Media Ecologies

Materialist Energies in Art and Technoculture

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Introduction: Media Ecologies

This is a media ecology made in bits of paper: "What abstract poetry tried to achieve is achieved in a similar fashion, though more consistently, by Dadaistic painters, who played off actual real objects by nailing them or gluing them next to each other in a painting. Concepts can be played off against each other much more clearly this way than when their meanings have been translated into words."[1]

Kurt Schwitters was writing about sticking shoes, sausage wrappers, tickets, and wire to a backing board in order to conjure up or discern a relationship among them. Parts no longer exist simply as discrete bits that stay separate; they set in play a process of mutual stimulation that exceeds what they are as a set. They get busy, become *merzbilder*. This patch of text from the master of collage life also makes clear two themes key to this book.

First, the only way to find things out about what happens when complex objects such as media systems interact is to carry out such interactions—it has to be done live, with no control sample. Objects here should also be understood to mean processes embodied as objects, as elements in a composition. Every element is an explosion, a passion or capacity settled temporarily into what passes for a stable state.

Second, the effect of what Schwitters says is to make a fundamentally materialist account of the world. But it is not one that is limited to being naively instrumental or that suffers the blinding effects of positivism. It is a materialism that acknowledges and takes delight in the conceptuality of real objects. All objects have a poetics; they make the world and take part in it, and at the

same time, synthesize, block, or make possible other worlds. It is one of the powers of art or of invention more generally to cross the planned relations of dimensionality—the modes or dynamics that *properly* form or make sensible an object or a process. As it does so, other worlds gently slip into, swell across, or mutate those we are apparently content that we live in.

This book is about such work. It is written at a time when objects have explicitly become informational as much as physical but without losing any of their fundamental materiality. The chapters ahead are about this materiality, how it can be sensed, made use of, and how it in turn makes other elements or compositions tangible. This book asks: what are the different kinds of such qualities in media systems with their various and particular or shared rhythms, codes, politics, capacities, predispositions, and drives, and how these can be said to mix, to interrelate, and to produce patterns, dangers, and potentials? Crucial to such an approach is an understanding that an attention to materiality is most fruitful where it is often deemed irrelevant, in the "immaterial" domains of electronic media. The conceptual dematerialization of art, labor, or information have at particular moments made for revealing and productive epistemological ruses, but more can be done. Drawing on Nietzsche's grounding of thought in materiality, in the thickness of life, in his renowned Polish blood,[2] this book attempts to layer such insights with a sense of their own *fabrication*—a medial will to power made in the ontogenetic, reality-forming nature of a media and in its capacity for connection and use.

The term "ecology" is used here because it is one of the most expressive language currently has to indicate the massive and dynamic interrelation of processes and objects, beings and things, patterns and matter. At the same time, like Schwitters's scraps and scrag-ends, it is a term that obviously has a history.

Media Ecologies, Prior Art

The term "media ecology" is used and in circulation in a number of ways.[3] The term is chosen here because this multiple use turns it into a crossroads. Butting these two words up to each other produces a conjunction of two variables that are always busy with meaning. Their dynamism, however, always arises out of concrete conditions. The virtuality of such conditions, their possible reinvention or alternate state, their pregnancy with change and interre-

lation, is as deeply implied in this concreteness as much as it can be said to be subject to definition.

The term is ambiguous, too, given its number of different current uses. That these uses exist, that the present work does not attempt to find a "new" title for itself, is intended to enhance the way in which this book uses pre-existing objects as being more loaded than the new and innocent, and hence potentially more powerful when dimensions of relationality that are virtual to them (but that perhaps remain hidden) are brought to the fore or potentiated. It is not the intention of this book to spend its entire course fidgeting with a possible hermeneutics of the term, but a brief mapping of its concurrent uses will usefully serve to locate the areas of concern here.

"Media ecology," or more often "information ecology,"[4] is deployed as a euphemism for the allocation of informational roles in organizations and in computer-supported collaborative work. Commonly, it is used as a saccharine term for the "natural" structuring of the microscopic to macroscopic dimensions of class composition and command in a workforce. On the one hand, this is done on a mundane level, such as in the ordering and management of reception staff within an organization, making sure they have the location, communications filter-rating, and availability of all other staff at their fingertips. Of keen interest too in such contexts is how information flows are routed within an organization. So the term often also implies an interrelationship with knowledge and time management processes, intellectual property regimes, database and software design, content control, access structuring, metadata, archiving, and the use and generation of new document and information types. A third, and related current is how auditing processes and "quality control" extend through informationalization into greater parts of contemporary work-patterns. In other words, the terms "media ecology" and "information ecology" are highly susceptible to interpretation as part of the jargon effluvia of the early twenty-first century. Underlying these terms, however, are key discussions about the development, contestation, and invention of life in the present day. Some of these issues will be discussed here, but somewhat at a tangent to the refrain of life, as a subset of a larger enterprise opportunity in which they are often found.

In a related sense, in that there is something of a shared predisposition to an uncomplicated but rather more spiritually troubled technological determinism, is another use of the term by a current surrounding media commentor and educationalist Neil Postman.[5] Here, "media ecology" describes a kind of

environmentalism: using a study of media to sustain a relatively stable notion of human culture. The intellectual background of this current includes Marshall McLuhan, Lewis Mumford, Harold Innis, Walter Ong, and Jacques Ellul—a vivid set of resources. Here, "ecology" is more usually replaced with the term "environment" or is used as a cognate term where the fundamental difference between the two concepts is glossed over. Echoing differences in life sciences and in various Green political movements, "environmentalism" possesses a sustaining vision of the human and wants to make the world safe for it. Such environmentalism also often suggests that there has passed, or that there will be reached, a state of equilibrium: that there is a resilient and harmonic balance to be achieved with some ingenious and beneficent mix of media. Ecologists focus rather more on dynamic systems in which any one part is always multiply connected, acting by virtue of those connections, and always variable, such that it can be regarded as a pattern rather than simply as an object. At times there is certainly an overlap of interests between this book and this current, particularly in attempts to investigate how media can be said to have certain kinds of causality. However, as with the business-oriented discussions of media and information management, much of the work in this second current is rather too often symptomatic of other, more fundamental shifts in cultural modes: how much longer until the ever-awaited fall of the book? Instead of providing a sing-along chorus to these changes, as the first current does for those parts of life falling under the regime of economics, the latter seeks too often only to trace them with the properly cultivated kind of detached horror. Their conceptual resources, however, have more to offer.

A third strand of use of the term is discernible in some of the most interesting parts of literary studies in recent decades in, for instance, the writings of N. Katherine Hayles,[6] Friedrich Kittler,[7] and others such as the critic and editor Joseph Tabbi.[8] These representatives of a thread of study in which literature becomes a part of a subset of media, and thus of discursive storage, calculation, and transmission systems, have fundamental insights to offer. Such work makes electronic or code-based logical composition and a developed theorization of interaction come into play with cultural analysis and production. Of particular use too is such work's discussion of domains usually roped off as science, its varied histories and philosophies. Such work also often serves to complicate and open up the possibilities to be found in the second thread. The interrelation of Kittler and McLuhan—despite the former's

amused anticipation of the moment when man is occluded and finally ignored by his "extensions"—is clear, for instance.[9] Where these thinkers gain perceptual and methodological power is in the introduction of, broadly speaking, poststructuralist concerns to the fundamentally humanistic, or even intrinsically religious, concerns of the "environmental" approach. It must be said, however, that here the specific term "media ecologies" is used largely either as an aside, or more precisely as something already accessible as a known object of reference. The context of this writing is to take this named thing, to take advantages of this reference in circulation, a scrap of phrase or concept-wrapper, and to make use of it, but also to test it and, one hopes, to extend its precision.

A key reference in doing so will be to make use of a sense in which the term ecology has also been extended in texts by Félix Guattari working among social movements that have themselves made such links. It will be clear from a scan of this book that Guattari, his serial collaborator Gilles Deleuze, as well as writers who have made their own uses of their work, such as Manuel De Landa and Howard Slater,[10] provide a persistent thread of reference. Guattari himself derives a great deal of conceptual ground from the cybernetician and anthropologist Gregory Bateson.[11] Guattari's use of the term ecology is worth noting here, first, because the stakes he assigns to media are rightly perceived as being profoundly political or ethico-aesthetic at all scales. Aligning such political processes with creative powers of invention that demand "laboratories of thought and experimentation for future forms of subjectivation"[12] also poses a demand for the inventive rigor with which life among media must be taken up. Equally, Guattari's repeated linkage and cross-fertilization of the three modes, "mental," "natural," and "social" of ecology[13] within "ecosophy"[14] provides insight into the way that any of these or other modes of an ecology always demand carrying over into another mode, another universe of reference, and always another, in order for these laboratories, whether in texts, persons, movements, or at other scales, to have any function.

Inventory of Parts

In addition to giving some context to the title, an introduction must make available a sense of the ways in which the book will treat its material and the means by which its argument is constructed. Below, each chapter is briefly

summarized, outlining its area of interest and the approaches, ideas, and activities used to mobilize the argument.

Chapter 1: The R, the A, the D, the I, the O: The Media Ecology of Pirate Radio

This chapter focuses on the media ecology of contemporary London-based pirate radio and its interweaving of various high- and low-tech media systems for the broadcast and intensification of music (at the time of writing, primarily garage, hardcore, jungle, and dancehall) and its networks. One of the concerns of this book is to develop arguments for a machine, digital, and electronic aesthetics. Such an aesthetics will take advantage of the perceptual capacities and methodologies of art. It should not, however, suffer the illusion that reflexive powers of invention are its unique purview. Pirate radio in London over the last decade has been the site of immense innovation. One example is the launch of jungle, now a superficially "dated" form but one of the most significant currents to have been produced in recent decades. But alongside music, the way in which the pirates have operated in terms of their mobilization of media systems also make demands on any discussion of media in combination and in excess.

Some of the the key themes to the book are introduced here. Deleuze and Guattari's "machinic phylum" provides for a sensual and technical aesthetics that can be developed in relation to media and music. The chapter also includes a reading of Stuart Hall's "Encoding/Decoding," a text that forms something of an transdisciplinary nodal point in cultural studies, linking as it does to information theory, but which can also be useful if reassessed in relationship to the concept of "Hylomorphism," the critique of a splitting of form and content or matter introduced by Gilbert Simondon and also developed in *A Thousand Plateaus*.[15] Whereas Hall's work has usefully illustrated the way in which media ecologies can be broken down into separate parts of a process, at each point undergoing treatment and filtering by specialization of interests, the machinic phylum provides a way of thinking through how elements of complex medial systems "cooperate" to produce something more than the sum of their parts. This tension, between the discrete or isolatable and the dynamic and multiplicitous, runs through the book. Finding ways to conceptualize and use the interplay between such states, rather than reduce them to two grand isolates, forms one of the key concerns of these chapters.

J. J. Gibson's systems-theorization of material "affordances" in ecological psychology[16] has been, partly since its introduction to design discourse by Donald Norman,[17] a key resource in thinking through the predispositions, capacity to combine, and inherent forcefulness of objects and organisms. Here it is put to work to trace how massively layered and interacting sets of affordances, embedded in technologies, music, and social networks in law and in people, shift and combine as part of thriving, inventive scenes.

The contemporary London pirate scene provides a rich lode of activity for thinking through the interrelation of self-organized cultural activity with media systems. The gendered, fleshy construction of technologized voices, the turntable as hip hop computer, the mobile phone as media assemblage, radio as unfinished project: this chapter follows through a sequence of the medial components of the media ecology establishing a means of understanding their traits and interrelations. The scope of the chapter is to develop the beginnings of the range and possibility of operating in media ecologies. Further chapters are thus set up with the task of working these seams in more detail.

Chapter 2: The Camera That Ate Itself

Where the work on pirate radio attempts to develop an account of multiply interlaced minoritarian use of media systems, chapter 2 narrows down to construct an approach to a single media object and its interconnections. Rather than making an initial mapping an "entire" media ecology, it focuses on an account of media aesthetics grounded in the conditions of a particular imaging technology—John Hilliard's 1971 series of photographs, *A Camera Recording Its Own Condition (7 apertures, 10 speeds, 2 mirrors)*. Following Vilém Flusser's concept of the camera as an "apparatus" that allows for media's being composed of multiple programs or drives, the chapter develops a relation between Karl Marx's observations of machine subjectivity in the *Grundrisse* and the interplay of mathematical, material, and social powers.

One way in which the observation of these powers can be used is, via Antonio Negri, to make a rich and inventively political technological sensibility. Such a sensibility necessarily recognizes the embittering conditions of capitalism, but it is, through its access to the dimensions of possibility coursing through life and media, able to scorn them. The prince of affirmational scorn is, of course, Friedrich Nietzsche. His prescient grounding of philosophy in physiology and matter provides one of the key terms of reference here,

the possibility to develop a medial will to power. This concept provides a more nuanced account of medial drives, allowing them to be recognized as formed in composition with other elements and currents. As such, and as a side effect, it is also able to move beyond the rather static formulation of media determinism. Introducing Nietzschean concepts into the debate emphasizes the materiality of machinic life, a move that also demands other forms of knowledge and capacities of perception. Medial will to power also throws the possibility of any neutral account out of whack. "Perspectivalism," the cognition of the specific loadedness of accounts, drives, and methods, undergirds much of the continuing work. This is one of the key revelations of Hilliard's careful matrix of photographic feedback, but it also leads to an acknowledgment of Friedrich Kittler's development of discourse theory as proposed by Michel Foucault—itself a development of this key Nietzschean theme—to include its constitution by media systems. This chapter, owing much to these last two writers, sets up some of the key tools of the book. It is how they fold in on themselves and each other, what insights they demand and release, that sets its pace.

Chapter 3: How This Becomes That

This chapter contains accounts of the following works: *Embryo Firearms*, by Cornelia Parker—parts withdrawn from the first stages of gun manufacture and made available for viewing under the mechanism of sculpture; *The Switch*, by Jakob Jakobsen—the addition of an on/off switch to a residential area's street lighting; *BITRadio*, by Bureau of Inverse Technology—a pirate radio broadcast device that cuts into an "owned" frequency when pollutant particulates are detected as present in the air; and *by the way*, by Germaine Koh—a radio transmitter that rebroadcasts the sound of a car as it passes the site of an installation, again cutting into the frequency allocated to another broadcaster.

The chapter begins with a story told by Franz Kafka in which a city's phone system is "phreaked" in order to establish a particular social space. The city is layered by a system of interpretation, a code, which allows for certain activities within a wider set of constraints to occur. Following previous chapters the work continues to make an exploration of ways in which "hidden" dimensions of invention and combination are embedded and implicit in particular dynamics and affordances of media systems and their parts. These

core themes of the book are tested and expanded toward a discussion of cultural and political dimensions of industrialized and algorithmic material culture.

While chapter 3 develops ideas about the ways in which the capacities and behaviors of media objects, systems, and dynamics are changed, potentiated, and mobilized when brought into abnormal or inappropriately preformatted relations to each other, it is also useful to make some account of how such "normality" comes about, of its own underlying drives. These drives can be understood as the effect of a certain sort of will to knowledge. Alfred North Whitehead's concept of "misplaced concreteness" as a founding blind spot in modern science and technology is discussed as a form of simultaneously productive and constraining perspectivalism. It is a concept extremely appropriate to media. Whitehead identifies "misplaced concreteness" as Newtonian science's tendency to construct ideally isolated objects as the basis of knowledge. This chapter suggests the conceptual and material problematic of the "standard object," a serial element such as an ISO standard shipping container whose potential has been—for the purposes of particular compositional tasks—utterly stabilized, as being the result of such knowledge. The standard object is presented as providing the opportunity for understanding technicity and organizational systematicity in terms that recognize its affordances, and its crucial agency in modernity. But it is also a mode of knowing and producing that effects limitations on other forms of understanding and use. Such limitations have been crucial to the powers of scientific modes of thought, the means by which they test themselves and clarify the scope of their capacity to speak.[18] At the same time, standard objects are always in combination with other forms of life. They exist only as a "settlement" of powers, affordances, and interpretations. More is always to come.

Chapter 4: Seams, Memes, and Flecks of Identity

Cctv—world wide watch is a sequence of Web pages by Heath Bunting that is published on the irational.org Web site. Users are encouraged to watch feeds from four webcams. If they see a crime, they are to report it on an HTML form. The contents of the form are apparently sent via fax gateway to a nearby police station. In this chapter, each step of the Web site, whether cultural device, imaging system, or protocol, is followed through, as in the chapter on radio, in order to draw out and map its implications.

