Chapter 12

Pattern Recognition in Human Evolution and Why It Matters for Ethnography, Anthropology, and Society

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You can take the human out of the Stone Age but
you can't take the Stone Age out of the human.
—*Anonymous*

Introduction

This final chapter is concerned with a world that has been irrevocably changed by the arrival of the Internet and the massive amounts of data its affordances have generated. It speaks to issues that are of fundamental concern for all of us who are thinking about where we are coming from and where we are going, given that we find ourselves in a present that experiences unprecedented changes in the material and symbolic environments in which we live, facing an uncertain future, and, significantly, coming from a more or less unexamined past that goes back several million years. What do these versions of the world have to do with each other? Why are we "we" and "here," and not "something other" or "somewhere else"?

We are concerned then with a number of wide-ranging issues, from the basic existential questions that confront society today to specific questions about the role of anthropology and ethnography in a world of ever-increasing complexity. This chapter attempts to build a case for the significance of evolution for ethnography as a methodology, for anthropology as a discipline, and, in the end, for the future of our society.

I begin our conversation with two central concepts: first, the idea (or image, if you like) of a helix with spiraling, evolving strands that allows us to conceptualize human evolution not so much as a series of discrete steps or thresholds, but as slowly emerging possibilities and opportunities; and second, a theory of patternality that says that all living beings depend on recognizing patterns in their environment to survive. I use these concepts as a foundation for exploring the question of potential parallels with the situation we are facing today. I will suggest that looking at the kinds of processes that have occurred throughout history and especially prehistory may give us some clues about our current situation, where again we are

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confronted with an utterly incomprehensible environment that may also require substantial pattern reorganization.

This chapter has two major sections: Part I positions us in "The World That Was." It paints a picture of transformation after transformation in the evolution of our species that individually and jointly changed us into the creatures we are today. Part II asks: "That Was Then. And Now?" Seeing our existence as a long line of slow transformations, I propose that we are again facing a changing world for which we might (or will have to) undergo major changes, thereby grounding the conversations begun by Maxwell, Riopelle, and others in this volume.

The Helix

Thinking in terms of a twisting, turning, spiraling helix that takes energy from the environment, both physical and human-made, allows a view that focuses on growth and development through processes of mutual influence, of coevolution, of imbrication, of a path taken when others could have been taken: a view that says it is the combination of many different influences that in the past drove the direction of evolution and most likely will continue to do so as far as our future is concerned. Of the many strands of the human helix, I have chosen to focus on the physical, cognitive, and social strands and their intricate linkings and interdependencies, where a tentative move in one opens up possibilities in the others, some of which may or may not be taken depending on a variety of often unknown ecological, climatic, or other changes in the environment in which our precursors lived. By invoking the image of the helix throughout this chapter, I invite us to focus specifically on the exceedingly slow coevolution rather than on the popular "stages" and "thresholds" that tend to get constructed around famous archeological finds (such as Lucy). I see rather a delicate, multifaceted helix with a variety of strands that eventually gets us to what and who we are, a development that at any point could have taken a different direction (and did so in other hominins).

I suggest that these strands and their paths became somewhat discernible some millions of years ago with anatomical changes such as slowly developing upright posture and bipedal locomotion, changes that fundamentally affected our ability to recognize patterns and with that not only led to further anatomical adjustments but also to cognitive and social changes that produced new pattern configurations. Slowly and persistently, over millennia, these became neurologically fixed and thereby available for more exploration and use.

Patternality and Pattern Recognition

The second concept that will be central to our conversation is patternality, the ability to discern (and ultimately make) new patterns in the environment. Patternality is common to all life forms. It represents a deep instinct, a drive, a need to impose order on the world so as to make it usable and survivable. I suggest that

this concept provides a powerful way of looking at the central questions we are investigating here.

Patternality with its affordances shapes how we and all creatures make sense and meaning of the environment within which we exist and the world within which we live. At the biological level, it drives survivability. At the cognitive and social levels, it drives learning and meaning-making for humans and many other social species.

There are two views of patternality. The first assumes that patterns (recognizably regular arrangements of "things") are out there in the world and can be detected through an organism's sensory capabilities. Thus, our ears detect certain frequencies in the space around us and not others. Pattern detection is present-oriented and descriptive, matching sensory capacities to particular configurations of things in the environment.

The second view emphasizes the process through which particular patternalities come into existence and is thus inherently temporally and evolutionarily oriented. On the social level, it asks questions about the construction of conviviality; on the cognitive level, it is concerned with making symbols and establishing categories and coherent "mental models" that serve as templates for making sense of the world. The difference between these views is between processes of recognizing existing orders and actively imposing them. In the literature, authors frequently do not distinguish between these views. I, similarly, invoke both aspects.

