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TRANSDUCTIONS

Bodies and Machines at Speed

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Preface

> Now the rockets fire. You feel the big push. Your moon ship gets away fast. THEN... .
>
> Mae and Ina Freeman, 1962

Getting off the ground, let alone into space, was represented as a technological sublime, a crowning achievement of *Homo faber,* during the twentieth century. A 1960s picture storybook for beginning readers called *You Will Go to the Moon* (Freeman and Freeman, 1962) promised space travel to Anglo-American — and Australian boys. At the start of the book, a neatly dressed child sits on a stool at his living-room window, observing the moon through a telescope. His father and mother (the only woman to be seen in the book, and only briefly) relax on the couch. A train set and model plane lie on the floor, the already half-abandoned toys of an earlier modernity. By the end of the book, in a surprisingly rapid sequence of events, the boy has rocketed to the moon, leaving his nuclear family behind. Suited-up, he and a `rocket man' stand on a lunar mountain looking towards another frontier, Mars. Below them lies the `moon house ... where you will live on the moon' (p. 61).

The literal promise of that storybook has not been kept. I have not gone to the moon. The sight and sounds of blast-offs, launches, orbits, and splash-downs have become stock footage, and space junk is piling up in decaying orbits, if it is not dropping out of the sky altogether. In fact, the only experience I have of space technology is what I have seen on television screens and in museum exhibits. The Hall of Space and Flight at the Powerhouse Museum of Technology in Sydney, for instance, exhibits a relic of the Cold War space race, a recreated space module. It stands on a pedestal at one end of the gallery. Steps lead

up to a cylindrical module lined with equipment, empty spacesuits, dials and nozzles. Astronauts lived there for weeks, drifting past each other with clipboards and Omega watches. Even on a Saturday afternoon, this end of the museum is not too crowded. It's a long way from the entrance, and more up-to-date interactive computer displays net most visitors before they get this far. A man, a boy and a small girl enter the hall and veer towards the spacecraft. They climb the steps, the boy in front, the girl lagging behind. The boy reaches the platform and runs into the module. The man follows. Behind them, the girl stamps her feet on the steps and grouches: `Boring old space.'

In miniature, that everyday incident encapsulates the core problem addressed by this book. Everyone has heard that technology will make the future better. Everyone has heard that it could make it a lot worse. The problem is to figure out what scope or capacity there is to collectively manoeuvre between these two somewhat bloodless abstract possibilities. *You Will Go to the Moon* was not alone in promising speed, new frontiers, and a homogeneous, clean, frictionless masculine culture of enormous rockets, well-sealed spacesuits and lunar colonies. That future, in which machines will overcome all obstacles, was and still is being often rehearsed today. High technology can symbolize the evaporation of political, religious, racial, ethnic, economic and gender differences. `Now there is not one thing to hold your moon ship back' (p. 39), the boy is told after blast-off. In many areas, such as biotechnology, information and communications, that same rendering of technology pulls enormous crowds.

At the same time, as a response to that kind of technological bombast, `boring old space' has its limitations. Admittedly, space technology itself has been somewhat of a disappointment. It seemed to lose momentum once the Cold War spark went out of it. So `boring old space' is an apposite retort to the museum's veneration of an obsolete technological fetish, of a future that was broadcast as imminent and important. Outside the museum halls, in the humanities, the typical response to the technological future has shared the girl's view: in general, technology is irrelevant, boring, subsidiary or, worse, hostile to culture, tradition, history and meaning. Critical thought has learnt to discount monotonous ideologically loaded talk of bright technological futures partly because of this perception of `technology' as a cover for troubling differences and conflicts within human collectives. Well beyond humanity's anxieties, anyone who has seen Arnold Schwarzenegger in *Terminator* knows that technology also can symbolize a devastated future. Machines could make us do what we don't want to do. They could foreclose the future. Or more soberly, as historian Leo Marx writes, technology is `a bloodless abstraction that represents no particular person or thing, no specific skill, vocation or other institution' (Marx, 1999, 144-5).

The point here is that these responses either straining eagerly towards an impossible technological fantasy, or resisting or ignoring it — gloss over that zone of our collective which is actively engaged, or as I shall be suggesting, *transduced* in technical mediations. From this angle, the problem is how to engage with a collective's embodiment of technical mediations without repudiating, or over-identifying with, technology. The concept of *transduction* is meant to develop some theoretical traction in this still somewhat obscure but richly diverse middle domain. It tries to show how technologies are both difficult to access in terms of subjects and societies, yet indissociably folded through collectives and cultures. That middle domain is lived collectively and it is eventful. Technology is within us, whether we thought we were getting into *or* out of it. To remain with the example of the space race: in its wake military/scientific/commercial satellites criss-cross the sky day and night, and, even more to the point, an intricate communication infrastructure is in place. When *You Will Go to the Moon* says on the last page `then YOU will *see'* (p. 63), it was adopting a slightly more situated outlook on the future of high technology: the space race was played out as a media spectacle, and it spun off media events like a comet's tail.