The chapter opens with a discussion of the memetic theory of cultural evolution. Here it is used to provide a potentially more fine-grained account of medial will to power. Its use is complicated by the misplaced concreteness introduced earlier. As an orthodox scientific theory, memetics suffers the problem of being, at least for the moment, unable to establish a definition of an isolated meme that can be used across cultures. This problem potentially threatens to scupper memetics as a research program. Without being able to be identified, how can a meme be monitored and shown to exhibit certain behaviors and qualities? Here, it is suggested, the *Cctv* site attempts to generate this same "problem" for surveillance. As information travels unevenly from street to image to network to text, what "fleck of identity" can be said to constitute proof? The problematic of the standard object and what escapes it are conjoined. While problematizing one putative standard object, the work relies absolutely on another, the Internet Protocol packet. Thus an opportunity is created to discuss, via "perspectivalism," the scale and mode in which objects can be said to exist or to operate. Chapter 4 asks how an account might be made of the ways in which such scales layer and interoperate in complex media environments, and how each scale comes with and creates its own dimensions of relationality: political, material, aesthetic, and other dynamics, which generate it and from whose perspectives it may be read. (The term "dimensionality" is used because, alongside those of extension that are obvious, any material element also corresponds and belongs to a multitude of other compositional forces and domains that place it in relation to others that may be virtual, affective, historical, and so on.)

After running for a while, the *Cctv* site received a cease and desist e-mail from the owner of one of the cameras it parasited. This letter in turn became part of the site. Such use of "documentation" allows the site to twist the dimensions of relationality that it exists in, to make others come in to view—even when such a view or perspective is owned. It also suggests an interesting set of approaches to material that is not registered as art but is produced in abundance by and around art systems. Another work, *A Media Art (Manifesto)*, founded on an arguably memetic exploitation of media perspectivalism, also exploits this mesh of possibility and provides a means of testing this culture of evidence.

Here, as with all of the chapters, the media ecology's materiality, the connections and uses made, missed, and implied, form a grounding part of the work. Webcams, their aesthetics, distribution, and their use, by, among

others, Wolfgang Staehle, are discussed starting from a simple account of their construction. Software and network systems such as those used by these cameras are usually understood to be value-free, simple utilities. Here, their compositional terms are taken up in order to test their affordances and limits.

It is also useful to locate the work in relation to another of its important contexts, namely, surveillance. Responses and additions to expanding processes of surveillance and an account of the developing typology of forms of monitoring, modulation, and control are also discussed in terms of their limits and powers, and the ways in which these are messed with or amplified by their existence and production within multiple dimensions of relationality. An aesthetics of layering, of adding complication and filtering, and of joining processes to networks is proposed, alongside that of forces and powers.

As a result of the several relations of dimensionality within which the work is seen as being made and operative, this chapter is rather longer than the others. Taking such work to exist in an expanded, "ecological" sense demands an effort at a making a nonreductive network of interpretation, with the unfortunate possible result of a certain arduousness. Children make their way around the world by responding with a ceaseless "why" to every explanation or grunt offered them. This chapter perhaps betrays the effects of the main methodological influences in my life at the moment, but I hope it benefits from the rather childish insistence on being able to take every path in a labyrinth simultaneously.

It is also in this sense, but within a much slower media ecology—that of books, one that ostensibly pays less attention to memetic buzz—that the present text is offered. An additional note should also be made on the way the following chapters at times employ different speeds, frames of reference, and narratologically different "voices." It is often customary in academic writing to spend pages of tangled and anguished excuse before the author dares drop a joke, which is then hurriedly attributed to someone else. This text itself is in a sense also an attempt at something akin to the paintings described by Schwitters. How can words, concepts, quotations, footnotes, the mechanics of a book, and the writings and accounts that evade them themselves be nailed down or glued to a page in a way that makes them reverberate? But more, how can conceptual worlds, different material practices, along variously restrained or absolutely *rude* interdisciplinary dynamics be satisfactorily brought together in a way that seeks not to develop a necessarily unifying

framework, but to hold in its hands for a few moments an explosion of activity and ideas to which it hopes to add an echo?

This last is a question of writing and of language itself as part of various media ecologies, one that provides an underlying question to the whole book. The question of language returns in several of the following chapters, in relation to and as materiality, as Deleuze and Guattari's formulation as "minor," or as the ur-form of a standard object, as a test case for meme theory and as the practice of MCs in the synthesizing of voices in the media ecology of pirate radio. It is a question that has the flexibility to be "reflexive," that is, to operate in second-order terms on itself. That is an advantage of writing. But in a consideration of a media ecology, it is also necessary to ask where these language-embedded and language-driven concepts and accounts go—where do the words end up? How do they operate as an engagement with a particular media ecology? In limited terms, they go into the hands of a few persons and are filed or registered in a number of archives and documentation and audit systems. Thankfully, they go too into the hands of readers who will make their own uses of them, even if only to soak up the coffee needed to keep themselves awake. A more fundamental question is how writing operates in relation to the other kinds of activity discussed. In this case, the question is not how these activities can somehow acheive an isomorphic relationship in which one confirms and absolves the other, but rather to find ways in which the one can trigger, make strange, and intensify the kinds of working and thinking done in each and in both.

1

The R, the A, the D, the I, the O: The Media Ecology of Pirate Radio

> Public space, in an electronic age, is space on the run.
> —VITO ACCONCI[1]

". . . [T]he electricity of everyone in the studio coming up on their E's at the same time, by the NRG-currents pulsing down phone-lines and across the cellular-phone ether from kids buzzing at home. Listening to pirate phone-in sessions like this I felt there was a feedback loop of ever-escalating exaltation switching back between the station and the hardcore 'massive' at home. The whole subculture resembled a giant mechanism designed to generate fervour without aim."[2]

The style of pirate radio operating currently in London[3] has developed precisely in terms of the ways it finds to amplify such fervor to find more routes for it to leak out and feed back. In a sense, this paragraph crystallizes the scope of this chapter. What is attempted here is a discussion of the ways in which this process occurs and how it provides a zone of experimental combination with which other forms of media culture can learn. The process by which this is attempted is to take each part of this giant mechanism and try things out with its components.

Lists and Detours

Describing minoritarian literature through a discussion of the poet Walt Whitman, Gilles Deleuze describes how the "American writing" that

Whitman and a throng of others exemplify is predicated on the hungry combination of many heterogeneous parts. When these writers get rolling, an "infinite patchwork" of "singularities, remarkable and non-totalisable parts extracted from a series of ordinary parts"[4] is mobilized. In Whitman, one of the ways these fragments coalesce is through the simple list. A key mode of formation in aesthetics of multiplicity, lists are found in the celebrated ecstatic artist Adolf Wolfli's descriptions of his mythic cities, as the enumeration of facilities and functionality in Michel Foucault's "archaeologies," as roiling concatenations of the manifestations of life "drunk on water" in the shaggy dog stories of Henry Miller, and the "dork sublime" of the detail upon detail word-clots of novelist Mark Leyner.[5] "The index" as a form of list has also been employed by science fiction writer J. G. Ballard,[6] for example, as a way of bringing a virtual or suppressed text into emergence through the accumulation of detail. As a form of speculative writing, the inventory (the list of items and supplies required for an expedition, an experiment, to open up a laboratory) opens up the space of a system of objects arranging itself in composition with as yet unknown combinatorial potentials.

The accretion of minute elements of signification into crowds, arrays, and clusters allows a reverberation of these cultural particles between them and together, the connotations of one into flying off the lick of another. Whitman expresses the cosmic urban rapture of the ever unfolding, ever reverberating conviviality and iteration through time in "Crossing Brooklyn Ferry,"[7] but there is also a sense in which any one of these elements contains the potential to themselves spiral off into further constellations. In "Once I Pass'd through a Populous City"[8] the writer sloughs off the role of the purposive poet, supposedly traveling in order to be ". . . imprinting my brain for future use with its shows, architecture, customs, traditions," wiping memory or self-improving intent by disappearing, being detained in love. The city as agglomeration of heterogeneous parts contains a myriad of magic doors and improbably secreted switching-systems opening up into other dimensions. There is an interplay between the one and the multiplicities it contains, that it might be, that it might have been, that it weaves in and out of as relations of dimensionality. Elements in a paratactic list always open up into a matrix of immanent universes. Each of the elements in a list is hypotactically stacked in relation to the immanence of what it is next to, what it abuts to and differs from. Such hypotaxis is virtual, that is, for its actualization it demands power to the imagination.

The fecundity of such writing is not found in adherence to the particular form itself. Lists in digital environments, appearing as menus in applications, the various types of lists available in HTML, or in radio-button interfaced multichoice forms front-ending databases, can, just as easily as being the signature of digital abundance, also provide a not-so-magical entrance to the preformatted pluralism of "customizable" portals.[9] Here, where the "One is always the index of a multiplicity,"[10] we can assume that it is the one as brand, portal, or identity that takes precedent. The form of the internet portal, for instance, provides not the content accessible via its site, but the "digital environment"[11] within which it is managed and policed, a hegemonic "manyness" for which all that can be claimed is that "there's lots of it and it's all equally great, being all the same." The aesthetics of multiplicity that Deleuze describes is instead characterized by an "almost mad sentence, with its changes in direction, its ruptures and leaps, its prolongations, its sprouting, its parentheses."[12] To be involved in such a sensorium is to experience a constitutional incapacity to be restrained or plugged into a format. A simultaneous reeling off of information and reeling at the implications of each element making it up provides a compositional drive for the use of lists in developing an account of medial interconnection. Simply enumerating the diverse components that make up a media system allows for speculative work to take place. Parataxis (a sequence of this and that, "ands") always involves a virtuality that is hypotactic (concepts and things, nested, meshed, and writhing). It puts into place a virtual syntax. How *can* they be connected? The heterogeneity, the massive capacity for disconnectedness of the parts, coupled with the plain evidence of their being linked by some syntax, of writing or performative action, allows for the invention of newly transversal, imaginal, technico-aesthetic or communicative dynamics to flower.

So here's a list. Pirate radio: transmitter, microwave link, antennae, transmission and studio sites; records, record shops, studios, dub plates; turntables, mixers, amplifiers, headphones; microphones; mobile phones, SMS, voice; reception technologies, reception locations, DJ tapes; drugs; clubs, parties; flyers, stickers, posters.

One "understands" what radio is. A list like this merely settles the point, a set of nouns. As a media ecology it has supposedly settled down into its place in the larger scheme of things. The list in the last paragraph is unremarkably flat. It arranges a sequence of components, all of which too are known. Such a list only provides a drop, a break between beats as the parts

themselves by virtue of simple alignment begin to suggests patterns, alliances, affinities. In *Energy Flash*, Reynolds's account of pirate radio focuses on how an "apolitical," rapturous unity is generated among participants in the circuit. At the same time, as all the various elements organize in combination within the sound, across the city, through a jumble of available media, there is also a sense in which the polyphony traversing the signal echoes a wider sense of connective disjuncture as a crucial term of composition. Multiplicity is induced by two processes: the instantiation of particular compositional elements and the establishment of transversal relations between them. The media ecology is synthesized by the broke-up combination of parts. This "unity" is thus brought into being by disequilibrium, the fact that things get moving, by asymmetrical relations of being in media. Each compositional fragment, each item on the list, can—while being under the effect of certain grammatical schema nameable as an object or a whole thing, as with the unexpected discovery of a lover in Whitman's populous city—opens up into other permutational fields. Each part, then, forms an axis to which this shifting patchwork can be connected.

Transmitter, Microwave Link, Aerial, Transmission, and Studio Sites

The tower block, condemned as a vertical slum by a Control[13] that would rather update its architectural dimension into forms more amenable to representation in the camera-friendly streetscapes of *Coronation Street*, *East Enders*, or *Crimewatch*, becomes an "incubator." The thicker the forest of towers, the more antennae perched above the city, the more the Radiant City, botched, radiates.

The most grinding work of a pirate operation is in maintaining transmission sites—renewing equipment after busts, finding new locations for studios, links, and aerials. Financial attrition as equipment gets eaten up in seizures is one way that the airwaves are kept locked down. Of the legal guidelines governing the running of Independent Local Radio stations in the U.K., there is a host that specify the technical standard of equipment to be used. These, according to Hind and Mosco, authors of a lively survey of pirates operating in the mid-1980s, perform as a substantial hurdle to broadcasting.[14] Pirates operate without such prescriptive demands, working instead with their inverse: at what level of cheapness will things still run? How disposable can

the gear be made in order that when it is seized another can be put into play as soon as possible?

It is also in these areas that much of the pragmatic-conceptual work—the tacit knowledge gained through active participation in a process that any culture of use or self-taught expertise lives on—of running a station arises. There is a phenomenology of cash flows, of the libidinality or dullness of the work of broadcast, of setting signals loose to evade capture, signals that are yet received, and a sense of a technico-aesthetic life inventing and resensing itself through the process. How can this part of the activity of pirate radio be thought through in relation to both the sounds blasting through them and the networks of the exultant city they forge and take part in? The pirates bring together a vast range of skills that are sensual, technical, economic, social, and eminently pragmatic.

For Deleuze and Guattari imagining into the working procedure of itinerant metal-workers, exploring and working the flows and idiosyncratic qualities of certain metals or alloys, "The *machinic phylum* is materiality, natural or artificial, and both simultaneously; it is matter in movement, in flux, in variation, matter as a conveyor of singularities and traits of expression"[15] (emphasis in original). The phylum of the taxonomist exists to demarcate between kingdom, of plant, animal, and so on, and in doing so track their slow torrent of mutations by means of similarity of appearance. The word is in the process of loosing its internality to zoology. Phyla are replaced or added to by other systems of reference, such as clades, analytical tools produced by emergent tools and discourses, such as genetic databases, which provide access to dimensions and interpretations of evolution other than those simply available to the interpretative eye.

Deleuze and Guattari's use of the term "machine phylum" echoes this loosening from specific reference, allowing the concept to take up its potential for transferability across domains. Like "ecology" itself, or the "replicator," which appears later, terms jump category. Here, the conceptualization of a phylogeny is the "persistence and change of many individuals through time."[16] Manuel De Landa provides a succinct image of the machinic phylum when he describes it as "The over all set of self-organising processes in the universe. . . . These include all processes in which a group of previously disconnected elements suddenly reaches a critical point at which they begin to "cooperate" to form a higher level entity."[17]

The metallurgic artisan theorized in *A Thousand Plateaus* provides a key early moment at which consciousness of such transitions into self-organization can be recognized as being also cultural and social. Tracing this flow of matter and the intensive points at which it changes from ore into a purer form, from solid into a molten state, is complicated by and echoed in the flow's relation to the points at which following it becomes subject to circuits, to arrangements between a here and a there, between one fixed state and another. Flows are connected, for instance, to the mercantile, to divisions of labor that separate out the roles of merchant, prospector, and artisan into distinct categories of behavior and access to modes of perception and action. Not properly nomadic, not capable of becoming sedentary, metallurgists become itinerant. Cursed into this border category by their knowledge, they must engage, carefully, with each strata and work with seams and thresholds.

The metallurgist posesses an intense relation to materiality: a proprioception of and through the changes of state of the matter that one is working with, becoming aware of its tics and glitches in terms of how they are mobilizable, in what realms they operate in topological terms, what they connect to or elide. An experiential science or tacit knowledge formed through the use of impurities and changes in structure and integration of metals by leaps between temperatures through heating and quenching. (An alliance of access to wood or charcoal, ores, and water was needed.) This minor science is presented in *A Thousand Plateaus* as being a tradition counter to or partly submerged by that of *hylomorphism*.[18] This schema, or "form–matter model," has dominated Western thought since the first systematic schools of ancient Greece. In the treatise on nomadology by contrast, Deleuze and Guattari propose an emphasis on the morphogenetic capabilities of material itself: the moments when a series of forces, capacities, and predispositions intermesh to make something else occur, to move into a state of self-organization.

Hylomorphism is "a model of the genesis of form as external to matter, as imposed from the outside like a command on a material which is thought inert and dead."[19] By contrast, the conceptual device of the machinic phylum allows thought to enter into a thicker relationship with practice, with material traits of expression, their constitution of effects. Counter to hylomorphism in Simondon's account, is the process of individuation, whereby materials produce their own capacities of formation in relation to the morphogenetic affordances around them. Recognizing hylomorphism allows accounts of tech-

nicity and media to escape from a merely semiological reading of the world into an expanded involvement with and of it.

In stating that "Electricity has always existed and it's not just a phenomenon of this century. It's always been in thunder, lightning. . . . Instead of wood or leather or metal and all the things we so far make music out of like stroking strings—now we're using electricity,"[20] Björk hooks into one of the thickest of the veins of this machinic arrangement of the wider media ecology of pirate radio. But crucially, her insight at once ablates the distinction between digital and analog electronic music by looking at a scale below: to its substrata, the various means for the extrusion and torture of electrons. It is this—whether it occurs as representation as bits of information, as slider bars on a sequencer interface, as the scraping of a vinyl trench against a needle, in stamping on a fuzzbox, or in the direct construction of circuits and hardware—that calls to mind that semimystical force experienced at the time of Edison and Tesla. It is as the hidden element between metallurgy and music that electricity also brings to light "A life proper to matter . . . a material vitalism that doubtless exists everywhere but is ordinarily hidden or covered."[21] Electricity scratches the vitalist itch precisely because it involves the operation of matter on itself.