Patternality is built slowly by conspecifics (individuals belonging to the same species or group) experiencing similar conditions. In humans it leads to a common, consistent, and coherent web of meanings that is constantly ratified in use. Thus, for social species, a major part of the ability to detect patterns that have meaning is consensually constructed and changeable in the crucible of an undependable physical and social environment.

To look ahead a bit, the key thread I am following throughout the course of evolution in this chapter has to do with changes in the environment, both given and human-made, that provide the energy for continuous amplification of patternalities, producing ever new ways of ordering and making sense of the world. There is little hard evidence for this story, so I sometimes employ what Maria Bezaitis and ken anderson (2011) have called "informed fictions", a device for opening up new thinking spaces in order to fill in the white spaces in our evolutionary history.[1]

Part I: Pattern Recognition in Human Evolution

Arbitrary Beginnings

Let us step into the picture millions of years ago when our ancestors started to manipulate objects in their environment, things like sticks and stones, to maybe scratch or scrape or dig, thereby beginning a process which in the long run changed the environment in ways no other species has done. We will go back about five or

six million years to start tracking the ways in which our prehuman ancestors have seen and constructed the patternalities of their worlds. Archeologists, paleobiologists, paleoecologists, and other specialists in reading the past tell us that somewhere in the hominin line there was a class of furry, quadrupedal animals that made a living scurrying around in the underbrush. They might have looked something like this (see Figure 12.1 below).

Eventually, these creatures found it advantageous to go upright and bipedal. Why is anybody's guess. Maybe it was because they sniffed and found things to claw from tree trunks, or they noticed that rising up allowed them to get at low-hanging fruit. Maybe it was because of the incursion of competitors. We don't know. The best guess is that there was some change in their environment that invited, maybe even propelled, them to change their behavior.

For the creatures who happened to get up on their hind legs, what was different for them? How did their perceptions change? Their ears now drew input from an expanded audiospace; their eyes saw things previously invisible, out of sight; their snouty nose, no longer to the ground, sensed new odors. The front paws that had always been exploratory became even more so. Their footpads began to differentiate between what they sensed from the ground and the tactile feedback they got from a little higher up. Increasingly, hearing, seeing, and sensing what was above ground opened new opportunities when they searched for food, for shelter, for mates. Above all, it increased the likelihood that they would not be eaten.

The quadrupedal posture had limited them to a rather confined field of vision. The patterns they had recognized through their senses had been very, very local,

FIGURE 12.1. A contemporary furry, four-legged, mostly ground-dwelling animal (photo by the author).

quite literally down to earth. With upright posture, their world opened up. They now saw landscape. Distance. Perspective. A new patterning of the world emerged that allowed them to understand that some of the small things out there could actually be large things. Slowly, as they explored the possibilities, their understanding of what is an obstacle, what is dangerous, and what were the opportunities in this new spatiovisual field changed, and with that, their behavior. Little by little their bodies and brains adjusted. Their memory of what leads to success and failure reconfigured and rewired itself, building templates for recognizing new patterns and in the long run establishing a new patternality that encompassed a novel view of the world.

Getting Up from the Ground

Between 6 and 3 million years ago (mya) there may have been several groups that were on the way to walking upright.[2] Our best example is *Ardipithecus ramidus*, a group of creatures that lived about 4.4 mya and left us an almost complete female skeleton that scientists affectionately nicknamed "Ardi." (Images of Ardi are proprietary. Any Internet search engine can find a representation of her skeleton and a reconstruction of what she might have looked like.[3])

Ardi definitely walked upright on two legs, and with that forever destroyed the myth of our ancestors swinging in trees like chimps. (She doesn't have the proper shoulder structure for that. Her anatomy had already changed.) While the ancestors of apes went up into the trees, ours acquired the ability to walk on the ground. The two lines developed different physiological, cognitive, and social modifications as their helices spiraled into somewhat different directions. Ardi and her kind had perfectly formed hands for fine manipulation, and feet that, though somewhat odd with a splayed-out big toe, were fully capable of supporting walking on two legs. But about their cognitive development we know almost nothing. Their brains were no bigger than chimps'.

We can only speculate about what happened during the millennia when these creatures explored the possibilities opened up by their upright posture and increasingly efficient bipedality. Informed fiction tells us that they found themselves adapting to every kind of change, whether that came from transformations in their environment—the climate changing, new predators coming in—or from the ongoing alterations in their anatomical and neurological makeup. They managed the transition by exploring their new lifescapes, learning (often the hard way) what aspects of their patternality didn't work anymore and, most important, experiencing what types of new patterns could be constructed with the resources the new environment provided. This surely was a long drawn-out process. Other groups of creatures engaged in it as well. Many followed similar paths, but at some point their helix took an ever so slight turn that led to extinction. I imagine that our line faced the same potential fate many times. But here we are, and we are *Homo*

sapiens, not chimps hanging out in the trees or the creatures whose massive skulls (and skulls only!) survive in our lectures as *Paranthropus*.