More generally, habitual desensitization to the stale and over-used word `technology' does not seem to inhibit the growth and webbing together of technical infrastructures, even if they do not have the high profile of rockets, space shuttles and space stations. No doubt, numbed by the bloodless abstraction `technology' and tired of its ideological baggage, there may be some reluctance or even incapacity within the humanities to fiddle around with the specific patterns and events associated with the multiple intersection of technologies. Yet, justifiably spurning utopian or dystopian talk of `technology' as a universal,

critical thinkers are landed with a problem: on what ground can anyone engage critically with specific technologies? This is a double bind. Learning to read *You Will Go to the Moon,* for instance, means learning to hear the subjectifying voice addressed to certain groups in the late twentieth century via the symbols of high technology, and at the same time, developing a feel for what always accompanied it: a complicated, messy, fluctuating tangle of technical mediations and collectives involving specific bodies and times. In that sense, *Transductions* is an attempt at learning to read again.

Introduction

A double bind applies to contemporary collectives. Against, through or with technologies, they test their capacities to make sense of their own situation. Yet they are burdened by an overloaded, stale abstraction, `technology', which overrides and attenuates a more polyphonic voicing of technologies. This book responds to the confusion and ambivalence which flows from that double bind. It is not the first attempt to deal with the topic, and it stands in the shadow, perhaps too much so, of the diverse work of other thinkers such as Gilbert Simondon, Donna Haraway, Bruno Latour, Bernard Stiegler and Martin Heidegger.

There are many ways into this domain. *Transductions* takes a fairly theoretical path, orienting its engagement with contemporary technologies by two problematic reference points: corporeality and temporality. There is no absolute justification for the privilege I am according to bodies and time as points of reference. These areas stand out at the moment for a loose cluster of reasons. Broadly speaking, it is in relation to bodies and time that modern technology effects its most intimate synthesis with cultures. For some time now, living bodies have been seen as `under attack', or about to be liberated (from nature, and ultimately from death) by communication, information and biomedical technologies. Similarly, the perception has been that time itself is being colonized by speed. Acceleration and instantaneity seem to intolerably compress time. More abstractly, in the general field of recent philosophical thought from which this book takes some important cues, body and time mark limits for thought. To think `the body' or to think `time' is to run up against the limits of thinking. Body and time challenge the prerogatives of thought. These two limit cases have undoubtedly triggered important theoretical

innovations which have not been clearly articulated together with technology. Our collectives are exposed to an *ongoing* technological dynamism which can perhaps begin to be thought in its nexus with bodies and time.

This approach turns away steeply from any generalized assertion of the effects of new technologies on society. That assertion coasts along on a separation between technology and society which I seek to undermine, if not collapse, at a fairly low level. It will be strikingly apparent from the outset that many specific political, ethical, economic, cultural or social problems efflorescing around technology are under-represented in this book. Recent and oncoming technological changes pose globally large problems, but the focus here is more on the conditions of intelligibility of technological practices in their specificity, on the interleaving of technoscience, capital and cultures. In simple terms, until we have better ways of articulating the technical constitution of our collectives, any general estimation of technological impact remains premature and perhaps mistaken. The volatile essence, the mutable, divergent and eventful character of technologies within our collectives eludes classification as merely `technical' or `social'. The interplay between what counts as social/cultural and what counts as technical is far more convoluted than most existing accounts admit.

TECHNOLOGIES, BODIES AND TIMES

Certain anxieties and expectations are insistently raised by the flux of technological change. They are mentioned constantly in the mass media, they figure in many different narratives, and occupy prominent positions in public debates. They revolve around the question of what possible points of orientation we can have when almost every foundation — place, tradition, self, other, body, life, death, culture, nation, history — seems about to be altered, if not utterly transformed, by technology. One question is how such anxieties arise: what drives them? I want to suspend that question, and slow down a little to ask: can we think through the conditions under which such apprehensions of technology arise? This might seem like an obtuse question. However, it is a way of holding onto the double bind mentioned above. On the one hand, we are already diversely technological. On the other hand, `technology' has become a problem-fetish for us. The concept of transduction can help frame this question of the `thinkability' of technology. It both highlights a margin of contingency associated with technological objects and practices within collectives, and clarifies some of the difficulties collectives have in making sense of technical practices. This is not to simply say that technologies can have different meanings, different uses or different effects within any given social context. Rather, this margin of contingency or indeterminacy participates in the constitution of collectives. It entails openness to future and past. The following chapters explore some corporeal and temporal implications of this indeterminacy and openness.

As a way of introducing the concept of transduction, I approach it first of all from the perspective of the deconstructive quasi-concept of `originary technicity'. Admittedly, this is not an easy way to come up to speed on the topic. However, originary technicity does help remind us that the problem of thinking about technology is also a problem of thinking about time, corporeality and, indeed, thinking about thinking. At a fairly deep level, it unsettles the certainty that we know what technology is in principle. I am assuming that the deconstructive logic of the supplement, with which originary technicity has strong affinities, is familiar enough to clear the path a little here. For the purposes of my general argument, the discussion of originary technicity is in fact mainly a ground-clearing move. Second, I sketch how the margin of indeterminacy just mentioned can be understood in terms of the notion of `technicity' developed by Gilbert Simondon. Finally, I explore the link between technicity and transduction. We will see that technical objects exist transductively. The agenda here, and in the chapters that follow, is straightforward. Until we can think of technical objects, machines, ensembles in their own terms, then their role in constituting who or what we are remains shrouded. The intelligibility of our own anxieties about technology is entwined with the way we think about technology.