But as Kittler easily points out, "Electrics does not equal electronics."[22] The media systems that in combination produce the current form of pirate radio include both the primarily electrical or electromagnetic (the T1200 gramaphone, the transmitter coil, etc.) and those that exist in the mode of digital information and electronics (e.g., the GSM phone—something of a bastard case in that it necessarily maintains an interface to electromagnetic waves; and computationally based samplers and synthesizers, etc.). Both electric and electronic sound technologies also allow a sense of a *doubling* of the machinic phylum in that the manipulation of singularities and flows at one level becomes explicable only when it manifests at another—in sound waves. Just as for generations of zoology, organic phyla were sensible only through our seeing them in particular senses as mutational fields of a shared body-plan, this area of the machinic phyla is operated in and manifest through sound. The threshold into self-organization is crossed only when a bunch of components becomes something else. This sound not only exists at a level independent of the technical and social assemblages that are mobilized around it; it also articulates them, gives them sensual, rhythmic, and material force. That is to say that the interactions of the multiple social, linguistic, algorithmic,

technical, and other drives that merge and recombine in the media ecology are of necessity not "comprehended" or owned by any one person or group; but there is a clear sensation that when it works—when it generates the mutually excitatory fervor that Reynolds speaks about—it works as a result of all these combinations crossing into another state.

Deleuze and Guattari credit the particular historical example of the itinerant metallurgist trading between the nomad and the sedentary, with a tendency to, of necessity, evade regulation. Such a position does not solely mean a simple disappearance from control, but also a process of pragmatic deformation of control. In this way, interrelation with the phylum, its process of combination, is with more than what simply gets caught up in its flow. The machinic phylum of the pirate radio traverses not simply that of its constituent technologies, but a whole interrogative field of social, juridical, legislative, political, and economic formations. As Tim Westwood points out, in a text full of unfortunately misplaced optimism about the possibility of the legal stations opening up fully to underground music, before the 1984 Telecommunications Act, which allowed for seizure of transmitters *in use*, the key innovation that allowed pirates to broadcast twenty-four hours a day was a barrister's interpretation of a clause in the Wireless Telegraphy Act (1949), "to the effect that 'any apparatus made in this country cannot be seized until the case goes to court and the order is made.' "[23]

The machinic phylum of the radio in this sense is that of the creation of flow among dense population, an expanded form of phyla that at once multiplies the domains in which it is traced but is *also* produced in the attempted or actualized imposition of hylomorphic patterning—law, the state, or the technologies of capture employed by it. Foucault[24] and lived experience remind us that the *capacity* of law for the full subsumption of what it deems its matter is never what is actualized. Elements in a composition are forged and conditioned by this encounter, but not in submission to it. *Readings* of these formations, their utilization, the finding of such loopholes within them—all constitute a way in which hylomorphic patternings themselves can become *hyle*, matter for the constitution of flow.[25]

Radio's section of the electromagnetic spectrum was born regulated. At the end of the nineteenth century, the British government "Made the wireless telegraph a state monopoly, assigning it to the Post Office, with oversight granted to the Admiralty."[26] The only portion of the spectrum not directly falling under state control and procedures of licensing is that visible to the naked

eye. For the purposes of radio broadcasters in London and the rest of the U.K., regulation is held by the Radio Authority and carried out by Branch Four of the Department of Trade and Industry (DTI). The media ecology of the radio is perspectivaly defined for this agency by section 172 of the Broadcasting Act, in its additions to the Wireless Telegraphy Act 1949, as: any premises, vehicles, vessels, or aircraft; any wireless telegraphy apparatus;[27] recordings, recording equipment, playback equipment; or any equipment "connected directly or indirectly, to wireless telegraphy apparatus."[28] This is a relatively close-quarters description of material likely to be seized on the spot in a raid by the DTI. Section 170 of the Broadcasting Act 1990,[29] however, expands culpability to a network of filiations involved in either maintaining the technical equipment of a station, providing material to be broadcast, or supporting or trading with the station in any way.

A conjunction can be made here with "Encoding/Decoding,"[30] an essay by Stuart Hall in which he argues for a derivation of the model of media communications, via several disciplinary permutations, from Claude Shannon and Warren Weaver[31]—a schema in which the process of communication can be resolved into five linearly arranged elements: source, transmitter, channel, receiver, and destination. In Hall's account, the three middle terms, that is, the "media" elements, have been replaced by the simple term, "message." The particular way in which "meaning" is shaped and conditioned is the object of Hall's study. In one sense, the text follows a broadly Althusserian account of "structure in dominance," in which various practices within this tripartite circuit are conjoined and modulated by the prevalent forms of discursive production. At the same time, the document is a key point in the collapse of left-functionalism and a useful transversal node to recognize as canonical cultural studies engages with information theory. One can read here an account of the breakdown of the smooth isomorphic mapping of the form of domination onto its object, which falls outside of this schema. While Hall follows a hylomorphic model in describing the mechanisms by which media are articulated, how meaning is produced through a "passage of forms," he also describes how, in the distinction between the circuit of communication and the "meaning" relayed, there is the possibility that, since each phase within it "has its own specific modality and conditions of existence, each can constitute its own break or interruption of the passage of forms on whose continuity the flow of effective production (that is, 'reproduction') depends."[32]

These differentiated moments within the "totality" formed by the social relations of the communicative process as a whole are, in Hall's account, points at which each distinct formation—an institution, a body of technical knowledge, a system of language—articulates the message according to its discursive and productive norms, and furthermore, must deliver the message. At this point again it becomes subject to the frameworks of knowledge, relations of production, and the technical infrastructure at play at the point of reception. At this point, if not earlier (although he is speaking specifically about television), each message is subject to potential mapping by meanings that are not "preferred," which do not "have the whole social order embedded in them," and, since "Connotative codes are *not* equal among themselves," the point of reception, of negotiation, and of potential "resistance" is reached. As is well known, this threshold is a point at which cultural studies as active project and as attentive, painful student of consumption trapped in receiver mode begin to bifurcate.

Although this account is extremely useful (since it distinguishes implicit productive, technical, and discursive activity, allows for a way of analyzing their conjuncture, and provides a way of tracking their ramifications through various layers of mechanisms of influence), it maintains the strict division between form and content. In its emphasis on the imposition of form, the model does not provide for a full account of potential media practices. If we are, for a moment, to follow the form–content model, it is possible to describe the regulations governing radio, the agencies that enforce them, and their technical apparatus and professional procedures as the "form," the shape-giver to the actual practices of radio—"content." The ability of the content to mobilize resonances in and of itself, to bust out of the regulatory jelly mold, would in this case be impossible, unconceptualizable. That it *is* able to do so is manifest. And in a sense this is precisely what Hall aims to highlight in his emphasis on the "struggle in discourse,"[33] but it is the way in which such practices are filtered by the form–content model, with its emphasis on reading and coding, that renders such an account unsatisfactory for any enactment or expression of becoming. The emphasis on interpretation comes in part as a residual anchoring in literary and textual practice, which constrains the mobilization that Hall attempts to make of them.[34] Here, where the model of form and content floats limply free from what it attempts to describe, the notion of media ecology, where media elements possess ontogenic capacities as well

as being constitutively embedded in particular contexts, begins to make itself useful.

Although we must take it as given that the regulatory agencies only fully exploit their powers to the extent of their discretion, and of those above them, such a formulation of the situation does not adequately describe the more complex interrelations of what are codified as form and content. And this is where an involvement with the tricky materiality of media synthesis pays off. Pirate radio has shown a capacity to generate medial growths that ground themselves in the attempt to impose form on them, to synthesize what is fundamentally heterogeneous. That is, the attempted hylomorphism itself becomes "content"—there is a coevolution, an arms race that feeds the machinic phylum. A particular component of most contemporary pirate radio provides an example.

Once the DTI gained the ability in law and in practice to seize studio equipment, it became imperative to separate the location of transmission from its source, the studio. This can be done physically, by barricading the studio off and keeping a wire connection between the two locations. But it is now most commonly achieved by means of interposing a simple microwave link between the two sites, something that can be done at reasonable range providing line of sight connection is maintained.

Mutual escalation of competing technologies, of legislation and its object, of the appropriation of locations for studios and for transmitter sites, produces its own mutational field in the composition of the machinic phylum of radio—more must be done, at greater difficulty and at higher cost, but the result is *in excess* of what had previously been legislated against. It is now harder to locate and capture a studio connected in this way to a transmitter than it was before the legislation was introduced. (The DTI have to first triangulate the position of the transmitter, then without disabling the broadcast signal repeat the operation from the position of the microwave link aerial.)

Deleuze and Guattari's introduction of the term "machinic phylum" makes possible its mobilization as a conceptual resource in addressing the process of innovation and constitution within conflict, that is, within historical time, of technologies and of media. What shapes-in-motion, what dynamics do these combinations of media instantiate as they come into composition? What, of these processes, of those that are actualized and those that remain virtual, are the ways in which the users and assemblers of these combinations of

technology track, channel, splice, and provide multipliers for the emergence of these mutations?

The focus of Hall's study is on the influence of other factors on the processes of signification/encoding and of reading/decoding and evinces cultural studies' particular kind of attention to the mechanisms of domination. The treatise on nomadology and more significantly the practices it draws on are by comparison concerned more with dynamics of combinatorial production, a production that in the use of it made here also exceeds that of metallurgy. This is not to say that the machinic phylum, in media for instance, has ever to be in any way metallic, electrical, or electronic. Ghost Dog is made invisible by an anachronism, the use of carrier pigeons to maintain contact with his master.[35] Zapatistas, passing unnoticed in the jungle under the array of scanning devices of the state, simply make no direct use of electromagnetic media, but appear at will on all networks.[36] In these cases, to avoid becoming content to form, to evade codification, is not only to disappear but to concentrate more fully on the material, the missing middle terms: receiver, channel, transmitter. This other term, the machinic phylum, allows us the chance to do that—to sense into the ways in which medial dynamics in combination generate behaviors, qualities, and openings that are more than the sum of their constituent, codified paths.

Records, Record Shops, Studios, Dub Plates, Turntables, Mixers, Amplifiers, Headphones

When it gets rolling, the psychosensory expansion of the media ecology of radio becomes itself a machine for the generation of potentiality, of combinatorial morphogenesis. At its dullest, too often, it simply becomes one more appendage to the *synergy* of a marketing strategy.

The turntable, with its appendages, is a stalled computer: a head and an infinite tape. It can read stored material, it can reproduce any sound; but used in the standard way, it can only read, not store. Hip hop declared war on this nonfacility by throwing the disc into reverse, mutilating predetermined regimes of speed and frequency. Hip hop mobilized the third category of action of the computer; alongside reading and storing information, the universal machine must be able to act on itself, to calculate. The phase space of all possible sounds of the turntable is determined by the table drawn up at the intersection of speed and frequency. Turntablism opens this space up to

mutation outside of the regimes of melody, harmony, and voice by forming a copula between the two series, rhythm and noise. The endless tape of the Turing machine is imposed on the finite coil, causing it to leap from break to break. Feedback is "the property of being able to adjust future conduct by past performance,"[37] to reprogram: to alter its performance in the light of computation. The turntable invents the DJ in order to compute.

Enough has been said about the close-up use of the devices of the DJ. This is an empty zone within this particular medial assemblage, one that is occupied by swarms of the part objects of ear and hand, but one that is—as that element most susceptible to being locked down as a proper name—that of least interest for this particular discussion. Let us simply say that these components can be plugged together in several ways.

Microphone

Tetsuo Kogawa[38] occasionally performs a technical instantiation of what Brecht[39] and Enzenberger[40] pointed toward and what every radio engineer knows. Any radio receiver can, with a modicum of fiddling, be converted to a transmitter. Radio waves are produced by feeding an electrical signal to a mast or antennae. The signal changes the energy levels of the electrons in the metal atoms within the antennae, thus causing them to emit radio waves. Before it reaches the mast, the sound wave that is to be transmitted is modulated or superimposed on the radio wave so that it "carries" the sound. At the receiving end, radio waves strike the aerial connected to the receiver—as they strike everything else—producing weak electric carrier signals in the metal atoms. The receiver selects the carrier signal of the required station, extracting the sound signal from the carrier signal, sending it to an amplifier and loudspeaker to produce the sound. The inverse correlation between loudspeaker and microphone continues this existence of the transmitter as mirror-world of the receiver.

Given this process, it is useful to give a listen to the various ways in which what the microphone is connected to—voices, throats, lungs, codes, language—operate within the context of the kinds of music that pump themselves with it through its reverse, the loudspeaker. How do you make a voice? The MC dictates to the ether, pitches rhythms to nervous systems rather than to ears. He or she may be constantly making up patches of lyric and sketching them down in a notebook or scraps of paper, but these are messages that

will never be transcribed. Constantly being written out on these sheets are precise instructions for manufacture of a voice.

How do you make a voice? You are tethered to an iron ring set into the floor by a rope a couple of metres long tied round your waist. You wear a thick coat but have bare legs and feet. Two loops of rope around your shoulders fasten a small glossy-leaved tree onto your back. Under your feet is a thin spread of vegetable oil on a concrete floor, and to the side a roasting tray of the oil, which you step in and out of whenever the puddle thins. Over your mouth is an oxygen mask fitted with a contact microphone. The mic feeds into a computer running speech-recognition software.[41] To make a voice, to speak, you have to run. To run means to slip. This running-slipping creates "nonverbal vocalising"[42] picked up by the microphone and interpreted as speech by the software.[43] A transcript of the interpretation appears on the screen. The dislocation of language by the creation of turbulence in one body allows it to be transversally hooked out of the limited corpus held within another, the computer.

In the first half of his *Discourse Networks 1800/1900*, Friedrich Kittler describes how the German Romantics celebrated the "language of the soul" as a succession of "Ohs" and "Ahs," the open throat and gaping mouth creating a superhighway for their transports of *Geistlichheit*. In *Gramophone*, *Film*, *Typewriter*, Kittler goes on to note how "By simulating and filtering certain frequency bands" the contemporaneous inventors of automata[44] were able to generate such sounds in a series of models based on the membranes of throats and mouths.[45] The manipulation of a set of parameters of frequency and speed of vibration[46] thus abolishes the soul, and "The real takes the place of the symbolic."[47]

What are the conditions in which we utter only vowels? "Ay," "Eeh," "Iiy," Oh, "Yoo"? The list starts easily, and goes on. Moments when we give vent without thought to linguistic signification.

In "Hearing Things," described above, Aaron Williamson enacts perhaps an echo of another of his poems, constructed through the figure of Solo Boy, a four-year-old who is "languageless" yet "padded round / walls soaked through / with sterile terminology."[48] Solo Boy perceives "not so much the people / around him, but the / invisible frisson / and tensions caused / by their perplexions / within an endless maze / of routings and referrals / filing cabinets fill up / equipment arrives / casebooks, articles."[49] Speech and its reception becomes Law, each syntagmatic accretion another node solidifying along

the alveoli of power. The imperative to adopt the correct positions of sender and receiver is instantiated in these media technologies of the discourse network of the doctor. Language becomes medicine. Eat it up. And the figure of the boy? "In any case he sits there / usually / in a corner / neither here nor there / yet boggled / with his amorphosis."[50] In "Hearing Things" the amorphosis is the shapelessness of the ill-disciplined throat. It returns as the making of shapelessness turned loose among the indexes and arrays—the rules for listening—of the speech recognition software.

One among many of the repetition of files and folders of the desktop metaphor, speech synthesis software interprets electromagnetic input from a microphone. The vibration of the mic is transduced into a series of variations in an electric current. This current is further interpreted by a series of logical operations built into the computer at the levels of hardware, operating system, and software. Signals, converted by the hardware into a series of ons and offs, become, in the software, a sequence of zeroes and ones, which the software then compares to an array of tens of thousands of other sequences of zeroes and ones corresponding to words.[51] At this point the software also makes available special discourse-recognition additions, with expanded corpuses of specialized vocabularies (for lawyers, "public safety professionals [investigators, agents, detectives, officers, and other law enforcement personnel]"[52] and doctors). Users can also specify at the point of purchase whether they suspect that they correspond as a speaker to the software's models of "American, Australian, British, Indian or Southeast Asian"[53] varieties of English. At the other end, the selected word appears on screen, free of any encumbrance of context apart from the algorithmically precise accident of being there. The text is pocked by punctuation, marking the momentary stillness of the microphone.

This conveyor of *parole in liberta* is a procedural reversal of Russolo's Futurist noise machines,[54] the bellows, plates, hammers, and noise-boxes of which were perhaps the paradigmatic manifestation of modernism's clocking of the tremors, beats, and aural shocks of industry and the new inventions of warfare. But in "Hearing Things," there is no music hall catastrophe machine built in much the same way as the speech automata described by Kittler; there is no escape into the purifying rapture of noise. Any signal at all is taken up by language. But language itself becomes the catastrophe. It is language as catastrophic and voice as an engorging of that catastrophe that will be discussed shortly in relation to the construction of the MC voice. First we need to take

a detour through the three key forms of recorded voice found in pirate radio. Here, "recorded voice" refers to voice explicitly realized as medial transduction of voice as recording. What is attended to are the various ways in which the mediality of these voices is produced as domains of mutation or of "reality."

