some* of what's going to be on the test, you need to know it all. Books are good for that. A handy medium would move data quickly. No one likes to wait. When you're stuck in Podunk and your wallet's been pilfered by street urchins, you want money wired, not sent by letter. A handy medium would store information for a long time. Sometimes the tax man comes calling. And when he does, you'd better hope that your tax records survived the basement flood last year. Finally, a handy medium would allow you to search, find, and retrieve stored information easily. Stored information that can't be found isn't really "stored" at all – it's lost and might as well not exist. Big libraries often have signs warning "a misshelved book is a lost book." Think about that the next time you decide to do the library a favor by putting a book back on the shelf yourself.

These considerations suggest the following media attributes are significant from the perspective of the user:

Accessibility: the availability of a medium itself.
Privacy: the covertness with which data can be transmitted in a medium.
Fidelity: the faithfulness with which data can be transmitted in a medium.
Volume: the quantity in which data can be transmitted in a medium.
Velocity: the speed with which data can be transmitted in a medium.
Range: the distance over which data can be transmitted in a medium.
Persistence: the duration over which data can be preserved in a medium.
Searchability: the efficiency with which data can be found in a medium.

We might well say that a really handy medium would possess all of these attributes and a nearly useless medium would possess none of them. That, however, would be a mistake. For in fact all media possess them to one degree or another. It's easy to see that speech

has the attribute "accessibility" because virtually everyone has access to it. It's harder to understand that Chappe semaphore lines – series of towers with manually operated signaling devices atop them – *also* have the attribute "accessibility" given that almost no one has access to them. But they do: after all, someone has access to them when they were built. It's just that speech has a lot of accessibility and the Chappe semaphore line only has a little. Similarly, we might think that the way a medium scores on an attribute is fixed. Speech, we might say, will always score well on accessibility, while Chappe semaphore lines will always score poorly. That, however, would also be a mistake. Speech could be made very inaccessible, for example, by cutting out everyone's tongue. Similarly, Chappe semaphore lines could be made very accessible, for example, by building everyone their own semaphore tower. In principle, then, any medium can be made to score well or poorly on any attribute *given a sufficient outlay of resources*. The actual score of a medium on a particular attribute, then, is a function of cost. This insight enables us to recast our definition of attributes as follows:

Accessibility: the cost of getting and using a medium.
Privacy: the cost of hiding the identity of users and the content of messages in a medium.
Fidelity: the degree to which data in a medium are coded.
Volume: the cost of sending messages in a medium relative to size.
Velocity: the cost of sending messages in a medium relative to speed.
Range: the cost of sending messages in a medium relative to distance.
Persistence: the cost of storing messages in a medium relative to time.
Searchability: the cost of finding messages in a medium.

Where the cost is low, the score will be high; where the cost is high, the score will be low. The cost of acquiring and using speech is generally low, so it will be highly accessible. The cost of acquiring and using Chappe semaphore lines is generally high, so they will be relatively inaccessible.

Medium Attributes → Network Attributes

Innis proposed that media attributes directly affected what he called "civilizations," a vague and controversial term we would probably do

best to avoid. In its place we will use "media networks." Media may or may not do a lot of things (that's what we are trying to find out), but there is no doubt that they directly and necessarily create networks. We know this because it is a purely definitional matter. By definition, all communications media allow people to communicate with one another. By definition, when people communicate through a particular medium, they become linked by that medium. And by definition, when they become linked by the medium, a media network appears. Thus, speaking creates speech networks, writing creates writing networks, printing creates print networks, electronic broadcast creates broadcast networks, and surfing (or any of the myriad things we do on networked computers) creates Internet networks. We sometimes forget that we create media networks when we use media. The media networks just seem to be there. Few of us think, when speaking to a friend, "I'm creating a speech network." But in fact we are, just as certainly as telephone linesmen create telephone networks when they string wire from pole to pole. Neither do we often reflect on the fact that media networks are finite. They seem to be everywhere. Few of us think, when speaking to our neighbor, "Lucky this person is on the speech network, or I wouldn't be able to talk to her." But we are lucky, because there are people who are not on the speech network (mutes, those who do not speak our language), just as surely as there are people who do not have telephones and therefore are not on the telephone network.