ORIGINARY TECHNICITY AND THE MEANING OF `TECHNOLOGY'

It is tempting to use the word `technology' to mean the whole toolkit of technical artefacts, diverse and innumerable as they may be. However, I am not sure it is possible to do that (and this provides the first cue for the concept of transduction). This difficulty was signalled strongly in the work of Martin Heidegger (Heidegger, 1954, 1977). When he grafted technology onto the question of Being, he exemplified perhaps the most exorbitant use of the term `technology' in philosophy to date (the German word *der Technik* does not map directly onto `technology'; Heidegger's response to modern technology will be discussed in Chapter 5). Roughly paraphrased, his work on technology asks: how can we deal with the fact that technology today displays itself everywhere as a constantly shifting, open-ended and groundless ordering of everything that exists, and yet we find it almost impossible to think about how we are collectively involved in that ordering, except in terms of an increasingly untenable anthropocentrism which elevates us, as `the human', to the summit of all things (Heidegger, 1977)? Put differently, when IBM Corporation's supercomputer *Deep Blue* beat the reigning human world chess champion, Gary Kasparov, in 1997, what was our reaction? To say that humanity is still superior in the contest of intelligence because it built the technology of supercomputing? Heidegger's questioning of technology addressed the profound incoherence of such a response. He sought to think through the experience of being suspended between growing orderability and an as yet indecipherable historically specific involvement with technology.

There is no simple way out of that experience. It is another version of the double bind. Could we then move up a level and, speaking more reflexively, say the technology is a set of artefactual, corporeal and semiotic realities, folded into each other through the broadly delimited experience of an historical situation (e.g. progress, utopia, dystopia, etc.) as modern? From this more sophisticated perspective, the word `technology' would be treated as a historically situated discursive entity, dating from some time in the early nineteenth century or a little earlier (Mitcham, 1994, 130-31). Any reference to technology would then inescapably filter through this complex historical siting. The unstable affective charge that the term technology carries today, whether it be Silicon Valley's enthusiasm, Wall Street's panicky glee, consumer resistance to genetically modified (GM) foods, or the girl's boredom with space as the final technological frontier, would thus connote the fragmentation of that historical experience. `Technology' could then be treated as a discursive reality generated by the historical processes of modernity.

The problem with this move is that, for better or worse, technology is more than a manner of speaking or launching new commodities or political programmes. It strongly resists reduction to discourse and signification. Rather, it tends to condition them. This is not to say that technology, or some aspect of technology, is outside discourse. Rather it is to say that we can think, signify, make sense and represent who we are in part only because of technology. Obliquely departing from Heidegger's work, recent work in continental philosophy has homed in on this point. Drawing primarily on deconstructive approaches, a cluster of French and British theorists including Jacques Derrida, Jean-François Lyotard, Bernard Stiegler, David Wills, Geoffrey Bennington, Richard Beardsworth and Simon Critchley have referred to a collective, constitutive human exposure to something tentatively called `originary technicity'. This difficult and awkward technical term shies away from any simple substantive definition. Keith Ansell Pearson outlines it in these terms:

> Current continental philosophy contends that the human is necessarily bound up with an originary technicity: technology is a constitutive prosthesis of the human animal, a dangerous supplement that enjoys an originary status. (1997, 123)

He refers to Derrida's work, which from time to time invokes the notion of originary technicity. Since it directly links originary technicity to corporeality, the following from Derrida is relevant:

> The natural, originary body does not exist: technology has not simply added itself, from outside or after the fact, as a foreign body. Certainly, this foreign or dangerous supplement is `originarily' at

> work and in place in the supposedly ideal interiority of the `body and soul'. (Derrida, 1993, 15)

One tack we could take on this quasi-concept of originary technicity is to say that it concerns the status of the body as a body. It may not be possible to think of a body *as such* because bodies are already technical and therefore in some sense not self-identical or self-contained. In *Specters of Marx,* the point is developed further:

> [W]hatever is not the body but belongs to it, comes back to it: prosthesis and delegation, repetition, differance.... To protect its life, to constitute itself as unique living ego, to relate, as the same, to itself, it is necessarily led to welcome the other within (so many figures of death: differance of the technical apparatus, iterability, non-uniqueness) (Derrida, 1994, 141)

If there is no non-technical body as such, what we call a living body will have and has already had to admit `others within'. A body might have to be approached under the general deconstructive rubric of iterability. Distinguishing the dynamics of originary technicity from the dynamics of technology as they are usually understood, Geoffrey Bennington observes, The dynamic of technicity will thus be the dynamic of the prosthetic — and thereby the human as non-proper supplementarity — in general (Bennington, 1996, 181). (It would be possible to cite formulations from Richard Beardsworth and also Simon Critchley that make the same point (Beardsworth, 1995, 1998; Critchley, 1999)). The mutability and eventfulness of technology should be neither approached as autonomous agent nor found entirely wanting in dynamism compared to the living. Most explicitly of all, Bernard Stiegler has expansively argued in his multi-volume work, *La technique et le temps* (Technology and time), that the notion of originary technicity draws out certain implications of deconstructive thought that have been more or less overshadowed in its literary and philosophical reception (Stiegler, 1994, 1998). Rather than treating technology as textual, all of these deconstructive treatments suggest that textuality, discourse, meaning and life more generally, is already technical without being, for all that, technologically determined. The line they mark between the technology as discursive entity and technology as globalizing ordering of communication and production is complicated, unstable and divisible.