The voice invented by soul, R&B, and hip hop is based on orality, the live rap, the open throat. The hip hop voice is indexical.[55] As the words are propelled forward through the throat and out from the mouth they also point precisely back at where they come from. "You represent where you're from and see who you are, like that."[56] Such a voice states its claim to attention in spatiotemporal terms. It emerges not only from a particular body, but from a body that has emerged from the violence of racist and class stratification of the United States, the *banlieue*, the townships, and the fractal colonialism of the U.K. It is an array of voices that has constructed itself as a means of escape from and mode of activation in these zones, while being profoundly marked by the conflicts involved in its "staying hardcore while going global."[57] The hip hop voice emerges from an interplay of constraints, attempts at and realizations of "practices of encoding," and, through amplificatory and productive processes, what sociolinguistics names a "domain."[58]

A key locus of difference between hip hop and R&B is in the construction of the voice: Hip hop mathematics class. At the front of the classroom the cadaver of a singer is laid out on a workbench cluttered with Bunsen burners, rizlas, vinyl. Limbs wrapped in blood-soaked Gucci loungewear hang loose, one arm flopped over the side. Thick air is sweet with the smell of meat on the turn, and motionless enough to allow columns of smoke from the fat jointed fists of the students/judges at their desks in the dark room to collect directly in a straight line up to the lowering cloud at the ceiling. At the front, behind the demonstration bench, underneath a tall hedge of hair and behind a surgical mask, stands the professor. At the end of his white-coated arm is a machete, sharp enough to be shaving the skull of the specimen. The task is quick and silent. Once the path has been cleared, the professor slowly lifts his blade to the full height of his arm and explains the preliminaries. At the precise moment he ceases to speak, it drops. The skull splits in one stroke. Every thread of smoke in the room is drawn through the same vortex of air echoing the movement of the machete as it spreads and dissipates through the room. Fingers are thrust into the exposed brain. The professor pinches onto

something and eases it smoothly out. He gathers long loops of minusculely thin threads, one hand pulling into the other, cupped. After a few minutes, the material has been spread onto an overhead projector looking like a nest of phlegm-eating worms. The professor spends some time arranging the threads so that their interlinked structure can be revealed. A simple forking hierarchy, a tree structure. The professor shakes bloody jelly from his fingers and looks out at the class with his most serious stare.

"A Markov Chain. The melodic, rhythmic, and lyrical structure of R&B is constructed through the progressive depletion of improbability. Neural pathways." On the screen, the shadow of his finger pokes a point in the hierarchy. "If the lyricist chooses 'sweet' at this point in the tree, and we have three child nodes branching from it, what are the ranges of probability determining their next utterance?" He picks out the next four nodes in the tree. "We have 'baby' here. 'Honey' here. 'Sugar' here, and 'sweet,' again, here."

"This parasitical organism is a mathematical infestation. In this case, the melodic, rhythmic, and lyrical state of each R&B track is a process containing a finite number of states for which the probability of being in each state in the future depends only on the synchronous state of the process. That is to say, the likelihood of any of these four lyrical moves after 'sweet' is determined by 'C,' the cheese quotient of the track calculable at each moment by its present state. In this case we have a uniform 25 percent probability for either baby, honey, sugar, or sweet. At each stage of branching the probability of one or more of the melodic, rhythmic, and lyrical possibilities rots that little bit more until at the end the subject is left gibbering, crouched on the floor of their soon-to-be-repossessed studio penthouse, and locked into one beat, one microscopic melodic loop and one lyric. At this point it is only civil to put the unfortunate host with the most out of his misery." He spreads his fingers in the direction of the corpse. "Beware, though: this plague jumps genres. No one is protected. Laws breed theyselves more laws."

Hip hop does funny voices, melancholic monotones, actorial expression, feeds its voices through the bit constraints of telephones and loudhalers, samples voices from other media (often as explicitly *non–hip hop* voices drawn from news, instructional recordings, but also as voices that are mobilized *as* hip hop—Malcolm X, Shaolin spiel, etc.). It teems with allegiances, dead friends riding the vocal cords,[59] voices of guns,[60] talking blunts,[61] advertisements,[62] mouths slurping on themselves in cod-sex. But almost nowhere, even in

beatboxing, and for many reasons, does it allow the voice to become primarily synthetic. The reckoning behind this? That it allows the voice to operate more vigorously in keeping it real.

Recognizing that the audibly synthetic is also what makes this realness is, by dint of many confluences, slips, and mixes, constitutive of the currents of music contemporarily most broadcast by pirates in London: primarily garage music and its spawn. Drum and bass and jungle are available too, where you can find it, as well as techno, electro, and the hemorrhage of genres associated with them.[63] Cue up the voices of Mantronik or of Kraftwerk, and what speaks is the Vocoder, the manufacturer of the first explicitly synthetic voices in popular music.[64] Complexifying the potential split between indexicality and synthesis, the vocoder was invented and initially used for marking the precise identity of the caller as one-of-two at the peaks of governmental-military hierarchies. Churchill and Roosevelt used a then advanced version of the technology to communicate between two room-size sets in Washington's White House or War Department and one in Westminster from 1943 onward. For the voice to be trusted as coming from a certain individual, as bearing truth, it had to become totally unrecognizable—alien.

Once the voice becomes captured, or, more accurately, is recoded as a waveform, it is manipulable along the two axes that map that waveform. Time modulation and frequency modulation, once manipulable, open the voice up to mutation. This is the condition of the voice within digital recording, but it is not the first time that the voice has had to become virtual in order to gain power: "3D recording"—voice overdubbing—was used on early, monaural, rock and roll records in order to give power and clarity to the vocal track. This virtuality, however, was and always is locked into providing a clarity of "presence" for the voice that refers only to its idealization and not to its production.

Dub—the permutational space of the studio combined with that of Kingston—brought to recording the equivalent of the optical unconscious that Walter Benjamin describes as being introduced by the film camera: "With the close up space expands, with slow motion movement is extended. The enlargement . . . reveals entirely new structural formations. So, too, slow motion not only presents familiar qualities of movement but reveals in them entirely unknown ones."[65]

For the sonic unconscious, speed of movement is processed directly in the body. John Woo (in a trademark technique that defined films such as

Hardboiled Cop, but which has now become part of the general repertoire of effects) slows down a bullet so that the grace and menace of its transition from barrel to body can engorge the sensation of its occurrence. Dub understands bass so well that it produces, in certain tracks, a sense of the bass line folding in on itself, to make a speaker produce a frequency so deep that you can sense yourself hearing the diaphragm slowing down to zero, but vibrating so powerfully that it contains a copy of its own obliteration and survives. The same can occur to the user of the music. Music such as dub and *x* amount of beats per minute up, jungle, provide a training routine for the user to learn and move among the conditions of operation in medial space in its broadest sense. Sonic unconscious is material that is collectively produced and is gated and intensified by multiple layers of processing—it becomes malleable, potentiated, in reception. These are types of music that are fundamentally synthetic. They declare the whole spectrum of vibrations at any speed or frequency subject to their inventive power.

Once digitized, any waveform becomes not only adjustable along the modulation vectors of time and frequency but also algorithmically manipulable. The voice thus loses itself as a separate category of sound. It is able to construct itself as "A mere motion of the air."[66] That is—notwithstanding the epistemological functions of the tools, filters, and capacities of the software and hardware brought to bear on it—it gains at least potential access to a much wider phase space of potential embodiment than the corporeally anchored voice. The sampled voice becomes part of the rhythmatic mix, rather than an indexical hook.

Rewind: Buju Queers His Throat

If the digitized voice in drum and bass, jungle, techno, and so on achieves an escape velocity that allows it to become monstrous, there is—in ragga—another field of vocal mutation worth exploring. Dancehall DJs[67] have invented some of the most powerful styles of voice to be found on pirate radio—and still found largely only on the pirates, or played by DJs who were originally on pirates—in London.

A voice can kill, a voice can destroy. A voice can be engineered to burst from a riven but resilient body. The voice emerging strong and energized from catastrophe is heard in hip hop perhaps most in the immense stomping tracks of early Busta Rhymes,[68] and others where the throat and mouth become a

chiliastic fuck-muscle drawn in Marvel Comic ink. In dancehall, perhaps the most mutant precariously hypermasculine voice is that of Buju Banton. The esophagus is lowered on its suspension in order to give the volume/velocity waveform at the larynx its typical menacing profile. The throat-scarring tortured roar of hardcore (Napalm Death, Deviated Instinct, Larm, Septic Death, etc.) is turned melodic, is sung, slowed down to wrap the vibrating flesh of the air pipe round your ear. In Buju's old duet with the falsetto Red Rat,[69] you can hear, as the voices alternate, how the part is literally played—how elements of the media ecology of the sound system, amplifiers, echo boxes, not only provide a venue for this voice, but while it remains ostensibly organic have also been partially incorporated into it. Chopping and cutting from throat-kill to sweet melody in a cunning but polite enough and never truly disturbing way, female vocalists in garage[70] break from dancehall to soul, from toasting to whispering make the air shudder. Such machinings of the voice do not only occur in terms of "the vocals" but are also drawn out by the other sounds it enters into composition with. Music, as it senses at different times and in different ways its own synthetic nature, intensifies its mutation of voice among sound. Compared to this, the supersaturated sweetness of the more vocally fixated and "mature" sounds typical in garage before it became welcomely grimy are absolutely forgettable. For voice, becoming electronic—not only becoming digital—makes it already aware of its own machining.

For Rudolf Arnheim, the announcer's voice should behave like polite typography.[71] Discreetly spoken captions to annotate the sequence of sounds being purveyed to equally courteous listeners. This mode remains as a default, constraint equaling authority, but mainstream broadcasting has since also developed an "extended" range of presenter voices.[72] This extension necessarily includes a categorization of those that are to be excluded:

> Don't expect the application of stylistic delivery crutches such as: The Puker, The Big Smile, and The Big O to improve your air person's delivery. (If you're not familiar with these terms, The Puker is the hyperextension of CHR [contemporary hit radio] delivery. The Big Smile, prevalent on soft-rock and AC [adult contemporary] formats, sounds as if a pre-formed plastic smile insert has been placed in the announcer's mouth. The Big O is the female talent who sounds as though they are on the brink of orgasm each time they open the mike.)[73]

The voice always exists in relation to what it is heard by. Just as the voice of crooners such as Bing Crosby became possible through an alliance with a new type of microphone, one able to pick up a softer, closer, style of singing, the MC voice evolves directly as a result of its wider context.[74] Intrinsic to pirate radio is that the hardware delay loop operated by all other stations, by means of which any transmission can be screened and brought back from the brink of the forbidden, has been taken out. Continuity is the result of fingers, discs and mixing desks, simple stamina and skills rather than cartridges of jingles and prefade links. The function of the MC is fundamentally different from that of the announcer, the newsreader, the personality. Pirate radio is made up of a crossfire of medial trajectories, the MC providing a form of metainformation about their intersection. It is a position that jumps, changes direction, and takes note, adding data on the fly. It gains this position by being hardcore.

What is hardcore?[75] Is it another "science," an abstract proving machine that governs the right to speak?[76] A science in the sense that all those who are allowed the capacity to practice it, who are hardcore and therefore need not speak about it but simply enact it, gain their ability to be hardcore by recognizing and invoking the epistemological, rhythmic, vocabulary modes by which it is made. This is the means of its dispersion, transport, and eventual mutation, its means of connection with other operations. In this manner, hardcore, a meritocracy of sorts, is constitutionally open at certain scales within the wider dimensions in which it operates. At the same time, it is because of the way in which all these stylistic and methodological elements are forged through multiscalar historical interactions with dynamics of social, aesthetic, and economic stratification and subjectivation—and demand that they be acknowledged as being so[77] (without falling into the trap of saying that it is simply "about," or the "result of" those of class or race and so on)—that their self-determination functions. If subjectivation here is becoming at the scale of an individual, or of a social body, it can also be said to function as a filtering system, a generator of surplus value, and as a war machine of voices and beats.

At the point of aggregation of all these medial dynamics, what does the MC do? Chats on the mike; gives the shouts; works the phone; reads out the texts; bigs up the DJ and anyone else in the studio; then chats on the mike some more. There's no naming of tracks, or hardly ever. Exceptions would be

to hype some exclusive new dub plate or the name of a track that keeps getting requested. The vocab is hyperconstrained: imperatives, requests, responses, assertions, declarations. At times, it could be a voice enthusiastically going through an e-mail header, noting its transition from place to place, the protocols by which it gains passage; listing the names of a crew texted to be shouted out to like a cargo manifest; a flow full of imperatives, a language composed entirely of UNIX commands, an operating system bent on beats spelled out in cockneyfied black twang. A market trader selling fresh, fresh, fresh, you know say it's fresh. The position of simply being hardcore is ridiculous, and the voice acknowledges this in gibberish, nursery rhymes, jokes that can't remember when they were last funny, shouts out to a cup of tea, rants bored stiff shouting out to all the sexy ladies from the cold flat studio. Next thing, the MC is inaudible. He's muttering about the DJ, talking over the drop in a track, flattening things out.

The MC voice exists in and among others spinning off the tracks: threats and announcements of painful and fast-approaching death hooked from kung fu movies; vowel sounds sucked out of a stack of electronic lungs doing femme; lick-shots untraceable to any known firearm; clips from any of a shed-load of commercially available sample discs; phrases go out like a little clockwork duck. Just as the same track might be reloaded more times than any one person might want to hear it in a lifetime, just for the joy of the simple fact that they can do it—play it until death—a phrase might be fake, stupid, replicate just because it was heard.

The boredom, the cretinously predictable nature of much MCing is a result of the way it fuses two apparently separate functions of language, two that are also the means by which it generates its strength: the MC's role as switching system for the pirate station, and his or her function as inducer of hype. Take the simple duty of reading off the requests and shout-outs. How does an MC treat data coming in? By engaging in simple data-management tasks: delay, storage, transposition—it's an information ecology. The text or call has to be received and the right moment taken for its delivery: does the shout fit in with a prepared or freestyled rhyme? What's the DJ doing with the track, what is she planning on mixing in next? Is the beat just about to change? What's the prestige of this track—can it just be chatted over? Is that a provocation?

In one sense, the MC voice lives simply in a microworld of calls and responses, but it is in the acknowledgment of this tight mode of operations

that one can hear it suddenly leap out of its apparently constrained ambit. It's not simply that the interlocutors of the MCs calling in on their mobiles, their mum's phone, at work, the ones who can't call but you know are listening in the nick, become hordes, massives, microcliques, empty space, that they obtain heroic proportions—they do. But "the glories of information and communication"[78] have become infested by passions, puns, rhymes, and more. Jittering, repetitive, nervous, bombastic, happy. That is, at the same time as the MC assumes the secretarial position, he or she corrupts this simply informatic role with the catastrophe of language. The phrases, statements, invocations, and orders bursting out of the radio are acts of enumeration, of the establishment of relations between different elements of the media ecology by a transitory tyrant. They are the results of the enactment of this violence, this escalation of exultation upon the MC position itself. It is in the pacing, heat, fluidity, and skills of this voice that it all becomes manifest.

Drugs, Clubs, Parties, Flyers, Stickers, Posters

Efficacy of a drug is determined in part by the regularity of the crystals of which it is made up. The greater the invariability of the size of these aggregates of molecules the more predictable is its metabolization by the user. That is to say, that the drug must be composed in the most regularized way possible: a pure data stream of zeroes, a molecular landscape of absolutely self-similar order. Dosing bodies with chemicals requires that such bodies must be first organized into a mass, a user base, and that this mass must have verifiably similar dysfunctions and organs: mass dysfunction in order to generate a requisite level of demand. Mass organs in order that use can be allocated to particular corporeal regimes: the blood-circulation system, and the various ways of accessing it, by mouth/stomach or nose/mouth/lung combinations, or directly by vein. Bodies themselves extrude or grow additional organs: mineral mouths that are able to withstand fire, veins that grow sores in order to remain perpetually open. Orifices left out of the schema of mass dosage (except for miserable and tokenistic topical applications) find ways to connect themselves to drugs that are also left out in the cold.

While the peritextual[79] apparatus of pirate radio—flyers, graffiti, flyposters, stickers—might, like any advertising, aspire to generating a plane of absolute consistency, of perfect commodities fitted to perfect customers, it is clear that not every particle of information reaches its intended receptor. Memes[80] cannot

be milled to an equidimensional powder, suspended in cream and spread across a city—unless, that is, they are intended only for uptake by subjects organized solely as mass receptors.