We can now formulate a simple hypothesis about what media do: *different kinds of media foster different kinds of media networks*. More formally, media with attributes A_1, B_1, and C_1 engender media networks with corresponding attributes A_2, B_2, and C_2. This hypothesis seems promising. Take one of the aforementioned medium attributes, range, that is, the distance a medium can carry a message without significant decay. According to our conception, media with different ranges should foster media networks with different attributes. Thus, unaided speech has a short range and therefore the effective networks built with it should be small. This seems correct. How many people are in your circle of friends, a typical speech network? Perhaps a few dozen. Television signals have a long reach and therefore the effective networks built with them should be large. Again, this seems right. How many people watch a major broadcast TV network? Millions. The correlation between spatial

reach and network size we find in the instances of speech and TV should be true for media in general: media with short range create geographically concentrated networks, while media with long range create large, diffuse networks. As we will see, this is in fact the case.

Media, then, create media networks, and particular media attributes create particular network attributes. Since there are eight significant media attributes, there should be at least eight corresponding media network attributes. They are:

1. *Accessibility → Concentration.* Depending on the cost of getting and using a medium, the network it fosters will be more or less concentrated. Concentrated networks are those in which control of the medium rests in the hands of a relative few; diffuse networks are those in which control is dispersed throughout the network.

2. *Privacy → Segmentation.* Depending on the cost of hiding identities and the contents of messages in a medium, the network it engenders will be more or less segmented. Segmented networks are those in which senders, recipients, and the exchanged data can be hidden from others; connected networks are those in which the identities of senders and recipients and the data exchanged cannot be hidden.

3. *Fidelity → Iconicity.* Depending on the cost of sending messages relative to fidelity in a medium, the network it engenders will be more or less iconic. Iconic networks are those in which transmitted messages do not have to be laboriously decoded by the recipient (they are simply recognized); symbolic networks are those in which messages must be manually decoded.

4. *Volume → Constraint.* Depending on the cost of transmitting messages relative to size in a medium, its network will be more or less constrained. Unconstrained networks are those in which a large amount of data can be easily exchanged and there is excess capacity; constrained networks are those in which only small amounts of data can be exchanged and all available capacity has been used.

5. *Velocity → Dialogicity.* Depending on the cost of exchanging messages relative to speed in a medium, its network will be more or less dialogic. Dialogic networks are those in which multiple

parties can easily exchange messages quickly; monologic networks are those in which such exchange is difficult.

6. *Range* → *Extent*. Depending on the cost of transmitting messages relative to distance and reach (number of recipients) in a medium, its network will be more or less extensive. Extensive networks are those in which messages are exchanged over a large area or number of people; intensive networks are those in which messages are exchanged over a small area or number of people.

7. *Persistence* → *Addition*. Depending on the cost of preserving messages relative to time in a medium, its networks will be more or less additive. Additive networks are those in which messages accumulate; substitutive networks are those in which new messages replace old messages and therefore the amount of data is stable.

8. *Searchability* → *Mappedness*. Depending on the cost of finding messages in a medium, the network constructed with it will be more or less mapped. Mapped networks are those in which it is easy to search, find, and retrieve stored messages; unmapped networks are those in which it is not.

Medium Attributes → *Network Attributes* → *Social Practices and Values*

We have established "Medium Attributes → Network Attributes," a set of regularities that correlate eight properties of media with eight characteristics of media networks. Now we face a final challenge: we must determine if and how these medium attributes, through the device of network attributes, mold the way we live and what we believe. It's important to recognize that the entire media studies program as set out by McLuhan rises or falls on this step. Either the medium is the message – that is, media technologies in and of themselves shape human institutions and values – or they don't. That is what we will try to find out. Our hypothesis is this: *media networks engender certain social practices, and these social practices engender related values.*[24] There are two separate arguments here: "Media Networks → Social Practices" and "Social Practices → Values." Let's treat each in turn.