In terms that markedly stray from this strongly Western European, deconstructive approach, I think that the feminist historian and theorist of science and technology Donna Haraway points to something similar when she writes, `I define corporealization as the interactions of humans and nonhumans in the distributed, heterogeneous work processes of technoscience' (1997, 141) or `the body is simultaneously a historical, natural, technical, discursive and material entity' (p. 209). She could be understood as saying that what we take to be a body is not only inseparable from technologies (or `technoscience'), but dynamically engendered in the interplay of disparate actants. The important point, highlighted in the second citation, is that bodies figure as sites of complication, intersection and heterogeneous collective processes. The sociologist of science and technology, Bruno Latour, also strikes out in this direction at times, when he writes, for instance, that `there is no sense in which humans may be said to exist as humans without entering into commerce with what authorizes and enables them to exist (i.e. to act)' (Latour, 1994a, 45-6); or, `even the shape of humans, our very body, is composed in large part of sociotechnical negotiations and artefacts' (p. 64). Again, as in the deconstructive accounts, stress falls on living bodies as the domain in which what it is to be human encounters something other, and finds itself in 'commerce' with an enabling other.

It is worth noting how many of these formulations directly and inextricably associate living bodies with technical action. The association is more than an external linkage between bodies and technical artefacts. The adjective `originary', as some of the quotes just given indicate, is one way to describe something more unnerving and unlocatable than merely strapping on, implanting or even injecting gadgets into living bodies. By now, `originary' has become familiar shorthand for the deconstructive logic of the supplement. The logic of the supplement describes all those situations in which what was thought to be merely added on to something more primary turns out to be irreversibly and inextricably presupposed in the constitution of what it **is** said to be added on to. Derrida writes in *Speech and Phenomena:* `the

strange structure of the supplement . . .: by delayed reaction, a possibility produces that which it is said to be added on' (Derrida, 1973, 89). If, as an earlier quote from Derrida indicates, technology can be seen as a `dangerous supplement', we may be justified in saying that the apparent `adding on' of technology to living bodies has a complex temporal structure. It may be necessary to think about technicity in relation to time. This will be the other direction in which originary technicity takes us: towards an engagement with technology as temporal, or more correctly, as temporalizing. To speak of the inextricability of bodies with technology is also and always to speak of time.

WHAT DOES TECHNOLOGY SUPPLEMENT?

What is supplemented by technicity (a term whose specific meaning will soon be discussed)? In nearly all the formulations I have quoted, it is `the human animal', `humans', or `the human'. More generally, it is `life' or `the living.' Now according to the logic of the supplement, if technicity supplements the living, the non-technical does not simply precede the technical. Conversely, technologies are not simply added on to cultures, for instance. So for instance, an essential human capacity to use tools cannot pre-exist the development of those tools (see Chapter 2). Originary technicity implies that the non-technical entity, the `who' or the human, also has need of the `what', the technical supplement, in order to become who she or he is. The point would not be to posit primacy for either the technical or the non-technical, but to see how the secondary position of one term (technicity) allows the other term to both be thought and remain in some sense unthought.

One way into this difficult terrain has been opened up by Bernard Stiegler. The deep interlacing of technology and time forms the principal focus of his recent work *(La technique et le temps. 1. La faute d'Épiméthée* (The fault of Epimetheus); *La technique et le temps. 2. La désorientation* (Disorientation)). Along with philosopher Gilbert Simondon's work (to which we will turn in just a moment), Stiegler's work offers one of the most elaborate and wide-ranging accounts of originary technicity currently available. (The major critical responses to Stiegler's work available to date in English are Bennington 1996; Beardsworth, 1995, 1997, 1998.) Stiegler brings the delayed reaction implied by the logic of the supplement to the forefront. In a strongly Heideggerian vein, he argues that the relation between technology and culture is a kind of historically materialized `temporalization'. He writes:

> Technology evolves *more quickly* than culture. More accurately, the temporal relation between the two is a tension in which there is both advance and delay, a tension characteristic of the drawing-out *[Erstreckung]* which makes up any process of temporalization. (Stiegler, 1993, 43)

The term `temporalization' is Heidegger's (1962, 386-7). It would be difficult to explore it in detail here. Conceptually, it could be seen as a precursor to the logic of the supplement. The important point is that, for Heidegger, time is not an entity or substance which would simply have a past, present and future as its attributes. Nor does it designate the unstable appearances of an underlying reality. Rather, temporality is an openness or disjunction affecting every level of what exists. Temporality temporalizes itself variously. For entities who think about it, it proves particularly troublesome. Existentially, it means that we do not exist simply in ourselves, but hold ourselves open to a future that we cannot fully appropriate (e.g. I will not experience my own death), and find ourselves unaccountably affected by a past that precedes us. By analogy, Stiegler is arguing that the relation between culture and technology also in some sense temporalizes, or makes possible, a relation to future, past and present.