Hands

But let us return to Ardi and her group. Not only had their sensory capabilities changed with upright posture, but the achievement of hands must have produced a fundamental reordering of the "things" in their world (like what is reachable and carryable). New behavior patterns emerged as things in their environment became accessible and available to them in a way that was radically different from what had been possible with the sensorimotor capabilities of the quadrupedal way of life.

The hands now could do much of what the mouth had done before and as the old mouth traditions slowly gave way to hand traditions, they could do it better. With that, their prognathous snout and those massive canines became less useful and then less prominent. Smell became less important; vision, more so. Hand-eye coordination established itself, especially for fine manipulation (Stout 2008). Over time, exploring and becoming familiar with these new resources, new *categories* of patterns emerged. There were now touchables and untouchables, graspables, transportables, maybe even giftables that expanded not only in quantity but also in practical meaning.[4]

With hands, as had been the case with upright posture, a tremendous potential opened up. Again there was a world out there that was full of uncertainties and unknown dangers, but it was also a world of vast opportunities, at the same time scary and promising. It was an inflection point for the human helix that opened new paths for our line while closing up others it might have taken.

The ancestors of chimps and gorillas, for reasons too complex to speculate about here (fun as it would be), made different choices, choices that laid out a route to stiff hands and stiff backs which are good support for hanging around in trees, rather than to the nimble hands and flexible backs that led to the complex beings we are today. The two lines diverged in other ways as well. As the hands of creatures like Ardi became adept at grasping and picking up things in their environment, our precursors realized that they could transport stuff from one place to another. Here too, the ape helix moved into a slightly different direction so that today they may manage to carry a nut or a rock a few meters to a more convenient site, but that's about all. They are neither good at walking any distance nor at carrying. For our predecessors, on the other hand, the ability to carry stuff again opened up their world for exploration and adaptation, mentally as well as socially.

Rocks, Tools, and Community

We know that our ancestors carried raw materials and stone tools (and surely all other kinds of things that were important to them) by 2.6 mya. I believe the importance of stone tools has been vastly overemphasized because they are the only

hard evidence of purposeful human activity that has survived. Their presence actually says little about what must have been an extraordinarily slow accumulation of experiments and experiences with natural (and naturally perishable) materials. The stick they might have poked into a rock crevice to scare out a lizard, decayed. The rock grasped to bash a nut survives as only a rock, not a tool.

It is reasonable to assume that ever since they went upright and developed hands that could grasp, our ancestors must have picked up things from nature and explored their affordances. Some turned out to be useful, became popular, and congealed into recognizable patterns and traditions, as always closing down some options, but also opening up new possibilities. Others simply disappeared.

During these eons, the helix slowly was energized by experimentation with multiple kinds of materials and substrata, organic as well as hard, generating an ecology of what we might think of as potential tools, pseudotools, tools-in-waiting, or simply tools in early stages of development. They must have played around with rocks of the kind I picked up in the Andean Altiplano, where the landscape is practically littered with such things. What is often identified as the earliest evidence for tool use (a bone with cut marks from about 2.6 mya) may well have been produced not with a recognizable tool but with such a rock (see Figure 12.2).

Tinkering and experimenting with what was possible with such objects fostered further pattern detection in the natural environment. It also stimulated pattern *making* in the modifications that their tryout tools underwent in the course of time. I suggest that it was this drawn-out process that eventually produced the traditions archaeologists now identify in surviving hard artifacts.

FIGURE 12.2. Naturally occurring "proto-tools" from the Andean Altiplano (photo by the author).

These strands of experimentation spiraled with the multiple neurophysiological and anatomical changes that made them possible and were thereby altered themselves. We can assume that all of these activities were embedded within a rich prototool ecology, an assortment of materials and techniques that were used certainly for beneficial practical results but possibly also for esthetic reasons.

Our informed fiction here is shaped by the fact that when stone tools do become identifiable, they appear not as single artifacts but as patterned collections, well-established traditions, and recognizable regional assemblages. By 2.6 mya, stone tools and resources were transported from place to place in the paleolandscape, maybe as much as 20 kilometers (Toth and Schick 2009:292). This implies a long period (maybe as much as 1.8 million years) during which skeletal, biomechanical, cognitive, and social strands cospiraled and developed, finally spitting out what became visible as stone tools. Thus it was in a perishable world that our ancestors must have first established the experimental artifacts, the behavior patterns, the skills, and the social relationships (and with that the patternalities) that were foundational for what we now recognize as "tools."

Our predecessors left stuff in heaps and piles numbering hundreds and sometimes thousands of pieces of raw material: flakes, cores, partially finished tools, and lithic residue in places that look like worksites. These accumulations indicate social activity and use over substantial periods of time. We can imagine that toolmaking practices were learned by observation and imitation, in small groups and workshop-like gatherings in what we would now call Communities of Practitioners, or COPs.[5] This suggests that collaborative work practices and the required social structuring must have been developed and perfected, supporting a now invisible exchange system, a "First Economy" if you will, long before they became evident in lithic traditions.