An unusual mode of treatment therefore emerges: the mutation of communicational redundancy into hype. To protect a message from getting chewed up, so that the amount of noise interfering with its transmission becomes immaterial to its meaning being received unaltered, it is necessary to reiterate it in different ways. This protective surplus of enunciation is known as redundancy. Redundancy can apply both in terms of the information sent—its meaning can be made many times in many ways—and also to the composition of the channels of its transmission (as in the case of distributed networks such as the Internet).

It is not clear, however, until the message is received, how much of the message—how many of its manifold reiterations—qualifies as actually being "redundant." "Junk" data may just be those elements that are reiterated until the point at which the information enters into composition with actual consciousness—at which point the last one in the chain "expresses" its message into the carrier body. That is, they cease to be noise and can be evaluated as information. Redundant information, calculated as, say, the number of stickers in corners, on walls, on lampposts that it takes to build cognizance of this information in one subject, may immediately be understood as informational by another subject. Marketing works out a cost-benefit analysis wherein the number of potential exposures to the number of subjects is tabulated against the number of product purchase opportunity uptake actuations. This, however, does not map across to the same mode of operation as hype.

The two uses of the word "information" are linked by their being used to describe conditions that refuse entropy. In the strict sense of information theory, information is measured on a scale of relative improbability where the state of maximum probability is that of entropy. The information carried linearly, from one point to another, by a message is the negative of its entropy. In the more common use of the term, information is simply "meaning"—what something "says" parsed by how it is "read"; how it is sensed, what perceptual and affective dynamics are routed through and with it, what is modulated and spun. Although the two uses of the term "information" are clearly not synonymous, what hype does is to blur the categories. Hype is that moment when the transmission of information in the strict sense reflexively incorporates information about the fact of its transmission as part of that trans-

mission. It is not simply information, but the way in which it moves. Thus, the more the information is transmitted—the more potential it has itself to become entropic—the more it leaves this double trace. At the same time, hype is not simply reducible to the circulation of good news, a good buzz. It has an algorithmic, epidemiological quality that is explicitly heartless, self-organizing. It is this double articulation that engenders the chance to leap out of the repetitious slide to informatic flatline, and into the nonlinear, into meaning mobilized and regenerated by expressive bodies.

Hype is a particularly delicate and temporary phenomenon, and its most intense manifestation within the general economy of pirate radio is the party/bashment/night/rave (these are not mutually interchangeable terms). It is the sense of the potential for it, the gating and opening up of exploratory systems of mutual excitation, as well as its activation that provides a sustaining drive of this media ecology.

Reception Technologies, Reception Locations, DJ Tapes

"Bwoy it jus' tek you. Its time to pump up the sound and metamorphosise with the world, gwan. We're all in cars, living rooms, bedrooms screaming for the rewind."[81]

There's a radio in the studio to check transmission quality every now and then, make sure the signal is getting outside of the room. For those in the studio there"s no guarantee of feedback, of listeners. Selection and mixing of tunes might be happening in a vacuum: a flat, (an apartment) an air-locked chamber designed for an industrial family unit, left over, no connection. The phone provides one way in for the outside. Another way in is constructed by the mapping of the media ecology by the state. According to the Radio Communications Agency, "It is an offence to listen to unlicensed broadcaster (pirate) without a license. Licenses are not issued for this purpose."[82]

The imaginary space of all potential listeners as participants in the machine are addressed as much as the actual listeners. Audience induces sound. There is a mythic categorical dimension to crews: the (ever popular) ladies crew, the HMP (Her Majesty's Prison) crew, crews formed by location. The imaginary circuit of sound is amplified by the possibility of involvement in, of hearing by, real bodies. The continual reference back to listeners as part of the circuit of the show is not an attempt simply to ego-amplify the MC and DJ but to develop a "multiple ear" in the listeners. At the same time as you listen on

Walworth Road, there's someone in Beckton texting or calling in to set up a rewind or a shout for their mates. The radio provides a way of triangulating this relationship based on disjuncture.

When it gets rolling, this imaginal space becomes the medial equivalent of the space of signifying systems and matter described by Burroughs in his description of the cut-up technique as live montage (that is, without obeying restriction to merely literary intertextuality): "Somebody is reading a newspaper, and his eye follows the column in the proper Aristotelian manner, one idea and sentence at a time. But subliminally he is reading the columns on either side and aware of the person sitting next to him. That's a cut-up."[83]

Just as for Burroughs the cut-up opens out into processes that "make explicit a psychosensory process that is going on all the time anyway"[84] the presence of the third mind. It is the enormity and variability of number of scales, speeds, and forms of conjuncture in the urban, in the "postindustrial," and all that it works in and out of, that make these connections and the popular consciousness and manufacture of them—the perceptual spaces of subjectivation folded into them—that requires the building of new orifices in order to intensify and explore this process. These organs are called media.

Different reception technologies—static radios, headphones, wearable stereos, and so on—afford particular conditions of listening. The perceptual shock of connective disjuncture is a fundamental loop in accounts of first experiences with a Walkman or other personal stereos. How they are hated by those who demand that you be rooted to your location, observing its norms. This shock is recapitulated by that of the mobile phone, the way it makes manners. Sounds of the street, the train carriage are locked out: a wormhole is opened to another time, place, rhythm, speed, tone of voice, to contexts in which speech is guarded, and to others in which it cuts loose. Mind your body language: the treble seeping out of your ears gives the game away as to what you're belonging to. The "earlid": in 1976, Louis Wolfson creates a pre-Walkman out of a tape recorder and a stethoscope in order to create a linguistic barrier between himself and the possibility of hearing his mother tongue. Thus, according to Deleuze, "For the first time in history a makeshift schizophrenic object lies at the origin of an apparatus that is now spread over the entire universe, and that will in turn schizophrenize entire peoples and generations."[85]

Each of these medial organs, as they arise, requires the superimposition of a new circulatory system to sustain it upon those that preexist. Every system

of calculation, distribution, and storage also entails the development of a system for the reproduction of devices through which the storage element is to be played. The mass production of compact discs, for instance, demands the mass production also of components for players and drives. "Roll-out" of a system requires that it begins to put into place its reception before it occurs: "The entertainment monopolies have triumphed through a process of continuous centralisation and integration of all the stages of music production and dissemination; their imperatives of growth have marked the development of music technology and its communicative discourse from the beginning of broadcasting history."[86]

Partial vertical integration of markets means that it would be quite possible to be listening to music on a radio made by Sony, from a record published and printed by Columbia (owned by Sony), being played on a turntable and mixer made by Sony, and requested by a listener via a text message from a phone made by the same company. As a paratactic list, each of these elements within the media ecology is only *potentially* branded by any particular company. That the record, turntable, or phone would be made by this particular corporation is not highly probable. But it is the task of shortening the odds on this probability that primarily arranges their activity in the area. (The metaorganization of these elements and their connections by, for instance, standard voltage rates, connector cables and sockets, and so on, is developed later in the discussion of standard objects.)

The movement of power through markets and monopolies appearing as the phenomenon of partial vertical integration of materials is something separate from media "convergence," and it is also different from the totalizing design concept of the home-entertainment console or system. These are discrete medial elements brought into combination by patterns of use. Such combination is not "authorized" by the company manufacturing these materials. Whether or not it "needs" to be authorized is immaterial. What is clear, however, is that a particular mode of media, consumer electronics, is articulated but not overdetermined by the activities of one—standing in here for a limited number—particular corporation. Key elements of the media ecology of pirate radio, such as the transmitter, are clearly left out of this schematic. The size of the potential market is too small for it to be considered as a possible area for the company's involvement (although in this case they do manufacture or subcontact for manufacture some of the basic components out of which the transmitter can be constructed). Finding such gaps in the

production of the material of media—in which independent constructions outside of mass production are necessitated—is one way of *symptomatically* tracing media ecologies.[87]

If minoritarian literature is writing in one's mother tongue as if it were a foreign language,[88] then perhaps to combine media against the syntax of the use of it imagined by its manufacturer and their marketing department would be to produce an analogous current in media. This possibility is complicated by the promise of the consumption of the self as epitomized in the personal computer, that one's personalized salad bar of needs and desires can be tailored to and customized via the desktop and what lies behind it.[89] In such cases—the mythic foundations of consumer electronics as a market—it is the position of the mother tongue that is assumed by the corporation.

Perhaps there is also a case to suggest that, on the contrary, out of the confluence of nonstandard uses of media that the company selects and focuses on for solidifying into targeted products (a process occurring particularly in the case of second generations of products, the point at which niching and differentiation occurs most massively), the relationship of the corporation to the medial systems that make use of the devices it manufactures is more accurately that of a constraining tendency. That is, the "creativity" of such formations is subordinate to the uses other actors make of its products. Both accounts would be complicated by a consideration of the actual processes of innovation, production, invention, and use that occur.

The aesthetic of mass radio is formed at the same time as that of the autobahn. The conjunction of car and radio accelerates toward the absolute immobilization of drive time. At the same time, it is a combination that plays into the deep slow bass of sounds such as Dr. Dre's early hip hop production efforts aimed toward the pace and habituations of driving in Los Angeles. After all, what is the point of having a huge bass capacity in your trunk if you don't play music to test it? The car and music, the car and radio, are, like the walkman, a way of riding down into your own ear canal at the same time as being manifestly present.

Needless to say, such formations are always themselves subject to technological rupture. The MP3[90] file format, which has achieved such mass usage as a means of circulating tracks via the Internet, is designed simply to match the included middle of the audio spectrum audible to the human ear. Thus, it obliterates the range of musics designed to be heard with the remainder of the body via bass. This is not simply a white technological cleansing of black

music but the configuration of organs, a call to order for the gut, the arse, to stop vibrating and leave the serious work of signal processing to the head. That's a sick part of it; another part is the way formats are decided on by "expert groups," committees defining standards for file formats and protocols that are supposedly open in procedure but where expertise, like those of hard-core methodologies, is defined in certain ways. Here, a fat bass becomes simply a particular Fourier transform mappable according to certain isolatable dimensions. Standard formation and nonstandard uses create a recursive cycle that is always ongoing but never entirely predictable.

Phones, SMS

In order to talk about phones, and their currently new range of facilities, it is worth marking the multiple features of their past. One episode is an earlier recursion of what Brecht, Enzenberger,[91] and Brian Winston recognize as the suppression or channeling of media's "radical potential"[92] through the range of compositional dynamics, agencies, and organizations that economic and social norms afford. In the latter months of 1877 the phonograph was "invented." This device, a literal "sound-drawer," consisted of a diaphragm with an attached stylus, vibrating to mark wax paper or tin foil. It figured in the mind of Edison, his collaborating mechanic John Kruesi, and the editor of *Scientific American* to whom it was demonstrated, as a possible way of recording messages delivered by telephone. What Edison and Kruesi did was to combine two already well-established techniques, to capture sound in a vibrating medium (i.e., ear trumpets) and to cause sound to represent itself visually by transferring the vibration to another media. Such media included a horse hair glued to a tuning fork vibrating to tickle carbon off a sheet of glass covered in fine smoke-residue, as well as the more familiar wax tubes.

Concurrent to Edison's development of the phonograph as a recording device, Charles Cros—in work later fully realized by Emile Berliner—produced the machine to become known as the Gramophone, a technology of mass-produced prerecorded sound, a technology of playback. Edison's device, initially conceived of as a recorder of telephone messages, was too slight to gain a market. His company subsequently attempted repurposing it as a recorder of various forms of speech: speaking books; language instruction material; an instrument for the recording of official proceedings; and eventually failing as a substitute for stenography. The Gramophone by contrast

grafted itself to the libidinal motor of prerecorded music.[93] The technologies of the phone and of music thus intertwine through their history—in a way that is not exhausted by the music left to you when the answering party departs and you are put on hold. Rather, they reciprocally and independently mark out a dimension of the media ecology, a momentary part of which is explored here. The effect of the development of one technology is occasionally to create a mutational field between two discrete techniques, allowing them to come together in various ways until one or more of their conjunctive compositions is taken up by a scale, drive, mode of enunciation, or by productive or repressive compositional dynamics, thus achieving a territorial consistency—which is then in turn perhaps subject to compositional turbulence by the emergence of other medial, social, political, economic, passional, or aesthetic configuration.

While the network of credit facilities, florist shops, and telephone known as Interflora makes the phone sprout flowers; car, radio, phone—the media ecology of the radio pirate listed above—recapitulates the abstract machine of the Blitzkrieg tracked by Kittler, which in turn is the transposition of the signaling culture of the sea,[94] of maritime war and emergency, to that of land—each element in motion feeding signals to each other in an endless (that is to say, despatialized—nomadically static) smooth space.[95] Smoothness of transmission from one to any other element in the assemblage ensures maximum uptake of signals. The transfer of that message of potential connection between one medial form and another is not nearly so smooth. Technology never receives the signals offering potential aggregation sent by the conceptual and technical framework of other technologies without that signal being translated, and hence filtered, noised, and interpreted by other configurations.

Technico-aesthetic turbulence among media technologies and between media and their conceptualizations or precursors is one such form of translation. The telephone also emerges partly as a result of a "failed" experiment in visualizing speech for the interpretative use of the deaf. The third generation of the Bell family of speech correctors originally imagined his device to provide a cross-wiring of the senses.[96] Not a constructed synesthesia but a codification of sound waves that was an expansion of the "visible speech" alphabet—designed by his father to provide a universal scripting system for vocalization by means of a series of letterlike symbols corresponding to the position of various parts of the mouth.[97]

The problematic of such devices is reiterated by Aaron Williamson's *Hearing Things*. Just as voices appear, disappear, and change in the shifting diffraction pattern of cumulative filtering and interpretative schemas, so do technologies: "this tongue . . . / . . . is, in fact, / an organ misappropriated / into a function / for which it never was / intended."[98] Currently, the race is on to provide mobile phones with connections to other media. This is its awkwardly born third generation. It is prefaced by a weird moment of product differentiation that is worth remembering. Gadgets merge with gimmicks and additional circuits are crammed into the case. Models such as those including an FM radio are doubtless to grow the same patina of the out-of-time micro-utopia as the alarm-clock-radio-teasmaid and various other dual or multifunction, single-object-casing-over-separate-mechanism devices. Others, aimed at users of a single function SMS (short message service), grow minuscule keyboards for faster texting. They provide not a sign of medial convergence but of the user being involved in a simultaneous concatenation and switching backward and forward between different media and medial codes. While they share certain components, such as headsets, they remain two medial personalities trapped in the same body but firewalled out from any potential schizophrenizing tendency. Instead, the phone-organ finds itself misappropriated into a function that was never intended to provide more than a small additional feature.

The growth in use of SMS, its massive eruption as a media, is a well-known story.[99] Initially, SMS was just seen as a somewhat gimmicky add-on to a cellular phone. The first generation of mobiles had no capacity for it—voice telephony being their sole facility. Only with the introduction of the GSM standard across all mobile phone manufacturers and service providers in Europe, Asia, and elsewhere (but not the United States where competing standards prevail) did texting take off.

The science fiction writer William Gibson took a job from the *Observer* newspaper running a "Japanese Month" promotional issue of their Sunday lifestyle supplement:

> Consider the Mobile Girl, that ubiquitous feature of contemporary Tokyo streetlife: a schoolgirl busily, constantly messaging on her mobile phone (which she never uses for voice communication if she can ever avoid it). The Mobile Girl can convert pad strokes to kanji faster than should be humanly possible, and rates her standing in her cellular community according to the amount of numbers in her phone's memory. What is

it that the Mobile Girls are so busily conveying to one another? Probably not much at all; the equivalent of a schoolgirl's note, passed behind the teacher's back. Content is not the issue here, but rather the speed, the weird unconscious surety, with which the schoolgirls of Tokyo took up a secondary feature (text messaging) of a new version of the cellular-telephone, and generated, almost overnight, a micro-culture.[100]

Given the positioning of this article as the introduction to a special issue on the forms of life that count as a life of style (the usual regime of contemporary art, sex, food, tourism, shopping, fashion, cinema), its particular focus on the interactions of media technologies with the wider culture they are part of is set up to resonate throughout the issue—a culture understood by one "national" name's capacity to take up, change, and communicate with one understood by another. Crucially, though, his essay also chimes with the wider problematic of media technology's capacity to operate in a deterministic fashion. Gibson states, "If you believe as I do, that all cultural change is essentially technologically driven, you pay attention to the Japanese."[101] The sentence captures the problematic within its illogic: if technology is "essentially" what drives all cultural change, then such change would be uniform wherever that technology were to be deployed. Nevertheless, when particular dynamics—which may be located at the multiply stratified scale of a "nation", or at that of an emerging part-generation of users escaping from and reinventing the processes of being female in all the multiplicity of ways in which this might be done, blocked, and detoured—when such dynamics come into composition with particular forms of media technology with their own capacities and propensities, it is clear that some of those dynamics have a greater ability to "find their own uses for things."