There are many questions that such a brief foray into technology as temporalization cannot answer. Strategically, Stiegler advances the idea that technologies temporalize rather than flatten time out. Apart from all the conceptual complications that Stiegler's work at times entails, this is a novel affirmative thesis which warrants serious consideration. For the moment, all I want to suggest is that approaching time and technology from the angle of original technicity has a better chance of negotiating the double bind than some other more conventional response approaches. For instance, technology is often viewed apprehensively as an unstoppable juggernaut. From Stiegler's perspective,

the technical runs ahead of culture, but it is not alone. It enlists humans to power its instantiation. As a supplement, it is not autonomous or intrinsically dynamic. This very complicated point awaits fuller discussion (see Chapters 4 and 5). The main idea is that when we think about originary technicity, we can expect to find a complicated interlacing of anticipation and delays. There is instability and movement at the joint between technology and culture, but this is not because either is an autonomous agent.

ELEMENTARY TECHNICITY AND DELOCALIZATION

Originary technicity brings the deconstructive logic of the supplement into play around technology. That means that when we try to decide whether humans and technologies are entwined corporeally and temporally, we cannot ground our judgements in a radically non-technical domain. Clearly, this must have consequences for the question we are tracking here. I asked: can we think through the conditions under which apprehensions (fearful, eager) of technology arise? A response informed by the quasi-concept of originary technicity would say that we can render those conditions intelligible in ways which are already marked by something technical. Thought, in other words, has its technicity. The logic of the supplement takes us a long way from ideas of technology as material artefact or ideological abstraction. It might help to explain how such abstractions gain traction. Meanwhile, the other term, `technicity', has been put aside. It can be brought forward to show how a margin of indeterminacy is associated with technology that neither belongs solely to human life nor belongs to some intrinsic dynamism of technology.

As it appears in recent French thought, the notion of technicity perhaps stems most directly from the relatively little known yet startlingly fresh and relevant work of the philosopher Gilbert Simondon. Whereas originary technicity stresses a dehiscence in concepts of the (human) subject, technicity, as developed by Simondon, emphasizes something similar in technical objects. Simondon was a student of Georges Canguilhem, and has published several books and many articles on technicity, technology, `individuation', affect and collective (Simondon, 1989a, b, 1992, 1995; Combes, 1999; Hottois, 1993; Dumouchel, 1995). When current deconstructive thought invokes the term `originary technicity', it is hard to not hear first of all an echo of the concept of technicity Simondon developed in the 1950s and 1960s, if only because the term is not often found elsewhere. Simondon initiated an important shift in perspective on technology through the notion of technicity. In drastically summarized anticipation of the consequences of his approach, we could say that the concept of technicity refers to a side of collectives which is not fully lived, represented or symbolized, yet which remains fundamental to their grounding, their situation and the constitution of their limits. Technicity interlaces geographic, ecological, energetic, economic and historical dimensions without being reducible to any of them.'

In Simondon's first book, *Du Mode d'existence des objets techniques* (The mode of existence of technical objects) (1958), the term `technicité' occurs repeatedly. The book seeks to redress a misguided opposition between culture and technology. Such an opposition may have long existed, but was less hampering when the technical objects in question were more discrete and less extensive and potent than recent or current technologies. Broadly speaking, Simondon argues that a misapprehension of the way in which technical objects exist prevents us from seeing their part in the constitution of human collectives, or in `the human'. The book also deals with the problem that large-scale technical *ensembles* (such as information, communication or transport infrastructures, biotechnological interventions, etc.) pose for thought, representation and collective life. These ensembles are difficult to represent as such because of their sprawling, distributed and often quasi-invisible existence. Simondon's response to both the opposition between culture and technology, and the problem of representing technical ensembles relied on the concept of technicity. Technicity plays a major role in re-evaluating what a technical object is, whether it be a tool, a machine or multi-system ensembles or infrastructures, and thereby opens the possibility of a conceiving collective life somewhat differently.