Could we imagine then that there were gatherings at known sites where we might have seen a group twisting vines to make rock carriers? Or prehistoric snugglis, for that matter? Had they established a fashion of bead and feather necklaces? And what kind of social life did those artifacts have? Could they be given as gifts? Did they acquire symbolic meanings beyond their use value? Ritual meanings? Were they indicators of prestige? Of accomplishment? Were they traded? We do not know, but it seems safe to assume that there was, long before the production of stone tools, a flourishing protoeconomy of objects that carried not only use value but also social symbolic meanings.

A Human-made Environment

As their world became dotted with traces of human activity, human-produced patterns added a new layer to the increasingly deep and consequential reach of our ancestors' ability for pattern recognition. Sensory input now differentiated between the things in the world that were out there because they were made by them or others of their kind, and other things that were part of nature. They recognized the

remnants of a camp, the debris from a production site, the cast-off coconut shell, as indications of presence and activity of their own kind: a new category of pattern that significantly increased awareness of conspecifics and opened possibilities for social interaction and collaboration. Their world was now doubly populated: by things independent of human existence, and others that had never before existed.

Looking into the future (our present), the start of the transformation of the natural into a human-made environment generated an autocatalytic process by which the human component grew, eventually exponentially, not only as the modification of the physical environment was driven by increasingly nonsustainable practices, but also by new ways of gifting, distributing and trading, and ordering "things" both physical and of the mind.[6]

In time, social life in emerging communities generated an environment rich in interaction, observation, and imitation where the inherent plasticity of neural circuits eventually allowed for sensory inputs to be replaced by inputs from physical entities and representations (Coolidge and Overmann 2012; Skoyles 2012; Stout 2008). Symbol remapping provided neural circuits with the capacity to support culture and ongoing cultural innovation, and with that, new patternalities based on symbolizing, intersubjectivity, language, domestication, hierarchies, automation and, eventually, the Internet.

Part II: That Was Then: And Now?

Setting the Stage

For the rest of this chapter, I propose to examine the possibility that we are indeed witnessing another inflection point, another point at which the helix is nudged ever so slightly but ever so significantly into a new path. I intend to examine some of the most visible indicators of a changing patternality and then explore what that might mean for society, for us as individuals, and particularly for investigative methods and topics of concern in ethnography and anthropology.

Let me begin by painting the digital environment. I will briefly pull up some of the phenomena that I see as instrumental in powering the transformation, such as sociodigitization, the data deluge known as Big Data, an increasingly powerful underground economy, the linking of online and offline information, and analytics as it attempts to make sense of the digital environment. I connect to Maxwell's accelerated pattern recognition as I explore augmented realities and an augmented self. Throughout, my eye will be on what ethnography and anthropology can do to help guide the helix into a more rather than less beneficial course.

Sociodigitization and the Second Economy

We have had digitization (transformation of text and other logocentric representations into digital form) for years now. What is truly new is the extension of

digitization to all aspects of social and cultural life, an extension (or invasion)[7] that has become possible only with new digital technologies and the emergence of the global Internet. Sociodigitization involves drawing social and cultural phenomena up into the cloud, in digital codes, images, and text, thereby transforming the social, geophysical domain of human activities into something that is no longer "grounded," no longer detectable with our senses (Latham and Sassen 2005). It is what provides much of the energy for the spiraling of the helix now and, I believe, will provide the parameters for a new digitally based patternality.

Sociodigitization liquefies not only nondigital bodies, artifacts, and properties—like the money in your pocket or the house you are trying to sell—but also immaterial properties such as the music you are composing or the business proposal you are writing, even the book you are reading, giving them a kind of hypermobility which makes them instantly available and globally actionable.

In just the last few years, sociodigitization has become expansively self-perpetuating (autocatalytic), which we recognize as a feature of the evolutionary process that began with the "humanizing" and technologizing of the environment. This process has already dislocated pattern recognition abilities that were trained on physical realities accessible through our senses.

As a consequence, communication and exchange systems (including markets in physical assets like real estate and virtual assets like expertise) will never be the same again.[8] Much economic activity is now carried out over cyber linkages that run all parts of global financial and communication transactions in what Brian Arthur, a pioneer in the field of complexity economics, calls a "Second Economy" (Arthur 2011). He points out that almost all movement of goods and services now occurs over a global network of servers and sensors that operate autonomously, meaning that human beings are no longer directly involved in running them. They track and make decisions that affect sales and inventory, financial transactions, commercial real estate operations, designs of physical and virtual entities, air traffic and shipping control, and just about every other global operation that can be digitized, growing slowly, invisibly, and with no end in sight. They archive automatically, sense and execute remotely, run in parallel, reconfigure themselves on the fly, and increasingly have properties of self-organization and self-healing. They could be seen as embodying something like a neural layer for the physical economy (Arthur 2011).