Earlier in this chapter, I presented a flatly described list of elements of the media ecology of pirate radio, and I suggested that any one of these elements, or elements in combination, could provide a route into numerous layers of possibility. We need now to pay close attention to the particular material qualities of these technologies as a means to accessing such layers. If we are to take the elements of these lists as being at one scale a whole, an object—perceptual effects, which will be discussed throughout the following chapters—we can also begin to take them apart. While such an element might provide, as for Whitman's poet detained in love, a door to a new universe of relationality in which we can lose ourselves, each component provides a chance

to get smaller, to get molecular, to get material, while at the same time getting more massive. Details count here. Perhaps any discussion of media technology needs to meet with and use at times the convention of a "straightforward" account. The "Requests for Comment" that provide the cornerstone documents of reference for the construction and development of the Internet are a paradigmatic example here[102]—scrupulously clear, scrupulously accountable to their peers, and revisable. Such an account is always a ruse, one that usually claims to have precleansed any disturbance from its clean laying out of facts and parts, but the ruse *works*. What is hoped for in the following brief account of a particular stage in the development of mobile phone anatomy is in places to make use of such a voice, but at the same time register how it is synthesized.

The author of *The Ecological Approach to Visual Perception*, a systems theory–influenced empirical account of vision and psychology, James J. Gibson suggests that the qualities or properties of an object, its "Color, texture, composition, size, shape, and features of shape, mass, elasticity, rigidity and mobility"[103] are not what is perceived when an object is looked at or otherwise sensed. (Here, although Gibson's primary emphasis is on vision, "perception" should be understood as being a fully sensory, not simply visual, act of understanding.) Rather, we perceive what he terms its "affordances." These are not what an object is "of itself" but what it might become in composition with other elements. This term has been of particular importance in the development of "user-based" approaches to design, notably those of Donald Norman,[104] and also in wider considerations of material culture, but particularly through Norman in the design of interfaces to media technologies.[105] Gibson chimes in with Deleuze (in the assertion that relations are external to their terms)[106] when his approach allows objects to be understood in terms of their *potential or activated relations*, and these relations are something separate from the object itself: "The fact that a stone is a missile does not imply that it cannot be other things as well. It can be a paperweight, a bookend, a hammer, or a pendulum bob."[107] The advantage of his work is that it takes up the possibility of detailed exploration of the material qualities of things-in-arrangement, rather than of their essence.

Where Gibson rather works to innocent his theory is in his description of humans. While they are described in an ecological sense as providing "mutual and reciprocal affordances at extremely high levels of behavioural complexity"[108] there is no sense of a will to power, or of change or disequilibrium

within this ecology. Instead, "What the male affords the female is reciprocal to what the female affords the male; what the infant affords the mother is reciprocal to what the mother affords the infant; what the prey affords the predator goes along with what the predator affords the prey."[109] Such statements might be a rather cold-blooded naiveté in some cases, but here it reads more like an idea getting stretch marks. Here, feedback occurs everywhere, but it is neither positive nor negative. It is simply homeostatic. This is the essential problem with holism—it stays in its skin, much like his version of the human body, which has become "topologically closed."[110] There are clues to possible interplay between Gibson's theory of affordances and that of the machinic phylum: "Substances have biochemical offerings and afford manufacture. Surfaces afford posture, locomotion, collision, manipulation, and in general, behaviour." It is, however, a rather static sense of the world, one of ergonomics and arrangements but little inherent dynamism. Nevertheless, as a materialist formulation of the micropolitics of detail that also escapes the form–content dichotomy and places objects and processes in a constellation of interrelations, his work is very suggestive. It is unfortunate that in design at least a good deal of its influence has been ideationally privatized, sequestered into the "techniques" of consultants who wish to present their particular brand of thought as a hermetic, individually owned and developed set of procedures. What is important about this emphasis on detail lies fundamentally in the direction suggested by Guattari at the end of *The Three Ecologies*: "The reconquest of a degree of creative autonomy in one particular domain encourages conquests in other domains—the catalyst for a gradual reforging and renewal of humanity's confidence in itself starting at the most miniscule level."[111]

Gibson continues that "Special forms of layout afford shelter and concealment. Fires afford warming and burning. Detached objects—tools, utensils, weapons—afford special types of behaviour to primates and humans. . . ."[112] In order to enhance its exegetic capacity one might also subject his list to an acknowledgment of the way in which these objects are caught up in the multiplicity of minor processes of power. For instance, Foucault's brief discussion of technological innovations in disciplinary processes suggests that they may be adopted in response to particular "needs," such as "An industrial innovation, a renewed outbreak of certain epidemic diseases, the invention of the rifle. . . ."[113] Equally, affordances may be understood as forming the day-to-

day materials of life, its possibilities, the way it is modeled, on work, on expectations of postures, of tasks to be fulfilled and accounted for, the way bodies, in the entire vast domain of industrial, transport, and consumer design are accommodated, positioned, leveraged, and made powerful. To be more substantially mobilized, to realize its own conceptual affordances, Gibson's formulation also needs to engage with what the elements of any ecological arrangement afford the "attentive malevolence that turns everything to account."[114]

One of the things that mobile phones do well is harness moments of boredom, of suspension between more purposeful activity. Little pockets of time that can be turned inside out, dawdled away, or used to get something over and done with. People text on the bus, type a message in on the tube ready to surface with it, in a lecture while waiting for something more interesting to happen. For the media ecology of pirate radio and other contexts,[115] they also exist as a way of intensifying a process and of adding to its composition. For Avital Ronell, it is the telephone's position as a conjunctive media that allowed it to become woven so fully into social fabrics. Newspapers, for instance, gained "addictive dependency"[116] for extracting up-to-date news from the far corners of the networks and the national territories that became perceptible around them. The phone, because of the interactive nature of the call, trumped the telegraph's one-way, asynchronous communication. Tighter communication and control between central editorial staff and reporters in the field reading in their stories also allowed greater capacity for the filtering and assessment of informants phoning in with news.[117] Thus, one medial dynamic becomes caught up with and works into another: The newspaper never simply becomes a transcript of calls to the editor, but is changed in its relation to what constitutes "news."

In its position as a conjunctive media, the phone gains opportunities to incorporate, copy, layer, or connect to the those technologies it supposedly supersedes—as with asynchronous modes of communication such as voicemail (a logical electronic replica of a cassette tape or solid-state answering machine) or answering service (a rationalized replica of certain functions of a secretary, flatmate, or family member)—and it is as an organ misappropriated by other medial dynamics that the phone is hooked into pirate radio. Call up the ghost of the telegraph in the form of SMS.

Call up too the ruse of clarity. If we are to discuss media as a temporary aggregation of elements, a phone as a set of components, where better to begin at the end of this chapter than with such an object made up of all its components, all its connections, its affordances, what it blocks and makes possible in front of us. If we can cite texts and tracks as references it would also be useful to make such links to an object, a technology, and have that available for users of the text to check in a library. So in order to date this text, or to imagine that such a system were in existence, let's be specific: a Nokia 6210—a GSM phone at the more featurized end of the "second generation" of mobiles, and a model with a sufficient longevity to remain available for retail after the fitful launch of what were not quite the "third generation" services in 2003, and on into the following year. The theory of affordances offers a particularly useful way to—as was suggested a few pages back—to "straight forwardly" notate this device as a set of elements and relationalities. If we are, as Guattari suggests, to start at "the most miniscule level," where better than at the ends of our fingers?

Keypad-based hardware interfaces to mobile phones are uniformly constrained by fingertip size. The dimensions of each key and the space between keys in turn determine the angle at which a finger must be held in order to press one without touching another. Requirements are placed on the posture of the user. The hand must be ungloved. Direct finger and eye coordination must be maintained. Further demands on the interface of the phone are thus generated. Instant feedback—for instance, via screen, or by sound—for each granule[118] of the interaction must be included in the system in order for one interactive sequence, such as keying in a letter or number, to be signaled as complete in order for the next to be entered. To write a text message, the user needs to compose it from the twenty-six characters of the roman alphabet arrayed across eight of the twelve keys on the main facia of the phone, adding other symbols and blank spaces where needed. Each of these keys is doubly articulated as providing access to a sound tone, which, understood by the user as a number or other character such as a star or hash, allows access to voice and other telecommunications systems by which it is interpreted as a command. These numbers may again be included in SMS messages. On the one hand this means that adding a certain character to a text message may take up to four sequential depressions of a key. On the other, it means that one element of the interface may afford three different functions—functions that overlap in certain cases but not in others.[119] The particular compositional

domain of the keypad can thus be described as an interlocking series of various affordances of access to different symbolic or instructional formats.

The alphabetical and numeric range of combinatorial possibility of the keypad; that it may take up to four sequential depressions of a key to specify a particular character; and the limit on message length of up to 160 characters[120] are the technico-aesthetic fields that combine to mark out the domain of potential text messages sent in any language of the roman alphabet.

Clearly, this short description is an exercise in stating the obvious. If you lose the handbook for a phone of this sort, use the above. Recognizing what we have forgotten we have learned, identifying tacit knowledges goes some way toward recognizing the way social intelligence is built into devices, codes, and networks. These clear but at the same time rather awkward affordances have been taken up in unexpectedly massive quantity and variety because the technology affords further connection to other modalities of life and mediality, which it then also becomes folded into and continues to mesh with and compose.

Immediately among these are the implications of the way in which the relational apparatus of the mobile phone ties into that of the cellular network itself. As a phone moves around it is constantly locating itself in relationship to the cellular macrostructure of aerials and satellites, signals and territorial possession. For the purposes of radio pirates, a phone is identified in two key ways, by its position in relation to a particular aerial or cell and by its subscriber identity module (SIM). Using a phone provides a possibly dangerous link back to a legitimate address, a "data-body"[121] identity that can be policed, and, via the databases of the company from which the telephone service is purchased, can provide punitive access to the physical body of the person. Thus the affordances of the phone must also be read in a manner that recognizes their modulation and conditioning by juridical and police apparatus. Chipped phones[122] or a handful of "lost" SIM cards are necessitated if the effect of a network's intermeshing with or stratification by a hierarchical formation—something inherent in the architecture of the phone network, but not in its uses—is to be navigated.

As the market for mobile phones stabilizes somewhat in the overdeveloped world, greater attention is turned toward regularizing the forms of criminality it involves[123] and makes possible. Equally, those organizations with an interest in stabilizing crime patterns begin to make use of the technologies. Police, for instance, begin to use phone networks to locate targets.[124] Use

of phones by radio pirates in London would thus have to change (were the crime to be "prioritized"). In the meantime, though, it is worth quickly documenting the ways in which the phone operates as part of this wider media ecology.

In broadcast media, it is generally unusual for a receiver–consumer to get in direct contact with a source or to feedback into a channel of information. It takes an element of protocol-busting or naive enthusiasm to step up and speak, to take time. When it does occur, it is under strict conditions of encoding, delay, filtering, and format. Perhaps the "rapture" called up by a pirate media ecology on a roll encourages this, or perhaps audiences are so specialized, so familiar with the people on the other end of the line that it's not such a big deal. (Additionally, since this research first started in 2000—when, in London at least, pirates were almost the sole media organizations making integrated use of the mechanism—use of texting in mainstream media has substantially increased.)

On the pirate stations though, use is made of the phone in three ways: voice, text, and rings. The latter two are of most interest here. Rings have developed as a way to use the telecommunications architecture at no cost to receiver or sender and to process a relatively large number of feedback signals at speed. The MC will call out for listeners to request rewinds of a track by calling the given phone line a set number of times (usually once), and then ringing off. The message is a simple "yes." Once a set number of rings has been reached, the track gets a reload. The message is not so much that people simply want to listen to the track but that they are out there, that the listening is being done collectively, that there is hype about a certain track, and that there is a system of feedback and production to intensify it. In domestic telephone use, rings are used to get access to someone who doesn't want to be called by anyone else and who isn't using voice-filtering via an answer machine: "Ring three times and I'll know it's you." They work as passwords. In this case, they don't so much allow the user to gain access—they are that access. That is to say, sending a ring in is not aimed at progressing to a second stage within that media, but is aimed at rearticulation as part of a wider process incorporating other media.

SMS, by contrast, is already something operating within an aggregate of media: alphabetical, numeric, audial, linguistic. As a system, its proliferation is also a result of the interactions between its existence as both a media-

cultural act and as an economic transaction. Each message is substantially lower than the price of a voice call.[125] Its emergence is conditioned by finding a route through for communication under economic pressure. Communication via constraint is thus on many levels the key "lesson" of SMS.

SMS triangulates the historical interconnection between wireless telegraphy, the telegraph, and the phone by providing a way for the compressed forms of writing employed in the telegraph to return via the telephone. The constraints imposed by the multiple usages of every key on the keypad, by the 160-character limit to each message and the tight limit on the amount of text viewable at any time on the small screen of the phone, have been taken up by a telegrammatic speech in which compression is achieved via the shedding of vowels redundant in signifying the word given the probability of its occurrence (determined by its co-occurent words and the likelihood of their usage in the sequence of exchanges that they form a part of); the use of numbers to stand in for homonymic words or word parts (e.g., "8" for "ate"); the general use of acronyms for standard phrases similar to the compressed phrasing of classified ads, the classification and meaning of which arises only through dialogic agreement and use rather than categorization. All of which is captured only in the minutest way by a clutter of novelty glossaries and handbooks of text protocol.[126] Language reinvents the alphanumeric character set into thick clots of association.

In this inventing, the tight set of freedoms and constraints of the keypad provide, at one scale, compositional access to another index of multiplicities, those that are symbolic, linguistic, and dialogic. The phone provides connection also to telecommunications systems and their particular and ongoing moment of mutation among longer-term changes in work and life. Phones are at other scales conjoined in the same object: gateways to globalizing systems of location; markets; governmentality; identification; permissions; punishment and ease of movement. These are just some of the dimensions of relationality compressed into a phone. Texting at this scale provides a microscopic opportunity for millions of connections and adjustments to be made. Here—in the way mobile phones are used in the context of London pirate radio—an urban culture, illegal in the capital of a collapsed empire refounded as an integrated circuit for finance, is, on close analysis of parts (which include the rare metal tantalum),[127] linked directly to the fomentation of a war that provides the raw material for components. Pirate radio is illegal, yet currently

foundational to the generation and regeneration of the cynically named, more-than-cynically operated "culture industries," which rely on the street innovations interpreted by cultural studies. By following these links through we see a culture making itself out of the virtualities and processes referred to by these names, out of the contradictory and refractory affordances of history: a culture always twisting in and out of the particular matter of the elements of media that make it up.

The account of pirate radio in this chapter has proceeded by following through the flat list of components. Each element was counted as an "index of a multiplicity." Each of these multiplicities is too much to handle. They are signposted, traveled through. In further chapters, this indexing of multiplicities will be taken up in different ways, different situations. The reader will make the rest of the connections. What goes on outside the text, what surpasses it, what it also I hope in some way thickens and makes perceptible, does the rest of the work. To carry on reading this, switch on the radio, make a transmitter.

The disjointed collective subjectivity of contemporary pirate radio in London is arrayed in multiple networks of production, multiple locations on which it is worked, through multiple medial forms. It is mobilized through relations that are at one moment legal and then illegal; group property, then private property, and then private (intellectual) property breached; but it is ultimately sustained by scenes and rythmatic drives that refuse to give in. It is a media system that is public and broadcast and then public, via filtering, but sent to a single destination: it is topologically inventive. It meshes with dynamics of fundamental violence expressed as economics, as investment, and also with the potential of escape from them. It is forged amid the multivalent conflict over technical standards and between media whose emergence and use is shaped and coded by multiple historical conditions. Pirate radio operates and changes through a range of musical life. It feeds into the styles and genera of musics thrown up by the scenes it makes and is part of. It is a current where formidable stylistic innovation meshes with grinding micro-conservatisms. As a media ecology it remains relatively persistent despite the changes in styles, yet manages to add to itself, often making use of machines ahead of any other media system, and keeps going. Thrown together by groups of varying aptitudes and drive, who understand each other by their capacity to fulfill and exceed certain roles as well as operate collectively in some way,

who connect to currents of libidinality, language, rhythm, and technicality, and who can suffer the tedium and cost of keeping the thing together. It is always more than it is supposed to be, from its almost incidental but foundational breach of the law, to its capacity to focus inward to the point of bruising monotony. But most fundamentally, pirate radio in London and elsewhere is made, and makes itself, by its always awesome capacity to flip into lucid explosions of beats, rhymes, and life.

Notes

Introduction: Media Ecologies

1. Kurt Schwitters, "Consistent Poetry" (1924), in *pppppp: Poems Performances Pieces Proses Plays Poetics,* edited and translated by Jerome Rothenberg and Pierre Joris, Exact Change, Cambridge, 2002, p. 223.

2. Friedrich Nietzsche, *Ecce Homo*, trans. R. J. Hollingdale, Penguin, London, 1979 (see esp. §3).

3. Historical precedent is not what is at issue here. However, the earliest use of the term that I have noticed is an intriguing short article in the form of a set of notes in a magazine of experimental video, Radical Software archived at http://www.radical-software.org/. Raymond Arlo, "Media Ecology," *Radical Software*, vol. 1, no. 3, spring 1971, p. 19.