CONCRETIZATION AS GENESIS

What is this promising concept of technicity? Unfortunately, there is a major obstacle to answering the question quickly and neatly, and this problem arises from a core difficulty in recognizing and figuring technology within the life of a collective. The technicity of something like a handtool can be provisionally isolated from its context. A handtool is, in Simondon's terms, a *technical element*. The technicity of 'a technical element' might materialize, for instance, in the different zones of hardness and flexibility combined in a blade that cuts well. That combination reflects a thoroughly localized assemblage of practices. They are so localized as to be given proper names: `Toledo steel' or `Murano glass'. Paradoxically, such names reflect the fact that these low-technology artefacts are more de-localizable than the extensive networks of technical mediation that characterize contemporary technology. The technicity of a technical element is more mobile or detachable than the technicity of an ensemble which is always in situ. So, ironically, despite the techno-hype, the most up-to-date, high-speed technical mediations are in Simondon's terms perhaps the least mobile, the most heavily constrained and weighed down by their context. A mobile phone or wireless appliance could be understood from this perspective as a massively encumbered object. Its physical portability and miniaturization comes at the cost of an increased ramification and layering of communication infrastructure. Because they can be detached and mobilized in different contexts, Simondon says that 'it is thus in the elements that technicity exists in the most pure way' (1989a, 73). By contrast, it is not possible to directly distill the technicity of a large-scale technical ensemble. Even the technicity of a machine (such as an engine) cannot be isolated from the `associated milieu' which it inhabits. That milieu (which includes flows of air, lubricants and fuel, for instance) conditions and is conditioned by the working of the engine. In the case of an ensemble, we would need to investigate how the technicity of sub-ensembles enter into commutation, and mutually condition each other.

As its technicity is heightened, an element becomes more stable, or detachable from its context. It becomes mobile, and its effects become more iterable. It is significant that even here in the case of `pure' technicity, the technicity of an element still derives from an ensemble. The technical element carries with it something acquired in a situated, grounded ensemble. For long time, a steel blade made in Toledo had a reputation for hardness, flexibility and durability that stemmed from a combination of the local charcoal, the chemical composition of the water, and the forging techniques used. Often the technicity of a technical element (something which enters into the composition of a technical object) reflects a complicated and even globally extended technical ensemble in its own right. Semiconductor chips exhibit that kind of technicity. Also, as we will see in a later chapter, the technicity of a simple technical element such as a stone hand-axe implies intensive corporeal organization. For an isolated technical element, technicity refers to the degree of *concretization* which the intersection of these diverse realities embodies. Note that we are already in the domain of a transductive process here: technical elements possess a degree of concretization because they encapsulate a singular combination acquired in an ensemble. The hallmark of a transductive process is the intersection and knotting together of diverse realities. (The next chapter will analyse a brick from that perspective.)

Technical elements, such as a spring, a wheel, a cutting edge, a switch, a logic gate or a monoclonal antibody, embody a capacity to produce or undergo certain specific effects. The technicity of an element is heightened or diminished according to the relative independence it displays in relation to variations in context. It consists in the 'capacity of an element to produce or to undergo an effect in a determined fashion' (Simondon, 1989a, 72-3). It is that `quality of an element by which what has been acquired in a technical ensemble expresses and conserves itself in being transported to a new period' (73). Technical objects actualize or instantiate their technicity in various degrees of abstraction or concreteness.

THE PROBLEM OF ENSEMBLES

How does this relate to the question of the intelligibility of responses to technology? We have already glimpsed the implications of the quasi-notion of originary technicity. It implies a contamination of thinking about technology by technicity. I am now suggesting that Simondon's

problematization of the technicity of ensembles permits a more fine-grained analysis of why it might be difficult to orient ourselves in relation to technology. Technicity pertains to a kind of iterability associated with the *technical elements* and derived from a singular, site-specific conjunction of different milieus. Technicity can be found within different contexts broadly ranging between small sets of tools to ensembles composed of many sub-ensembles. The technicity of a hand-tool implies something different to the technicity of a telecommunications network or a semi-autonomous machine. Even if, as we will see in a later chapter, the technicity of a hand-axe cannot really be ranked *lower* than that of a supercomputer, it is the technicity of the ensemble that is particularly problematic.

As a first step in his problematization of technical ensembles, Simondon argues that technical objects need to be understood in terms of their genesis, rather than as stable objects. This is not a suggestion that we should simply take an historical perspective on technological development. Rather, he is emphasizing that the very mode of existence of machines and ensembles implies sometimes divergent tendencies which provisionally stabilize in specific technical objects. The essentially genetic existence of technical objects springs from the variable consistency or concretization embodied by different specific technical objects. A technical object lies somewhere between a transient, unstable event and a durable, heavily reproduced structure. Its degree of `concretization', to use Simondon's terms, is the technicity of a technology.[2] In these terms, a high technology can possess a low technicity. The genesis of a stable entity is implicitly a transductive process. Simondon describes technicity as `a unity of becoming' (1989a, 20), and as a network of relations:

> Technicity is a mode of being only able to fully and permanently exist as a temporal, as well as spatial, network. Temporal reticulation consists of resumptions of the object in which it is reactualized, renovated, repeated under the very conditions of its initial fabrication. Spatial reticulation consists in the fact that technicity cannot be contained in a single object. An object is only technical if it occurs in relation with other objects, in a network where it takes on the meaning of a keypoint [point-clef]; in itself and as an object, it only possesses virtual characters of technicity which actualize themselves in active relation to the ensemble of a system. (1958, 325)

Once we think about technical objects as existing genetically, technicity exists as a network of references or relays. Even if a technical element exists discretely, its technicity is deployed in relation to other elements and gestures, to other practices and institutions. Pure technicity is very elusive, because technicity endures or persists through dispersed, even discontinuous, repetitions across clusters of technical elements in interaction.