The Data Deluge and Data Mining

Another defining feature of the new sociodigital landscape is the data deluge, usually now referred to as Big Data. Facebook alone uploads 300,000 photos a day and globally data grows at a rate of five trillion bits a second (Overbye 2012).[9] Maxwell (this volume) said, "What can be digitized will be digitized." I would now amplify that by saying "What can be archived will be archived": automatically, continuously, and relentlessly. The result is mega data streams that are channeled into

gigantic holding depositories in the cloud. They are fed not only by the "click data" that automatically note every keystroke, but also by data coming from remote sensor technologies and other digital devices that record practically everything that moves in the digital universe. With the explosive expansion of social networking sites, machine-generated data have been augmented by human-generated, personal data, making a rich mix of information that is begging to be analyzed. In spite of widespread questioning of the meaning of these data, their "mining" has become standard procedure in industry, government, and partisan politics.

Linking Online (Digital) and Offline (Physical) Information

An absolutely critical feature of the present-day digital environment for establishing new pattern categories is the linking of online and offline personal information (Jordan 2009). It has deep existential implications since it disturbs and potentially recasts our notions of what it is to be a human being. But it also has given rise to wide-ranging controversies about privacy, as we will see later in this chapter.

The structure of human society is built on social relations where individuals have access to carefully regulated kinds of information about each other, depending on their role and position in society. Our social interactions have been built around who we know, closely or distantly, from family to friends and strangers. The delicate negotiations about what we allow others to know about us or what we believe we have a right to know about them are part of building any kind of relationship for us. These understandings and the ability to give or deny access are fundamental to our sense of self and the borders between self and society. One highly significant way in which these borders are being breached is through the connecting of online with offline information that is now possible.

Consider this: we have been offloading large amounts of personal information to the web now for some time, in blogs, pictures, personal websites, and social networking sites, assuming in some unacknowledged way that this information has a level of accessibility that is negotiable and rather similar to the access control we have over our file cabinets and storage sheds. With online/offline merging of personal data, awareness of who has access to this information and what they can do with it is growing (amazingly slowly) in the public consciousness. When access control slips, the "augmented individual," whose physical (offline) reality is supplemented by (or merged with) information about him or her from the cloud, is beginning to tug at deeply held convictions about privacy and the self.

Analytics and Algorithms

The driving force in attempts to develop tools that could detect meaningful patterns in Big Data agglomerations is what has become known as "analytics" (which originally simply meant "the analysis of meaningful patterns"). It now refers to a

collection of algorithms that are applied to massive digital depositories in attempts to coax meaning out of them. Big Data, data mining, and analytics at this point are lightning rods for both the promise of digital technologies and the uncertainty surrounding their implications for the future.[10]

In analytic operations, algorithms (statistical computations with clearly defined steps) are central, having attained new significance in searches for meaning in digital depositories. They are involved in sense-making (pattern detection) as well as in meaning-making (pattern building) through existing recognition algorithms and by actively constructing algorithms that will lead to a desired outcome. Typical data mining requires multiple, conjoined sets of algorithms and multiple iterations during which the correct series of steps is determined.

Algorithms are a crucial feature of the digital transformation. But it is important to remember that they are not neutral; they have a language and a politics. They incorporate a certain worldview.[11] In analytics, we are dealing with a concatenation of different algorithms whose relationships and assumptions interact and quickly become untraceable. Ethnographers need to understand what kinds of algorithms affect their research and what interests, technical knowledge, and resources drive their construction.

Significantly, we often do not know what assumptions algorithms are built on, nor do we know much about the communities of specialists that produce them. This calls for insider studies similar to the laboratory studies of the 1990s, with apprenticeship in the academic and corporate research labs where algorithms are produced. A central question is in what ways new algorithms could be developed that are based on and interact with ethnographic data about what matters for the future. Riopelle and Gluesing (this volume) have begun to move in this direction.

Ethnography: Making Sense and Making Meaning

As we explore this new digital landscape, opportunities for contributing to solving its problems offer themselves at every turn. Specifically, I believe ethnographers need to be tracking and documenting the many small changes that cumulatively lead to pattern reorganization while at the same time exploring the existential mega problems that are emerging in the digital society. In this, we need to keep in mind what Francoise Brun-Cottan (this volume) has called the Malinowskian teeter-totter: the need to pay attention to the micro *and* the macro at the same time, as the contributing authors in this book have done. We need to do both fine-grained, on-the-ground ethnographic documentation of what people do and say, and integrative system analysis of what those behaviors could add up to in a historical global systems perspective. We need to understand the helix and the strands, the patternality and the patterns; and we have available for this the whole arsenal of ethnographic methods, including technology-aided tools.