Among the most sensible things Marx ever wrote was this: "Men make their own history, but they do not make it of their own free will; they do not make it under circumstances chosen by themselves, but

under circumstances directly found, given, and handed down from the past."[25] This is a powerful statement. Despite what we might vainly imagine, we are not free. Rather, we are constrained by "circumstances" we do not select, we do not create, and in many cases we cannot alter. They are of two types. The first circumstance is simply human nature, the set of evolutionarily programmed behaviors that distinguishes *Homo sapiens* as a species.[26] We call them by various names – "needs," "impulses," "reflexes," "urges," "hungers," "wants," "desires," "inclinations" – but in the end they are all the same: things we are driven to do because it is in our nature to do them. The second circumstance is environmental, the varied physical and social terrain upon which humans, driven by their natures, "make history." This terrain has many features, each of which constrains human action in different ways. Famously, Marx investigated one such feature, the "mode of production"; we are investigating another feature, the "media network." But the basic explanatory logic is the same. Two sets of "circumstances" – one biological and one historical – interact in such a way as to shape human action, which in turn leads to the generation of particular social practices. Humans need to do certain things. Different historical terrains – in our case media networks – either *facilitate* or *impede* the fulfillment of those needs. According to whether they do the one or the other, different social practices will emerge.

Marx also said something clever about the relationship between social practices and values. "Ruling ideas," he wrote, "are nothing more than the ideal expression of ruling material relationships, the ruling material relationships grasped as ideas."[27] What he's saying, *inter alia*, is that what we *actually* do in relation to others determines to a large extent what we think we *should* do. This is exactly the reverse of what most people think about the relationship between actions and values. We like to believe that we are, perhaps uniquely among animals, moral creatures: we can know what is right and what is wrong. We can know this, we say, because God has granted us a moral code (the religious version) or because we evolved a kind of innate moral sense (the secular version). In either case, we don't exactly decide what is right and wrong. Our values are "just there," an intrinsic part of the universe. When we act, we say we are guided by these transcendental values. The timeless "ought" shapes the temporal "is," or at least should. Marx – and he was hardly alone[28] – believed we have it backward: the

NOTES

INTRODUCTION: MEDIA CAUSES AND MEDIA EFFECTS

1. Karl Marx and Friedrich Engels, *Werke*, 39 vols. in 41 (Berlin: Dietz Verlag, 1961–1974), vol. 3: "Die deutsche Ideologie," 20.
2. Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw Hill, 1964), 7.
3. McLuhan, *Understanding Media*, 8 and 13, respectively.
4. Though each of these men went on to write several books on orality and literacy, their seminal contributions were: Walter J. Ong, *Ramus, Method, and the Decay of Dialogue: From the Art of Discourse to the Art of Reason* (Cambridge: Harvard UP, 1958); Eric A. Havelock, *Preface to Plato* (Cambridge: Harvard UP, 1963); and Jack Goody, *The Domestication of the Savage Mind* (Cambridge: Cambridge UP, 1977).
5. For a withering critique of the Mentalist School, see John Halverson, "Olson on Literacy," *Language in Society* 20:4 (1991), 619–640; John Halverson, "Goody and the Implosion of the Literacy Thesis," *Man* (New Series), 27:2 (1992), 301–317; and John Halverson, "Havelock on Greek Orality and Literacy," *Journal of the History of Ideas* 53:1 (1992), 148–163.
6. The seminal text is a chapter in Max Horkheimer and Theodor W. Adorno's *Dialektik der Aufklärung* (Amsterdam: Querido Verlag, 1947) entitled "Kulturindustie – Aufklärung als Massenbetrug." Marcuse's contribution was the *One-Dimensional Man* (Boston: Beacon, 1964).
7. Marxist treatments of the media are somewhat out of fashion today, although they can be found. See Mike Wayne, *Marxism and Media Studies: Key Concepts and Contemporary Trends* (London: Pluto Press, 2003); Phil Graham, *Hypercapitalism: New Media, Language, and Social Perceptions of Value* (New York: Peter Lang, 2005); Matthew Fuller, *Media Ecologies: Materialist Energies in Art and Technoculture* (Cambridge: MIT Press, 2005); and Lee Artz, Steve Macek, and Dana L. Cloud, eds., *Marxism and Communication Studies: The Point Is to Change It* (New York: Peter Lang, 2006).
8. The standard-bearers – indeed, gurus – of the modern Critical Theory approach to media studies are Jürgen Habermas and Noam Chomsky. Both have written many books and have many followers. For examples of their work, see Jürgen Habermas, *Strukturwandel der Öffentlichkeit. Untersuchungen*

zu einer Kategorie der bürgerlichen Gesellschaft (Neuwied: H. Luchterhand, 1962); and Edward S. Herman and Noam Chomsky, *Manufacturing Consent: The Political Economy of the Mass Media* (New York: Pantheon Books, 1988).