Having understood technicity in genetic terms, the reason why ensembles pose a problem for thought becomes visible. They are composed of the technicity of their technical elements. Technical ensembles assemble and organize the technicity of elements, not by forming matter. To see technical action as assembling technicities involves a specific and nuanced critique of the hylomorphic or matter-form schema that has regulated most understandings of technical action and many philosophical notions of what a body is since Plato. (This will be discussed in the next chapter; see Simondon, 1989a, 74.) However, it also raises the problem of how to think about the technicity of the ensemble. If the technicity of a technical element is already temporally and spatially reticulated, what about technical objects such as machines and ensembles? There is an almost bewildering topological and temporal complexity here: the technicity of the ensemble is constituted from the spatially and temporally reticulated technicities of its elements.

TRANSDUCTION AND COLLECTIVE INDIVIDUATION

Handling this complexity requires a final shift in the level of analysis from the problem of the ensemble to the concept of transduction. It brings us back into proximity with collective life, something we have not caught sight of for a while. The concept of transduction answers directly the problem of thinking about diverse interactions and resonances between the elementary technicities present in a technical ensemble. At the same time, it also extends to the emergence of

resonance and coupling between diverse realities. It occurs around singular points, and it is a process that highlights *metastability* rather than stability in a given context. The problem of the technicity of a technical ensemble feeds directly into the broader problem of thinking through the conditions under which anxieties and expectations about technology arise.

In his later work *L'Individu et sa genèse physico-biologique* (The individual and its physico-biological genesis), Simondon provides a kind of definition of transduction:

> This term [transduction] denotes a process — be it physical, biological, mental or social — in which an activity gradually sets itself in motion, propagating within a given domain, by basing this propagation on a structuration carried out in different zones of the domain: each region of the constituted structure serves as a constituting principle for the following one, so much so that a modification progressively extends itself at the same time as this structuring operation. ... The transductive operation is an individuation in progress; it can physically occur most simply in the form of progressive iteration. However, in more complex domains, such as the domains of vital metastability or psychic problematics, it can move forward with a constantly variable step, and expand in a heterogeneous field. (Simondon, 1995, 30-31)

Note the continuity between this definition and that of technicity. Both concentrate on ontogenesis rather than ontology. That is, technicity and transduction account for how things become what they are rather than what they are. Technicity is one important kind of transduction: that which pertains to technical objects. A technical element such as a blade, a spring, a switch or a cultivated seed resolves a divergent set of constraints within a given domain. It represents a certain degree of compatibility between them. Again, a machine embodies a technicity that pertains to a collection of elements located at the intersection of different milieus. Finally, an ensemble possesses an even more distributed kind of technicity.[3]

In *L'Individu et sa genèse physico-biologique,* first published in 1964, Simondon generalized the term 'transduction' to name any process (physical, biological, social, psychic or technical) in which metastability emerges. His interest in *ontogenesis* (that is, on how something comes to be) rather than *ontology* (that is, on what something is) stems from a mode of thought focused on a unity of becoming rather than a unity of substance. The spectrum of transductions ranges from simple iteration (as in Simondon's paradigmatic example of a physical transduction, the growth of a seed crystal suspended in a liquid) to constantly varying rhythms oscillating in a field structured by differences and repetitions (as for instance, in affect and thought). Transduction arises from the non-simultaneity or metastability of a domain, that is, in the fact that it is not fully simultaneous or coincident with itself. Boundaries, singularities and differences underlie transductions.

This means that living things can also be understood transductively. (We should note first of all that transduction has specific meanings in recent biology. As we will see in the last chapter, in the 1950s molecular biology began to speak of 'transduction'. Cell biology has also developed a specific meaning for the term `signal transduction'. In molecular biology, it named a specific event in which a virus carries new genetic material over into the DNA of bacteria. Viral transduction prefigures the forms of genetic manipulation currently under intense development.) Non-living individuation, while transductive, always occurs on the surfaces or boundary between the individuating entity and its milieu. The planes on which the crystal grows are always on those surfaces of the crystal in contact with a liquid. Life is transductive too, but involves temporal and topological complications. The living encounters information, understood strictly as the unpredictability of forms or signals, as a problem. It resolves the problem through constant temporal and spatial restructuring of itself and its milieus. It develops and adapts, it remembers and anticipates. Unlike a crystal, life can individuate (that is, develop in its specificity out of a domain of unresolved tensions and potentials) to a greater or lesser extent by becoming information for itself. It possesses interior milieus. It is as if a crystal could become a medium for its own further growth. Simondon calls that process a `recurrence of the future on the present' (1989a, 144). The living gives information to itself and, in doing so, individuates itself on the basis of a reserve of pre-individual singularities, or a field of intensities not yet organized in specific forms and

functions.[4] Finally, there would be forms of life whose collective individuations includes technicity.

THINKING TRANSDUCTIVELY: FROM TECHNICITY TO COLLECTIVE

There are still unanswered questions about transduction, and perhaps especially about transduction as a way to think through the double bind between technology as overloaded signifier and technical practices, intimately embodied and situated. The main point is that transduction aids in tracking processes that come into being at the intersection of diverse realities. These diverse realities include corporeal, geographical, economic, conceptual, biopolitical, geopolitical and affective dimensions. They entail a knotting together of commodities, signs, diagrams, stories, practices, concepts, human and non-human bodies, images and places. They entail new capacities, relations and practices whose advent is not always easy to recognize.