Observations at the Inflection Point

If we are in fact at an evolutionary inflection point, where would we find the subtle changes that indicate a shifting patternality? In everyday life, of course! We see daily routines transformed, such as lunch (Denny), city parking (Isaacs), or just plain "categories for arranging stuff" (Sunderland, Rijsberman; all this volume). Or, check out the baby that tries to "open" a magazine picture with the finger motions that work on her iPad but don't work on paper (Graff 2011). Is there a new pattern category emerging for her that distinguishes between things that are "openable" and those that are not? Or observe that stress and overload are taking on a different flavor. What we see now is not so much particular events that threaten to overwhelm people, but a very large, ever-expanding task environment that, instead of requiring a brief spurt of energy, generates a constant floating attention, a highly stressed scanning of the environment that expects trouble on multiple fronts.[12] Or you notice the mass of photographs sent out over the web that evaded shoebox purgatory and wonder what else has become newly mobile or is still locked up in personal lives, physical communities, and histories. Walking through a Las Vegas casino you notice zombie-like behavior induced by the hypnotic effect of fast-action digital screen presentations. You start to think about the role of sequentiality in what humans do and, reaching back into evolution, you wonder if there are basic ways in which the brain processes information that get disturbed when familiar things go by too fast. You also begin to notice that people treat each other differently; hanging out on social networking sites, they now know different things about each other. People are building new expectations about face-to-face interaction and across digital media, as Martin Ortlieb (2011) has observed.

There is also a greater willingness to be playful, to be different, to stick out, that you see in people's clothing and activities that are now tolerated, even appreciated, for their scent of freedom, difference, tolerance, and release. Take, for example, the recent urban phenomenon Parkour (Figure 12.3 next page). In an impressive combination of discipline with noncompetitiveness, young adult practitioners train in loosely integrated groups to master very difficult physical skills. In this highly supportive environment, philosophy is as important as body, equipment, and technology.

For building one's intuition about where society is heading, self-observation is a powerful tool. It may involve tracking things that make you slightly uncomfortable or unreasonably happy, and explicitly noticing what responses and anticipations of behavior don't arise automatically anymore for you. A while ago I was about to explain to a stranger what I look like so she would recognize me in a crowded restaurant, when she said, "Oh no, I know you. I've looked at your website." A major advantage of auto-ethnography, of course, is that you know the context and that often you can go back and see in what ways things have changed.

I would love to see classrooms of students required to go out and produce blip diaries of this sort: on the fly, quick jottings on paper, a brief comment on a picture just snapped on their phone, video clips and snippets from public media.

FIGURE 12.3. A practitioner of Parkour practicing in a periurban setting (photo by Matthew Downey).

Of course my hypothetical classroom (or group of young business leaders) would then get together and jointly analyze their various observations. They would see patterns newly emerging and others fading. They would build a coherent image of a system undergoing change, checked against insights from a cadre of peer observers.[13] It does not take much imagination to see that such insights would be of value to all kinds of interests, academic as well as corporate and commercial.

We have lots of aggregate data, be they from public opinion surveys or data mining, about what people *say* they do, but observation tells you what they are actually doing, and as you show them the great picture you just took, they also tell you the whys and hows, the history and the meaning. What people say is often not what they do, so this is why observation of actual behavior is so important. At the same time, of course, we want to know how people think and talk about that because that is what feeds into the discourse of marketing and public consciousness.

Mega Issues

Working from the bottom up invariably surfaces systemic issues. Some of them are highly charged and in the public eye. Others live subsurface.[14] (They tend to emerge with "what-if" questions.) It is when we are faced with major societal issues that the systemic aspects of anthropological research become relevant. Mega questions require a deep understanding of the ways in which sociodigitization generates problems while at the same time embodying their solution. This suggests

that what is important for understanding how the system works is to carry out research on multiple levels, with multiple methodologies and multiple kinds of researcher embeddedness, in the technology sector, in industry, and in governmental policy settings. Relying on in-depth ethnographic interviewing and observational shadowing, in person and remotely, and employing all of the technologies available to us, we need to re-articulate, as Sherry Ortner suggests, the practices of social actors on the ground with the big structures and systems that both constrain those practices and yet are ultimately susceptible to being transformed by them (Ortner 2006:2).

Privacy

Privacy, certainly, has now become a societal mega issue. If you listen to how people talk about privacy, you quickly realize that there are actually two topics: the first revolves around what constitutes the self and how much of that is confined to the physical body. It asks how much of your activities and knowledge you can offload without affecting your identity. The second question revolves around rights to commercialize the personal information people have uploaded to the web.

Regarding the first, we do not know to what extent people now actually consider their online representations to be a part of their identity. If everything you have on the web disappeared, who would you be? Or, *what* would you be without your memory, your history, your connections? We have long espoused the notion that the self is private and have regulated access by others socially and legally. But what if those regulations and assurances have become ineffective? What if the information we have deposited on the web becomes available to others (as Nardi et al. asked as early as 2004)? As a matter of fact, this is happening today. It is now possible for anybody with the right resources to strip away the cloak (or protection) of anonymity.