9. On the shortcomings of the entire research program, see David L. Altheide, "Media Hegemony: A Failure of Perspective," *Public Opinion Quarterly* 48:2 (1984), 476–490.

10. Michael Agger, "And the Oscar for the Best Scholar...," *New York Times* (May 18, 2003), Section 2, 15.

11. See especially Jean Baudrillard, *In the Shadow of the Silent Majorities*, translated by Paul Foss et al. (New York: Semiotext(e), 1983); and Jean Baudrillard, *Simulacra and Simulation*, translated by Sheila Faria Glaser (Ann Arbor: University of Michigan Press, 1995).

12. The most thorough Poststructuralist analyses of media are those of Mark Poster. See Mark Poster, *Information Please: Cultural and Politics in the Age of Digital Machines* (Durham: Duke UP, 2006); Mark Poster, *The Information Subject* (Amsterdam: G + B International, 2001); Mark Poster, *The Second Media Age* (Cambridge: Polity Press, 1995); and Mark Poster, *The Mode of Information: Poststructuralism and Social Context* (Chicago: University of Chicago Press, 1990). For a Poststructuralist treatment of eighteenth-, nineteenth-, and early twentieth-century media, see Friedrich A. Kittler, *Discourse Networks 1800/1900* (Stanford: Stanford UP, 1990) and Friedrich A. Kittler, *Gramophone, Film, Typewriter* (Stanford: Stanford UP, 1999).

13. On Innis's life, see Donald Creighton, *Harold Adams Innis: Portrait of a Scholar* (Toronto: University of Toronto Press, 1957); Paul Heyer, *Harold Innis* (Lanham: Rowman & Littleman, 2003); and Alexander John Watson, *Marginal Man: The Dark Vision of Harold Innis* (Toronto: University of Toronto Press, 2006).

14. Harold A. Innis, *A History of the Canadian Pacific Railroad* (Toronto: McClelland and Stewart, 1923); Harold A. Innis, *Fur Trade in Canada: An Introduction to Canadian Economic History* (New Haven: Yale UP, 1930); and Harold A. Innis, *Cod Fisheries: The History of an International Economy* (New Haven: Yale UP, 1940).

15. These books include Oswald Spengler, *Der Untergang des Abendlandes: Umrisse einer Morphologie der Weltgeschichte*, 2 vols. (Munich: Beck, 1918–1923); Arnold Toynbee, *A Study of History*, 12 vols. (Oxford: Oxford UP: 1934–1961); Alfred Kroeber, *Configurations of Culture Growth* (Berkeley, Los Angeles: University of California Press, 1944); and Pitirim Sorokin, *Social and Cultural Dynamics*, 4 vols. (New York: American Book Co., 1937–1941).

16. The foundation texts are Milman Parry, "Studies in the Epic Technique of Oral Verse-Making. I: Homer and Homeric Style," *Harvard Studies in Classical Philology* 41 (1930), 73–143; Milman Parry, "Studies in the Epic Technique of Oral Verse-Making. II: The Homeric Language as the Language of an Oral Poetry," *Harvard Studies in Classical Philology* 43 (1932), 1–50; and Albert B. Lord, *The Singer of Tales* (Cambridge: Harvard UP, 1960).

17. Harold A. Innis, *Empire and Communications*, revised by Mary Q. Innis with a foreword by Marshall McLuhan (Toronto: University of Toronto Press, 1972), xiii.

18. See Harold A. Innis, *Empire and Communications* (Oxford: Clarendon Press, 1950); and Harold A. Innis, *The Bias of Communications* (Toronto: University of Toronto Press, 1951).

19. The literature on creativity, innovation (scientific and technical), and diffusion is very large. Concerning creativity, see M. A. Runco, "Creativity," *Annual Review of Psychology* 55 (2004), 657–687. On scientific innovation, see Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962) and the voluminous literature that followed in its wake. For a review of theories of technical change, see Alex Roland, "Theories and Models of Technological Change: Semantics and Substance," *Technology & Human Values* 17:1 (1992), 79–100. On the diffusion of innovations, see Everett M. Rogers, *The Diffusion of Innovations* (New York: Free Press of Glencoe, 1962) and the copious literature that followed it.

20. On the myth of the "inventor" and his "discovery," see Simon Schaffer, "Making Up Discovery," in *Dimensions of Creativity*, edited by Margaret Boden (Cambridge: MIT Press, 1996), 13–53.