4. A sympathetic book on the nature of interface and information cultures, which does not fully match the uses of "information ecology" mentioned here, is Bonnie A. Nardi and Vicki O'Day, *Information Ecologies: Using Technology with Heart*, The MIT Press, Cambridge, Mass., 2000. A problem with such a work is that although it is formed out of a substantial care for technologies and for people, the scope of the work is insufficient to challenge standardizations of either. This leaves such accounts in all their attentiveness too easily open to use as a cover story for the same old restructuration.

5. See the "Media Ecology Association" Web site: http://www.media-ecology.org/.

6. See, for instance, N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, University of Chicago Press, Chicago, 1999, or her *Writing Machines*, The MIT Press, Cambridge, Mass., 2002.

7. I.e., in Friedrich Kittler, *Discourse Networks 1800/1900*, trans. Michael Metteer with Chris Cullens, Stanford University Press, Stanford, 1990.

8. See the *Electronic Book Review* at http://www.altx.com/ebr/.

9. I.e., the closing parts of Friedrich Kittler, "The History of Communication Media," *CTheory*, http://www.ctheory.net/text_file.asp?pick=45#note63.

10. I.e., Howard Slater, *Postmedia Operators*, archived at http://www.nettime.org/.

11. See Gregory Bateson, *Steps to an Ecology of Mind*, Ballantine, New York, 1972.

12. Félix Guattari, "Entering the Post-Media Era," in his *Soft Subversions*, ed. Sylvére Lotringer, trans. David L. Sweet and Chet Wiener, Semiotext(e), New York, 1996.

13. Félix Guattari, *The Three Ecologies*, trans. Ian Pindar and Paul Sutton, Athlone, London, 2000.

14. N.B.: There is no substantial link to Arne Naess's deep ecological coining of the term "ecosophy" in *Ecology, Community, and Lifestyle: Outline of an Ecosophy*, trans. David Rothenberg, Cambridge University Press, 1990.

15. Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia 2*, trans. Brain Massumi, Athlone, London, 1988. Hereafter, ATP.

16. James J. Gibson, *The Ecological Approach to Visual Perception*, Lawrence Erlbaum, Hillsdale, 1986.

17. See, for instance, Donald Norman, *The Design of Everyday Things*, The MIT Press, Cambridge, Mass., 1998.

18. Particle physics is one well-known case in which, through schemas such as the "uncertainty principle," certain kinds of convulsive reflexivity are demanded of scientific practice—perhaps providing a limit case for the argument here.

Chapter One: The R, the A, the D, the I, the O: The Media Ecology of Pirate Radio

1. Vito Acconci, "Public Space, Private Time," in W. J. T. Mitchell, ed., *Art and the Public Sphere*, University of Chicago Press, Chicago, 1990, pp. 158–176.

2. Simon Reynolds, *Energy Flash: A Journey through Rave Music and Dance Culture*, Picador, London, 1998, p. 234. While its central thesis about the inventive power of hardcores as both popular and experimental movements is important, the book is flawed in some details. One example is the profoundly inaccurate description of Praxis records, a label specializing in fast, abrupt, and grimy-sounding techno, as somehow reproducing fascist and militarized body-culture. This accusation is made through vague argument by analogy. Aside from the material refuting this characterization in the Praxis-allied zine, *Datacide* (http://datacide.c8.com/), the series of ideas about the related work of Underground Resistance assembled by Kodwo Eshun in *More Brilliant Than the Sun* (Quartet, London, 1999) works to provide a more productive account of "brutal" sound at speed.

3. See appendix A in this volume, "Nonexhaustive List of Pirate Radio Stations Received in Central London in 2001–2002."

4. Gilles Deleuze, "Whitman," in *Essays Critical and Clinical*, trans. Daniel W. Smith and Michael A. Greco, Verso, London, 1998, p. 57. See also Gilles Deleuze and Claire Parnet, "On the Superiority of Anglo-American Literature," in *Dialogues* II, trans. Hugh Tomlinson and Barbara Habberjam, Continuum, London, 2002.

5. I.e., Mark Leyner, *I Smell Esther Williams*, Fiction Collective Two, Boulder, 1983; *My Cousin, My Gastroenterologist*, Flamingo, London, 1990.

6. J. G. Ballard, "Notes Towards a Mental Breakdown," *ReSearch No. 8/9*, San Francisco, 1984, pp. 84–87.

7. Walt Whitman, *Selected Poems*, Penguin Popular Classics, London, 1996, pp. 128–135.

8. Ibid., p. 165.

9. See an analysis of AOL's "My News" by Korinna Patelis, "E-mediation by America-Online," in Richard Rogers, ed., *Preferred Placement: Knowledge Politics on the Web*, Jan van Eyck Academy Editions, Maastricht, 2000, pp. 49–64.

10. Gilles Deleuze, *Pure Immanence: A Life*, trans. Anne Boyman, Zone Books, New York, 2001, p. 30.

11. Patelis, "E-mediation by America-Online."

12. Deleuze, *Pure Immanence*, p. 58.

13. Control is here understood to refer to three things: the cybernetic facility of control (Norbert Weiner); that element of the will to power which constitutes a drive to dominate, "*Herrschaft*" (Nietzsche); and the dynamics and agencies of such control which Burroughs refers to by that name in the Interzone trilogy, in "Ah Pook," and in other texts.

14. John Hind and Stephen Mosco, *Rebel Radio: The Full Story of British Pirate Radio*, Pluto Press, London, 1985.

15. ATP, p. 409.

16. Lynn Margulis and Dorion Sagan, *What Is Life?*, Weidenfield and Nicholson, London, 1995, p. 185.

17. Manuel De Landa, *War in the Age of Intelligent Machines*, Swerve Editions, New York, 1991, p. 6.

18. In its complex discussions of substance, the term "hylomorphism" is derived from Aristotle's *Metaphysics*. Deleuze and Guattari's attempt to think beyond its constraints is prompted by Gilbert Simondon in works such as *Du Mode d'existence des objets techniques*, Editions Aubier-Montaigne, Paris, 1989. See also Gilbert Simondon, "The Genesis of the Individual," in Jonathan Crary and Sanford Kwinter, eds., *Zone 6: Incorporations*, Zone, New York, 1992. Useful discussions of the term in relation to theories of corporeality can be found in Adrian MacKenzie, *Transductions: Bodies and Machines at Speed*, Continuum, London, 2002. A discussion of hylomorphism also figures in John Protevi, *Political Physics: Deleuze, Derrida, and the Body Politic*, Athlone, London, 2001. Also useful in this area is Alistair Welchman, "On the Matter of Chaos" in *Pli—Warwick Journal of Philosophy*, vol. 4, nos. 1, 2, pp. 137–158.

19. Manuel De Landa, "The Machinic Phylum," in V2, ed., *Technomorphica*, V2_ organisation for the unstable media, Rotterdam, 1997, p. 39.

20. Björk, cited in Brian Belle Fortune, *All Crew Muss Big Up: Journeys through Jungle Drum and Bass Culture*, second edition, All Crew, London, 2000, p. 35. For those looking for material on the recent world of London pirate radio to update the accounts in Hind and Mosco's *Rebel Radio*, the chapter on radio in this book is excellent.

21. ATP, p. 411.

22. Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz, Stanford University Press, Stanford, 1999.

23. Tim Westwood, foreword to Hind and Mosco, *Rebel Radio.*

24. Foucault's arguments in this area, treated in terms of the thematic of architecture, are usefully expressed in the essay, "Space, Knowledge, and Power," in *Michel Foucault: The Essential Works*, volume 3, *Power*, ed. James D. Faubion, trans. Robert Hurley et al., Allen Lane, The Penguin Press, 2000, pp. 349–364. There is a possibility that the suspension of society in such an infinitesimally controllable solution is made difficult to some extent to the degree that unified frameworks are kludged by their need to operate via layers of heterogeneous organizational forms. For instance, the U.K. government is a layering of monarchical, feudal, bourgeois, liberal democratic, budgetarily rationalized, and technocratic forms and practices. This said, however, the tendency to make these variables sing in harmony can clearly be seen, for instance, in compositional formations such as international trade agreements and infrastructures as well as in militarizing multiscalar panic attacks.

25. In the section of ATP entitled "The Body without Organs," it occurs this way: "To block, to be blocked, is that not still an intensity? In each case we must define what comes to pass and what does not pass, what causes passage and what prevents it."

26. Armand Mattelart, *The Invention of Communication*, trans. Susan Emanuel, University of Minnesota Press, Minneapolis, 1996, p. 221.

27. Broadcasting Act 1990, Public General Acts and Measures of 1990, Part III, London: HMSO 1991, section 172, clause 4 (3).

28. Ibid., clause 4 (3AB).

29. (a) Participating in the management, financing, operation, or day-to-day funding of the station, knowing or having reasonable cause to believe, that unauthorized broadcasts are made by the station;
(b) supplying, installing, repairing, or maintaining any wireless telegraphy apparatus or any other item knowing, or having reasonable cause to believe, that the apparatus or other item is, or is to be, used for the purposes of facilitating the operation or day-to-day running of the station and that unauthorized broadcasts are made by the station;
(c) rendering any service to any person knowing or having reasonable cause to believe that the rendering of that service to that person will facilitate the operation or day-to-day running of the station and that unauthorized broadcasts are so made;
(d) supplying a film or sound recording knowing, or having reasonable cause to believe, that an unauthorized broadcast of the film or recording is to be so made;
(e) making a literary, dramatic, or musical work knowing or having reasonable cause to believe that an unauthorized broadcast of the film or recording is to be so made;
(f) making an artistic work knowing or having reasonable cause to believe that an unauthorized broadcast including that work is to be so made;
(g) doing any of the following acts, namely—
(i) participating in an unauthorized broadcast made by the station, being actually present as an announcer, as a performer or one of the performers concerned in an entertainment given, or as the deliverer of a speech;
(ii) advertising, or inviting another to advertise, by means of an unauthorized broadcast made by means of the station; or
(iii) publishing the times or other details of any unauthorized broadcasts made by the station or (otherwise than by publishing such details) publishing an advertisement of matter calculated to promote the station (whether directly or indirectly).

30. Stuart Hall, "Encoding/Decoding," in S. Hall et al., eds., *Culture, Media, and Language*, Centre for Contemporary Cultural Studies and Hutchinson University Library, Birmingham, 1980, p. 128. For a useful survey of Hall's work, which includes an extended discussion of this essay, see Chris Rojek, *Stuart Hall*, Polity, Cambridge, 2003.

31. Claude Shannon and Warren Weaver, *The Mathematical Theory of Communication*, University of Illinois Press, 1963.

32. Hall, "Encoding/Decoding," p. 129.

33. Ibid., p. 138.

34. This particular moment in the encoding/decoding model is contextualized usefully by Colin Sparks in "Stuart Hall, Cultural Studies, and Marxism," in David Morley and Kuan-Hsing Chen, eds., *Stuart Hall: Critical Dialogues in Cultural Studies*, Routledge, London, 1996.

35. Jim Jarmusch, dir., *Ghost Dog: The Way of the Samurai*, 1999.

36. Ricardo Dominguez, "The Ante-Chamber of Revolution: A Prelude to a Theory of Resistance and Maps," *CTheory*, http://www.ctheory.net/text_file.asp?pick=203.

37. Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society*, Free Association Books, London, 1989, p. 33.

38. Tetsuo Kogawa's homepage, giving basic information, is at http://anarchy.k2.tku.ac.jp/.

39. Berthold Brecht situates his short, "The Radio as an Apparatus of Communication," as a proposal for innovative excess, the utopian and materialist exploration of potential in media technology as a form of struggle. In Neil Strauss and David Mandl, eds., "Radiotext(e)," *Semiotext(e)* no. 16, New York, 1993. See also "An Example of Paedagogics (Notes to *Der Flug der Lindberghs*)," which shares some of the elements of this text, in John Willett, ed., *Brecht on Theatre*, Methuen, London, 1978.

40. Hans Magnus Enzenberger, "Towards a Critique of Media," in *Raids and Reconstructions: Essays in Politics, Crime, and Culture*, trans. Michael Roloff et al., Pluto Press, London, 1976.

41. The software used by Aaron Williamson in this series of performances is Dragon's *Naturally Speaking,* http://www.lhsl.com/naturallyspeaking/.

42. Aaron Williamson, *Hearing Things*, BookWorks, London, 2001, p. 41.

43. Aaron Williamson, *Hearing Things*, performance, Beaconsfield, London, Friday, March 2, 2001.

44. Avital Ronell cites an episode from Alexander Graham Bell's childhood, in which the construction of such a speaking device was set as a project for him and his brother by his father after he had seen a Professor Faber's speaking machine *Euphonia* on a visit

down to London. Avital Ronell, *The Telephone Book: Technology, Schizophrenia, Electric Speech*, University of Nebraska Press, 1989, p. 315. Both Kittler and Ronell provide vivid and substantial resources in the material imaginaries of the telephone and its precursors.

A useful history of automata is Gaby Wood, *Living Dolls: A Magical History of the Quest for Mechanical Life,* Faber and Faber, London, 2002. Descriptions of the internal configuration of several famous automata are given here.

45. Much of this simulation now occurs in a form of reverse engineering. A neural network "listens" to a voice and attempts to generate the same sounds. Work to physically reproduce speech by mechanical means is still ongoing; see, for instance, the work of Hideyuki Sawada, http://www.eng.kagawa-u.ac.jp/~sawada/.

46. Helmholtz's speech synthesizer, a copy of which is on view at the Teyler's Museum, Haarlem, is notable for taking a different approach. Rather than attempting to recreate a physical throat and mouth assemblage, this synthesizer uses a series of tuning forks. The forks are made to vibrate by means of an electromagnet attached to them, each of which is activated by a key, similar to that of a piano. The result is a machine capable of generating a series of vowel-like tones or the "resonators" that Helmholtz later theorized in *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, trans. Alexander J. Ellis, Dover, New York, 1954.

47. Kittler, *Gramophone, Film, Typewriter*, p. 24.

48. Aaron Williamson, "Solo Boy," in *A Holy Throat Symposium*, Creation Press, London, 1993, p. 65.

49. Ibid.

50. Ibid.

51. *Naturally Speaking* advertises a basic corpus of 2,300,000 words.

52. Http://www.lhsl.com/naturallyspeaking/.

53. Ibid.

54. Luigi Russolo, *The Art of Noises*, trans. Barclay Brown, Pendragon Press, New York, 1986.

55. Charles Sanders Peirce, *Collected Papers,* vols. 1 and 2, ed. C. Hartshorne and P. Weiss, Harvard University Press, Cambridge, Mass., 1960. In Peircian semiotics, an indexical sign is one that is an inevitable consequence of the thing it signifies. Examples are the symptom of a disease or the movement of a barometer caused by changes in air pressure.

56. Sample from Andre Gurov, "Livetime Monologue," on *Electric Ladyland 5*, Force Inc., Frankfurt, 1998.

57. Richard Pierre-Davis of Mongrel, in conversation, February 2001.

58. "Domains are . . . associated with widespread sociocultural norms and expectations and lead to congruent social and linguistic behaviour." Gerhard Leitner, "The Social Background of the Language of Radio," in Howard Davis and Paul Walton, eds., *Language, Image, Media*, Basil Blackwell, Oxford, 1983, p. 55.

59. KRS ONE raps, of his dead partner, Scott La Rock, "I knew his breath was one with my breath." *Return of the Boom Bap*, Jive Records, 1993.

60. Nas, "I Gave You Power," on *It Was Written*, Columbia Records, 1996.

61. KRS ONE, "I Can't Wake Up," on *Return of the Boom Bap*, Jive Records, 1993.

62. El-P, "Stepfather Factory," on *Definitive Jux Presents 2*, DefJux, New York, 2002.

63. For links to track such currents, see *Datacide*, cited above, and the excellent *Hyperdub*, http://www.hyperdub.com/.

64. Recordings of synthetic voices singing popular songs had by contrast been made since the late 1950s. Max Matthews produced a series of programs called "Music", which, by controlling only pitch, time, and volume, could produce basic vocalization. See Max Matthews, "Bicycle Built for Two," on *Early Modulations, Vintage Volts*, Caipirinha Music, cat. no. CAI-2027. An intriguing analysis of recent uses of another kind of relationship of synthesis to voice is Natalie Jeremijenko, "Dialogue with a Monologue: Voice Chips and the Products of Abstract Speech," available at http://www.cat.nyu.edu/natalie/VoiceChips.pdf/.

65. Walter Benjamin, "The Work of Art in the Age of Its Technological Reproducibility," *Selected Writings*, volume 3, *1935–1938*, Harvard University Press, Cambridge, 2002, pp. 101–133.

66. Alexander Graham Bell, cited in Avital Ronell, *The Telephone Book,* p. 322.

67. Footnoting the obvious: In the context of Jamaican-originated dancehall/ragga, "DJ" means what in the U.K. or U.S. would mean MC or rapper, whereas the "Selector" operates the turntables.