For example, researchers at Carnegie Mellon University (CMU) have shown it is possible to identify social security numbers (SSNs) (plus much other sensitive information) using minimal data from the web, such as a person's photo along with a place and date of birth. They do this with face recognition software that connects the unidentified photograph to public online data. (They use other algorithms to determine birth information, and then employ algorithms modeled on patterns detected in the Social Security Administration's public Death Master File to predict SSNs [Acquisti and Gross 2009; Acquisti et al. 2009, 2011]).

These kinds of experiments are carried out in multiple scientific and industry labs. At this point they don't scale, but there is every expectation that they will. Online information, still regarded as private and restricted in the old pattern, is in the process of transforming into public information that is accessible by unknown others.[15] It may well be that our idea of what makes a person is slowly changing to include not only physical but also digital enhancements, and the idea to give others access or control may become deeply threatening.[16]

The question then arises: what rights do consumers have to keep the information (the parts of their self?) they have deposited on Facebook, Twitter and other social networking sites from commercialization, and what rights do the big Internet companies have to use this information for profit?

A Changing Discourse

The existential privacy question turned acerbic when it became clear that the vast amounts of personal information that are archived in social networking sites can now be mined for commercial purposes. In the ensuing discourse (or battle), the big Internet companies insist that they provide a service that improves the searchability of information for subscribers and enables better design and placement of advertisements with more of the types of ads that customers are likely to want. Their language is one of service to the customer and the industry.

Consumers complain that the companies don't tell what data they collect and what they do with them. Companies, consumers say, hide behind privacy policy written in legalese and use duplicitous language where information that has been "removed" may not mean that it has been deleted. And if you unsubscribe, the company keeps the information it has collected. As a matter of fact, it is for all intents and purposes impossible for a subscriber to find out what information is being held, much less get it deleted.[17] Consumers seem to have a point.

This conflict is visible not only in legal skirmishes but also in more general arguments that employ the language of service provision, democratization of surveillance, and Do-It-Yourself analytics, suggesting the shared benefits of the new technologies. The phrase "publicly available" has come to mean "usable by anybody." For example, the CMU group and others emphasize that the data they use (from social networking sites, voter registration lists, and such) are available to anyone, and the software (e.g., PittPatt) can be bought in any computer store. But nowhere in their presentations do they emphasize that running these programs requires massive computing resources.[18] There is no way that "the general public" can do the data mining that can be done by using the massive resources Internet companies and scientific establishments have accumulated. This—if I may borrow a phrase from Bourdieu and Passeron (1977:42) here—provides "a market for material and especially symbolic products of which the means of production are virtually monopolized by the dominant classes." It is pretty clear that there is a major gap between users and providers. Can ethnography make a difference here?

Any ethnographer will see research questions and issues in this terrain for which basic ethnographic documentation could provide clarifying information, such as: to what extent do consumers consider their web presence a part of their identity? What do they consider "personal information," and how does that overlap with providers' definitions? Are consumers more concerned about disclosure of personal information or about its commercial and political use?[19] What do they actually object to? Are they concerned about violation of the self or about shar-

ing the wealth? Do they actually read privacy policies and if so, how does that affect their behavior? What do people believe about the protection of their uploads and how does that correspond to the de facto situation? What kinds of service do people want from Internet sites and service providers, and how does that correspond to what they get? Answers to such questions should provide guidelines to lawmakers and regulators as well as industrial designers.

There are untold numbers of splendid, indeed awe-inspiring research issues waiting for us in the new digital landscape. I see a vibrant, exciting, new ethnography emerging that helps document and guide its development.

Conclusion: From Then to Now and into the Future

We have followed the path of the human helix from early beginnings, millions of years ago, and have seen how miniscule, opportunistic, arbitrary changes in one combination of strands have opened up opportunities that provided energy for the others. And we have seen that the fundamental process that drives the evolution of the helix is pattern recognition, the increasingly sophisticated ability of living creatures to arrange things in the world in such a way that their potential becomes apparent and can be exploited for further useful adaptations.

Repeatedly, the creatures who eventually became our ancestors were confronted by situations of immense uncertainty, with momentous transformations in their lifescapes. For example, when they got up to walk on two legs rather than four, an unknown world opened up to them to which they responded, as our species has done again and again, through massive realignments in their sensory capabilities, their anatomy, their cognition, and their social relationships. I have been suggesting that the transformation of our environment brought on by the digital turn has taken us to such a point again; that we are witnessing an alternate, augmented patternality being constructed, a new way of life for the species where new pattern recognition capabilities are now in the process of being shaped, albeit by fits and starts. The existential question is how to develop this new patternality in such a way that it keeps the species' options open for a positive future.