21. Just what causes people to be creative remains something of a mystery. For a review of the literature, see R. J. Sternberg, ed., *Handbook of Creativity* (Cambridge: Cambridge UP, 1999); and M. A. Runco, "Creativity," 657–687.

22. As a result of "network externalities" or "network effects." On these, see Michael L. Katz and Carl Shapiro, "Technology Adoption in the Presence of Network Externalities," *Journal of Political Economy* 94:4 (1986), 822–841; and, more generally, Nicholas Economides, "The Economics of Networks," *International Journal of Industrial Organizations* 14 (1996), 673–699.

23. Here I draw heavily on Michael Mann, *The Sources of Social Power. Volume 1: A History of Power from the Beginning to A.D. 1760* (Cambridge: Cambridge UP, 1986), 1–34.

24. The "network" approach to the study of society is burgeoning. For a recent review of the literature, see Duncan Watts, "The 'New' Science of Networks," *Annual Review of Sociology* 30 (2004), 243–270.

25. Karl Marx and Friedrich Engels, *Werke*, 39 vols. in 41 (Berlin: Dietz Verlag, 1961–1974), vol. 8: "Der achtzehnte Brumaire des Louis Bonaparte," 115.

26. It is remarkable how hesitant many scholars are to accept that there is such a thing as "human nature." On this tendency, see Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (New York: Viking Press, 2002).

27. Karl Marx and Friedrich Engels, *Werke*, 39 vols. in 41 (Berlin: Dietz Verlag, 1961–1974), vol. 4: "Das Eland der Philosophie," 130.

28. See Nicholas Abercrombie, Stephen Hill, and Bryan S. Turner, *The Dominant Ideology Thesis* (London; Boston: Allen & Urwin, 1980). On the origins of values generally, see Michael Hechter, Lynn Nadel, and Richard E. Michod, eds., *The Origin of Values* (New York: A. de Gruyter, 1993); Hans Joas, *The Genesis of Values*, translated by Gregory Moore (Chicago: University

of Chicago Press, 2000); and Raymond Boudon, *The Origin of Values: Sociology and Philosophy of Beliefs* (New Brunswick: Transaction Publishers, 2001).

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1. Plato's *Phaedrus*, translated by R. Hackforth (Cambridge: Cambridge UP, 1972), 159-160.
2. "Gorgias," translated by Donald J. Zeyl in *Plato on Rhetoric and Language: Four Key Dialogues*, introduction by Jean Nienkamp (Mahwah: Hermagoras Press, 1999), 101.
3. An excellent review of recent theories on the origin of language is provided by Derek Bickerton, "Language Evolution: A Brief Guide for Linguists," *Lingua* 117:3 (2007), 510-526.
4. David Hume, *A Treatise of Human Nature*, edited by L. A. Selby-Bigge (Oxford: Oxford UP, 1888), 173.
5. Jean-Louis Dessalles, *Why We Talk: The Evolutionary Origins of Language*, translated by James Grieve (Oxford: Oxford UP, 2007).
6. This idea – "kin selection" – is ordinarily credited to W. D. Hamilton. See his "The Genetical Evolution of Social Behaviour (I and II)," *Journal of Theoretical Biology* 7 (1964), 1-16 and 17-52.
7. This theory – "reciprocal altruism" – is usually credited to Robert Trivers. See his "The Evolution of Reciprocal Altruism," *Quarterly Review of Biology* 46:1 (1971), 35-57.
8. On the formation of reputations, see Martin Nowak and Karl Sigmund, "Evolution of Indirect Reciprocity," *Nature* 437:27 (2005), 1291-1298.
9. On subgroups within primate bands, both ancient and modern, see Charlotte K. Hemelrijk and Jutta Steinhauser, "Cooperation, Coalition, and Alliances" in *Handbook of Paleoanthropology*, edited by Winifried Henke and Ian Tattersall, 3 vols. (Berlin: Springer Verlag, 2007), vol. 2: 1321-1346.
10. For what follows, see F. B. M. de Waal, *Chimpanzee Politics: Power and Sex among Apes* (New York: Harper & Row, 1982); and Richard Wrangham and Dale Peterson, *Demonic Males: Apes and the Origins of Human Violence* (New York: Mariner Books, 1996).
11. See Robin Dunbar, "Neocortex Size as a Constraint on Group Size in Primates," *Journal of Human Evolution* 20 (1992), 469-493; Robin Dunbar, "Neocortex Size and Group Size in Primates: A Test of the Hypothesis," *Journal of Human Evolution* 28 (1995), 287-296; Robin Dunbar, "The Social Brain Hypothesis," *Evolutionary Anthropology* 6 (1998), 178-190; and Robin Dunbar and H. Kudo, "Neocortex Size and Social Network Size in Primates," *Animal Behavior* 62 (2001), 711-722.
12. The idea of "relevance" was first developed by the linguists Dan Sperber and Deirdre Wilson. See their *Relevance: Communication and Cognition* (Oxford: Basil Blackwell, 1986).
13. On "costly signaling," see Amotz Zahavi and Avishag Zahavi, *The Handicap Principle: A Missing Piece of Darwin's Puzzle* (New York: Oxford UP, 1997).
14. This is true of primates generally. See Arnold H. Buss, "Evolutionary Perspectives on Personality Traits," in *The Handbook of Personality Psychology*,