68. Compare also the rapping voices of Ja Rule to his speaking voice, or the special praise for the bullet-mashed mildly slurring mouth of Fifty Cent. Roots Manuva is probably the rapper who messes with his voice the most, slurry, stung, laughing, doped, watch out—here comes a little singing, drifting out of this style and that.

69. Red Rat featuring Buju Banton, "Love Them Bad," on *Oh No, It's Red Rat*, Main Street Records, 1997.

70. See, for instance, Sticky, featuring Ms Dynamite "Boo," London Records, 2001, or several tracks by Mis-Teeq.

71. Rudolf Arnheim, *Radio*, trans. Margeret Ludwig and Herbert Read, Faber and Faber, London, 1936.

72. See Gerhard Leitner, "The Social Background of the Language of Radio," in H. Davis and P. Walton eds., *Language, Image, Media*, Blackwells, Oxford, 1983, pp. 50–74.

73. Tyree Ford, "Monday Memo," broadcast May 11, 1987, p. 18, cited in Peter B. Orlik, *The Electronic Media: An Introduction to the Profession*, second edition, Iowa State University Press, Ames, 1997, p. 401.

74. There are also histories of recursive couplings between voices and ears. Allan Ginsberg describes one such: ". . . Frank Sintara was actually an influence on Karouac. Sinatra, I think, learned his technique from Billie Holiday. So the lineage is Billie Holiday through Sinatra to Karouac." Elissa Scheppel, "A Semester with Ginsberg," in George Plimpton, ed., *Beat Writers at Work*, Harvill Press, London, 1999, p. 256.

75. Some notes on "hardcore": Hardcore takes a number of routes. The name turns up in use for the most compelling areas of music (i.e., an initially U.S. outcropping of punk beginning in the early 1980s; a form of techno that introduced break-beats and accentuated its potential for "cheesy" sounds—this aspect is well covered by Reynolds in *Energy Flash*) and also an approach to making music and being in life that transcends any specific area of music, such as the following sample: "Q: What do

you believe in? A: Hardcore. . . ." Gunshot, *Patriot Games*, Vinyl Solution, London, 1993.

76. For one take on this process of inclusion, based on familiarity back in the day, see Oxide and Neutrino, "Up Middle Finger," on *Execute*, Warner Music UK, 2001. So Solid's lyrics in general are like set theory with a beat.

77. See Paul Gilroy, "'. . . To Be Real': The Dissident Forms of Black Expressive Culture," in Catherine Ugwu, ed., *Let's Get It On: The Politics of Black Performance*, ICA and Bay Press, London, 1995, pp. 12–33.

78. Jean-Jacques Lecercle, *The Violence of Language*, Routledge, 1990, p. 51.

79. The "Publisher's Peritext" is that "zone" of the book which is the direct and principal responsibility of the publisher—here, understood to relate to the work of promoters, designers, possibly a separate group of managers, etc. Genette provides the founding and exemplary close analysis of this aspect of publishing, which also offers a good to other accounts of media working through detail. (Thanks to Miriam Rivett for an introduction to this material.) Gerard Genette, *Paratexts: Thresholds of Interpretation*, trans. Jane E. Lewin, Cambridge University Press, 1997.

80. For the initial proposal of meme theory, see Richard Dawkins, *The Selfish Gene*, second edition, Oxford University Press, Oxford, 1989. Meme theory is discussed further in chapter 4. For now it is useful to counterpose it with the following statements on the evolutionary, conflictual, mutually assistive, and adaptive in §508 of Nietzsche's late notebooks published as *The Will To Power*: "Originally a chaos of ideas. The ideas that were consistent with one another remain, the greater number perished—and are perishing." But this must be counterposed with §709: "We do not make our 'desiderata' judges of being! That we do not also set up terminal forms of evolution (e.g. spirit) as another 'in-itself' behind evolution!" This last needs restating as respite after almost every sentence of Dawkins's idealization of the gene.

81. Brian Belle-Fortune, *All Crew Muss Big Up*, p. 93.

82. Radio Communications Agency Information Sheet RA 169 (rev. 4), May 1999, reproduced in Richard Allport, *RadioToday: Ultimate Scanning Guide*, Radio Society of Great Britain, Potters Bar, 2000, pp. 7–8.

83. William Burroughs and Brion Gysin, *The Third Mind*, John Calder, London, 1979, p. 4.

84. Ibid.

85. Gilles Deleuze, "Louis Wolfson; Or, the Procedure," in *Essays Critical and Clinical*, p. 13.

86. Judy Borland, "Contradicting Media: Towards a Political Phenomenology of Listening," in Strauss and Mandl, eds., *Radiotext(e),* p. 209.

87. It is a measure of the depleted imagination of electronics culture and the economies it exists in that with such a range of prefabricated circuits and highly powerful components available, the best that can be delivered, or made popularly available are yet more and more featurized mobile phones. (Thanks to Rolf Pixley for numerous insights into such areas.)

88. Such a reading corresponds to what Deleuze and Guattari name as the first characteristic of minor literature, "That in it language is effected with a high coefficient of deterritorialisation," *Kafka: Towards a Minor Literature,* trans. Dana Polan, University of Minesota Press, Minneapolis, 1986, p. 16.

89. See Brian Holmes, "The Flexible Personality," in his *Hieroglyphs of the Future: Art and Politics in a Networked Era*, What How and For Whom and Arkzin, Zagreb, 2003.

90. The Shorten compression format provides the beginnings of an alternative to MP3. It offers less compression but is fundamentally lossless. See Tony Robinson, "SHORTEN: Simple Lossless and Near-Lossless Waveform Compression," Cambridge University Engineering Department Technical Report CUED/F-INFENG/TR.156, 1994.

The MP3 format has the potential effect of triggering a new mass format shift in a similar manner to that of the shift from vinyl to compact disc. The substantial income for record labels as people "rebought" their existing record collections may be short-circuited this time around by the capacity to copy CDs. The restructuring, extension, and strengthening of intellectual property regimes or their alternate reinvention along the lines of positive rights to share is now a crucial ground of contestation and invention, and one in which digital file formats is already playing a key part.

91. Hans Magnus Enzenberger, "Constituents of a Theory of Media," trans. Stuart Hood, in *Raids and Reconstructions.*

92. Brian Winston, *Media, Technology, and Society: A History: From the Telegraph to the Internet*, Routledge, London, 1998.

93. In *Media, Technology, and Society,* Winston, pp. 60–64, recounts how with the development of the inscriptive sound-recording technologies of the last quarter of the nineteenth century, no one really had a clear idea as to their applications. It took their nominative and organizational "invention" as the gramophone, as a storage and playback system for music, to make them really take off. Winston's book excels at describing such situations. Even more remarkable perhaps is the story of the Atikythera. This sophisticated clockwork device, apparently usable for celestial navigation, was sunk in approximately 76 B.C. and recovered by divers in 1901. The first thorough work on this object was is Derek J. de Solla Price, "An Ancient Greek Computer," in *Scientific American,* June 1959, pp. 60–67.

94. The network structure with which Guderain so effectively invested his tank formations was basically a transposition of the wireless telegraphy communications first installed by the naval commands of the imperial powers necessitated by the introduction of "Ironclad" ships. Turning land into fluid in this way is a typical example of the spatiotemporal compression achieved by military control theorized by Virilio and later "innocently" taken up by proponents of the "networked enterprise" etc. (see Castells, *The Rise of the Network Society*). This characterization of the car–broadcast radio coupling is first made by Kittler in *Gramophone, Film, Typewriter*, and is useful in understanding the mobile crowd, on the road, tuned into the same station, and also able to communicate laterally among themselves (given the knowledge of personal numbers) and provide feedback to the network hub (the studio) of which they form the spokes.

95. ". . . Tape decks made music consumers mobile, indeed automobile, as did the radio producers in the Magnetophone-equipped German lead tanks of old. Thus, the 'American mass market' was 'opened up' by the car playback system." Friedrich Kittler, *Gramophone, Film, Typewriter*, p. 108, citation from Steve Chapple and Reebee Garofalo, *Rock and Roll Is Here to Pay: History and Politics of the Music Industry*, Nelson Hall, New York, 1980. Vinyl, a by-product of petroleum, further develops the coevolution of the two processes. See also Kittler, "Unconditional Surrender," in Hans Ulrich Gumbrecht and K. Ludwig Pfeiffer, eds., *Materialities of Communication*, trans. William Whobrey, Stanford University Press, Stanford, 1994, pp. 319–334. For another source of this argument, see also Marshall McLuhan, *Understanding Media: The Extensions of Man*, The MIT Press, Cambridge, 1994, p. 271.

96. Avital Ronell, *The Telephone Book*, p. 329. Jay Clayton describes conversely how the devices making up the various early telegraphy systems produced noises that were

listened to rather than read visually. Jay Clayton, "The Voice in the Machine: Hazlitt, Hardy, James," in Jeffrey Masten, Peter Stallybrass, and Nancy Vickers, eds., *Language Machines: Technologies of Literary and Cultural Production*, Routledge, London, 1997, pp. 209–232.

97. Norbert Wiener also discusses the potential for such inscription systems by means of the vocoder in *The Human Use of Human Beings.*

98. Aaron Williamson, "Dear Surgeon," in his *Cease to Exist*, Creation Press, London, 1991.

99. Statistics showing the increasing use of SMS can be found on the Mobile Communications Association Web site: http://www.gsmworld.com/.

100. William Gibson, "Modern Boys and Mobile Girls," *Life*, April 1, 2001, pp. 8–11. See also Akira Suzuki, "Unplugged Connected Pockets," in Fiona Raby, ed., with Ben Hooker, *Project #26765—FLIRT: Flexible Information and Recreation for Mobile Users*, RCA CRD Research, London, 2001.

101. Gibson, "Modern Boys and Mobile Girls."

102. The Requests For Comment archives are maintained by the Internet Engineering Taskforce at http://www.ietf.org/.

103. James J. Gibson, *The Ecological Approach to Visual Perception*, Lawrence Erlbaum, Hillsdale, 1986, p. 134.

104. Donald Norman, *The Design of Everyday Things*.

105. See, for instance, Brenda Laurel, ed., *The Art of Human Computer Interface Design*, Addison Wesley, Boston, 1990.

106. Deleuze draws this from David Hume (and it is explored in a section entitled "The Nature of Relations" in Gilles Deleuze, *Pure Immanence*, p. 37), but it is also a cybernetic insight about patterns and their continuity.

107. James J. Gibson, *The Ecological Approach to Visual Perception*, p. 134.

108. Ibid., p. 137.

109. Ibid., p. 135.

110. Ibid.

111. Félix Guattari, *The Three Ecologies*, trans. Ian Pindar and Paul Sutton, Athlone, London, 2000, p. 83.

112. Gibson, *The Ecological Approach,* p. 137.

113. Michel Foucault, *Discipline and Punish: The Birth of the Prison*, Peregrine, London, 1979, p. 138. Here we can also refer to Nietzsche's explicit critique of a stable understanding of the usefulness of objects, codes, and customs in §12 of *On the Genealogy of Morality* (Cambridge University Press, Cambridge, 1994) , which makes every element in a composition susceptible to futurity.

114. Foucault, *Discipline and Punish*, p. 139. Deleuze, in a footnote on this aspect of Foucault's work, suggests that we should also understand it in useful correlation to the "microsociology" of Gabriel Tarde and the "sociology of strategies" promulgated by Pierre Bourdieu. Gilles Deleuze, *Foucault,* trans. Séan Hand, Athlone, London, 1999, p. 142, n. 7. Certainly Bourdieu also begins to make possible a theorization of medial affordances. Tarde's work, and its conflict with Durkheimian mass sociology, is also discussed in ATP, pp. 218–219. For a development in theorizations of Tarde, see a special section of the journal *Multitudes*, no. 7, December, 2001, available online at http://multitudes.samizdat.net/rubrique.php3?id_rubrique=38.

115. For an account of three uses of mobile media in mass spectator events, see Andreas Nilsson, Urban Nuldén, and Daniel Olssen, "Mobile Media: The Convergence of Media and Mobile Telecommunications," *Convergence*, vol. 7, no. 1, spring 2001.

116. Ronell, *The Telephone Book,* p. 301. See also Elias Cannetti, *Crowds and Power*, trans. Carol Stewart, Phoenix Press, London, 2000, p. 52.

117. An extension of this, once phones lose their wire tail, is that "Cellphones break down space. . . . there's no place that can't be connected to another space. If there's an image that captures this, it's the great moment in the movie 'Three Kings,' where Marky Mark finds a cellphone deep in an Iraqi bunker in the middle of the desert, and uses it to call his wife, back home in suburban America." McKenzie Wark, "The Cancer of Cellspace: The New Culture of Cellphone Communication Is Leaving Cyberspace Behind," *Arthyte*, archived at http://www.nettime.org.

118. "Granularity" is a term to describe the basic isolatable unit of which an interactive process can be broken down to and at the end of which another can begin. (Stewart Brand, *Media Lab: Inventing the Future at MIT*, Penguin, London, 1987.) In a sense, each granule can be understood as a "moment" in the use made of the term by Hall's "Encoding/Decoding."

119. This number of functions is of course a minimal description of what exists or is possible. Chip expansion and product differentiation, and the many reasons for them, enable the phone to operate in many more than the few modes described here.

120. In 2001 a number of phones were introduced that allowed the composition and sending of 480 characters, using three sequenced SMS messages.

121. Critical Art Ensemble, "The Electronic Theatre and the Performative Matrix," in their *The Electronic Disturbance*, Autonomedia, New York, 1994, p. 59.

122. To "Chip" or "clone" a phone is to capture the phone number and serial number transmitted by any legitimate phone and program it into a new SIM card to be inserted into a stolen or new and blank phone. The GSM standard, which includes a basic level of encryption, means that this is less and less easy to do. For a "law-enforcement" perspective, see Dorothy E. Denning and William E. Baugh, Jr., "Hiding Crimes in Cyberspace," in Peter Ludlow, ed., *Crypto Anarchy*, *Cyberstates*, *and Pirate Utopias*, The MIT Press, 2001, pp. 115–142.

123. This, along with the purging of large and expendable sections of the work force as seen in mass firings and factory closures in the U.K. by Ericsson and Motorola in April 2001.

124. See the U.S. E911 or the EU the E112 mandates.

125. Between 10 and 12 pence per message was the standard price of the four major networks in the U.K., April 2001–April 2003. The cost of a message is largely incurred by the connection to the network, not use of bandwidth. A bit-per-pence comparison of the price of an SMS with dial-up e-mail reveals the disparity in price—with SMS tens of thousands of times more expensive.

126. A number of series of these small booklets exist, sold at checkouts and trinket outlets, e.g., *LUVTLK! Ltle bk of luv txt*, Michael O'Mara Books, London, 2001.

127. See, for instance, Steven Fyffe, "Tantalum Carnage Continues in the Congo," *Electronic News*, http://www.e-insite.net/electronicnews/index.asp?layout=article&articleid=CA91083.

Chapter Two: The Camera That Ate Itself

1. Vilém Flusser, *Towards a Philosophy of Photography*, Reaktion Books, London, 2000, p. 26. Flusser's suggestion that the apparatus of the camera compels the user to take photographs, and in a demented enclyopedism to attempt to exhaust the infinity of all possible images, is perhaps best taken up by Bernd and Hiller Becher's cataloging of building types—water towers or half-timbered houses; Ed Ruscha's *Every Building on the Sunset Strip* (1966); photographic documentation projects such as the *London's Found Riverscape* project; the cataloging of people, types, and individuals by the police initiated by Cesare Lombroso and Georges Bertillon (see Peter Hamilton and Roger Hargreaves, *The Beautiful and the Damned: The Creation of Identity in Nineteenth-Century Photography*, Lund Humphries/National Portrait Gallery, London, 2001; John Tagg, *The Burden of Representation: Essays on Photographies and Histories*, Macmillan, Basingstoke, 1988; Armand Mattelart, *The Invention of Communication*; Marek Kohn, *The Race Gallery: The Return of Racial Science*, Vintage, London, 1996); or by the compulsive second-order copying of or attaining rights to copy picture libraries. Such a drive or a codification of it can be seen also to compose recent photographic activity, as it veers into acknowledging and using its potential collapse—in the amassing of near nonphotos by Hiromix, for instance—and of the representational task supposedly left to it by painting. (Facial recognition software inverts this relationship. Every face is scanned, but only those that correspond to a certain "meaning" by which they are correlated to another sector of the photographic universe count as "successful" images.)

2. Flusser, *Towards a Philosophy of Photography*, p. 28.

3. Ibid., p. 29.

4. Ibid., p. 31.

5. See the artist group Bank's section of commentary on art press-releases in *Bank*, Black Dog Publishing, London, 2000.

6. Catherine Lambert, *Live in Your Head: Concept and Experiment in Britain 1965–1975*, Whitechapel Gallery, London, 2000. There is a better, full-page reproduction of