Our job as anthropologists and ethnographers, and humanity's concern at this point, is to find ways of dealing with this invisible world. Continuing a long ethnographic tradition, making visible what is invisible, should help drive the field from mechanical data mining closer to what Maxwell calls ethnographic analytics, that is to say the committed collection and analysis of meaningful data in a sociodigitized world.

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Notes

1 I provide some key resources for the voluminous scientific literature on which my claim to *informed* fiction is based in the references.

2 Important dates for finds mentioned in this chapter are: Ardi (*Ardipithecus ramidus*), 4.4 million years ago (mya); Lucy (*Australopithecus afarensis*), 3.2 mya; bone with cut marks (first evidence of proto human behavior), 2.6 mya.

3 Most instructive is a 2009 special edition of *Science*, which is readily available (with free registration) at http://www.sciencemag.org/site/feature/misc/webfeat/ardipithecus/, accessed June 12, 2012. The report of the 47 scientists who worked up the findings was published in 2009, though Ardi was discovered in 1992.

4 It has been suggested that the emergence of new competencies in pattern recognition may have drawn on the inherent malleability of neurological structures together with very ancient "feral" cognitive capabilities such as numerosity. Numerosity, the ability to appreciate quantity, is also present in preverbal infants and nonhuman animals and the inherent malleability of neurological structures (see Coolidge and Overmann 2012 and comments therein).

5 Ongoing discussions in paleoneurology suggest that sustained behavioral repetition and habituation are associated with complex integration of neural substrates (Coolidge and Overmann 2012; Skoyles 2012; Stout 2008). It is possible, then, that it was precisely these rhythmic, repetitive, social activities suggested by the remains of these workshops that might have supported the kind of improved pattern recognition ability required for increasingly sophisticated, patterned tool use.

6 This self-referential, exponential "up-ratcheting" has been identified by Brian Arthur as a characteristic of technologies in general (Arthur 2009).

7 You will see me sitting on the fence about evaluative aspects of these phenomena. I deeply believe that there are potentially both immensely positive and immensely negative outcomes of this turn.

8 Things that formerly were fixed can now appear any place in the world, albeit in a different form. For example, a luxury house for sale on a remote tropical island now appears as an ad on the front page of the *New York Times*, and your own face now stars in an ad courtesy of Facebook.

9 Note that these numbers don't mean anything anymore. There is no real-world experiential equivalent that would give them meaning. They are metaphors and should be investigated as such.

10 Of the several types of early studies with a social science approach, let me mention the insightful experiments of anderson et al. (2009) and the early work of Churchill and Goodman (2008), which anticipated many of the issues that are lively now. For questioning the meaning of algorithm-based research, see Ladner (2008).

11 Cory Doctorow, author of *Makers*, said algorithms are "statistically expressed opinions." For embedded assumptions, see Ladner (2008).

12 Linda Stone, a former Microsoft and Google Vice-President and dedicated self-observer, talks about attention, stress, email apnea, and physiological changes in our now continuously connected world. She argues that our connectivity is changing the way our brains function (http://lindastone.net/; accessed June 12, 2012).

13 http://trendwatching.com, a website for businesses, uses a process that incorporates some of these ideas. They use 700 spotters across the world to collect concrete instances of behaviors, products, and installations that speak to emerging business trends (such as "transumers" or "pop-up stores").

14 See James Ferguson's forthcoming book on the new politics of distribution; also Karen Ho (2009), Gillian Tett (2009), and Janine Wedel (2009). Many of the digital mega issues are tied to economics and financial markets, where ethnographically informed analysis has barely begun.

15 The extreme formulation of that possibility would be something like: If everything that can be digitized is digitized, and everything that is digitized is archived, and everything that can be archived is connected, there IS no privacy.

16 Is there a parallel case in the wide acceptance of physical augmentations such as artificial body parts, surgical reconstructions, organ transplants, extreme cosmetic surgeries, and the like?

17 It took Max Schrems, a 24-year-old law student from Vienna, to force Facebook to hand over the 1,200 pages of data they had recorded on him. As suspected, his dossier contained items he had deleted, including photos he had detagged himself, email addresses and location information he had never provided, plus the names of everybody he had ever "poked" or chatted with. To get the information he finally had to file a complaint in Ireland, where privacy laws are much stronger and tend to be enforced. The Federal Trade Commission in the United States is hamstrung with insufficient funding and personnel (Maass 2012).

18 In the SSN project, the researchers had access to high-performance computing resources, including the Pople system with 768 processors and 1.5 terabytes of memory. They worked with a core dataset of about eight gigabytes and used 100 processors for up to eight hours for each of seven runs, not to speak of human resources like four highly trained graduate students. See http://www.psc.edu/science/2009/privacy/, accessed June 12, 2012.

19 Should we see parallels here to indigenous people objecting to having their blood and DNA used for commercial (and scientific) purposes?