edited by Robert Hogan, John A. Johnson, and Stephen R. Briggs (San Diego: Academic Press, 1997), 359.
15. This is because modern hunter-gatherers are modern. See Katherine A. Spielmann and James F. Eder, "Hunters and Farmers: Then and Now," *Annual Review of Anthropology* 23 (1994), 303-323; and Steven L. Kuhn and Mary C. Stiner, "The Antiquity of Hunter-Gatherers," in *Hunter-Gatherers: An Interdisciplinary Perspective*, edited by Catherine Panter-Brick et al. (Cambridge: Cambridge UP, 2001), 99-142.
16. For a review of the literature, see Fred Myers, "Critical Trends in the Study of Hunter-Gatherers," *Annual Review of Anthropology* 17 (1988), 261-282; and Richard B. Lee, "Art, Science, or Politics? The Crisis in Hunter-Gatherer Studies," *American Anthropologist* 94:1 (1992), 31-54. That the category "hunter-gatherers" encapsulates a remarkable amount of on-the-ground diversity is demonstrated by Robert L. Kelly, *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways* (Washington, DC and London: Smithsonian Institution Press, 1995).
17. Roger Griffiths, "Speech Rates and Listening Comprehension: Further Evidence of the Relationship," *TESOL Quarterly* 26:2 (1992), 385-390. Griffiths says the "average speech rate" is 188 words per minute.
18. Griffiths, "Speech Rates and Listening Comprehension."
19. For a review and discussion of the research on facial memory and recognition, see Vicki Bruce and M. E. Le Voi, "Recognizing Faces," *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 302:1110 ("Functional Aspects of Human Memory") (1983), 423-436. On vocal memory and recognition, see E. C. Carterette and A. Barnebey, "Recognition Memory for Voices," in *Structure and Process in Speech Perception*, edited by A. Cohen and S. G. Nooteboom (New York: Springer, 1975), 246-265; and B. R. Clifford, "Voice Recognition by Human Listeners: On Earwitness Reliability," *Law and Behavior* 4 (1980), 373-394.
20. The typology of signs presented here (icon, index, and image) is that of Charles Sanders Pierce. See his "Sundry Logical Conceptions" [based on lectures given in 1903] in *The Essential Pierce: Selected Philosophical Writings*, vol. 2: 1893-1913, edited by Nathan Houser and Christian J. W. Kloesel (Bloomington: University of Indiana Press, 1998), 273-275.
21. The distinction between motivated and unmotivated (or arbitrary) signs is Ferdinand de Saussure's. See his *Course in General Linguistics* [based on lectures given between 1906 and 1911], translated by Roy Harris (Chicago: Open Court Publishing, 1986), 130-131.
22. "Prophet's Name Growing Ever More Popular, Even in Britain," *Yemen Observer* (June 16, 2007).
23. "Wang Tops List of Surnames," *China Daily* (April 25, 2007).
24. Website: "How Many of Me?" Retrieved July 24, 2008.
25. Website: "Longest Lecture Marathon," Guinness World Records. Retrieved June 4, 2009.
26. Elaine Marieb, Jon Mallatt, and Patricia Wilhelm, *Human Anatomy*, fifth edition (San Francisco: Pearson Benjamin Cummings, 2008), chapter 11 ("Fundamentals of the Nervous System and Nervous Tissue"). The nerves in question are "Group A fibers."