A transductive approach promises a more nuanced grasp of how living and non-living processes differentiate and develop. It understands the emergence of a mode of unity without presuming underlying substance or identity. Every transduction is an individuation in process. It is a way something comes to be, an ontogenesis. Importantly, transduction refers not only to a process that occurs in physical, biological or technical ensembles as they individuate. It also occurs in and as thought. Thinking can be understood as an individuation of a thinking subject, not just something that someone who thinks does. To think transductively is to mediate between different orders, to place heterogeneous realities in contact, and to become something different. Correlatively, thought which undertakes to comprehend such processes must itself be transductive if it is to accompany the constitution of individuated entities. A transductive process calls for transductive thought.

Looking back, we can now at least envisage the problem of the double bind between technology as a grand signifier and the diversity of technical practices a bit differently. The first step we took was to say that however we think about technology, there is no way we could purify any other term (human, life, society, politics, subject, ethics, truth) of its technicity. This was a very general point, but it means that anxieties and hopes concerning technology can be read critically, even deconstructively. They themselves are already technically mediated. Our second step was to quickly traverse a finer-grained account **of** technicity drawn from Simondon's work. Technicity is a concept that diffracts technical objects into a network of temporal and spatial relays. The mode of existence of technical objects is genetic. It involves delocalizing and localizing vectors, and it moves between unstable events and durable structures. In particular, technicity flags the problem of representing the mode of existence of contemporary technical ensembles. The third stage was to say that thinking about technicity opens on to a wide-ranging style of thought focused on individuation, or on the emergence of new capacities in the intersection of diverse domains.

The question I posed was: can we think through the conditions under which technology becomes something to be apprehended fearfully as an alien or hopefully as a saviour? Thinking transductively about this problem entails suspending any prior, separate substantial unity in either technology or the collectives (societies, cultures, civilizations, etc.), and attending to the processes that separate and bind them. This is easy to say, but how does one do it?

SINGULAR EXAMPLES, GENERAL CONCEPTS?

Each of the following chapters traces a thread held in tension by the double bind. Each one takes some idea, figure, perception, experience **or** affect associated with contemporary technology (speed, power, autonomy, complexity, pleasure etc.), and shows how that double **bind** between technology as overloaded signifier and concrete practice applies to it. From another angle, the chapters of this book can be **seen** as plotting a path through recent philosophemes. The chapters **take** general concepts such as body, materiality, time, community, individuality and life, and engage with them through singularities or **key** points of technicity in contemporary collectives. Examples such as **a** brick, a seventeenth-century pendulum clock, a supercomputer, a pre-hominid hand-tool, a performance by the artist Stelarc, an online computer game, a satellite navigation system and a genomic database

have been chosen because their singularities strike me as implicated in some way in the more general concepts.

The first chapter discusses corporeality and technicity. The connections between bodies and technologies are currently under intense theoretical and practical scrutiny in many quarters (ranging from critical theory to biotech and pharmaceutical companies), not least because of the increasingly direct biotechnological manipulation of what was held to be in some sense immutable — the limits of life and death — and inalienable — the propriety or `mineness' of living human bodies. Technical practices often figure as invading living bodies, or liberating subjects from the burdens of embodiment. Representing them in this way risks losing sight of the ways in which our collectives are redistributing and reconfiguring relations between different life-forms and technical apparatuses. Even calling these practices 'biotechnology' obscures the problem to a certain extent. The technicity of these new arrangements resists formulation in terms of existing ideas of what a technology is, and it certainly poses a challenge to many theoretical accounts of embodiment. Drawing on feminist theories of the body, the first chapter develops a transductive account of corporeality. The argument develops out of the more abstract formulations of originary technicity encountered above: what we take to be a body is already in some sense technical, and therefore bodies and technologies couple in ways that are a little more complicated than any simple version of technology as organ extension suggests. By taking into account some of the ways bodies are constitutively and intimately technical, it might be possible to offer an altered account of the propriety of the living body, one which begins to orient itself with respect to fears of a loss of corporeal propriety. The complexity of modern technology is often contrasted with other so-called `primitive' technical practices. Thinking transductively about embodiment undercuts the self-evidence of that contrast. Such contrasts can obscure the historical-collective existence of technologies.

The second chapter contrasts two historical limit cases: that of stone hand-tools used by proto-hominids and the supercomputers used in nuclear weapons design. These artefacts are not disinterested examples. Hand-tools figure strongly in discourses concerning hominization. They have functioned as a kind of limit-term between nature and culture in philosophical, social-scientific and popular accounts of human origins. **M** terms of technicity too, they exemplify limits. The hand-tool is a **technical** element radically detached from the collective in which it was produced. Nuclear weapons are another limit, but this time by **'virtue** of a massive technological ensemble developed under specific economic and political conditions during the second half of the twentieth century. Nuclear weapons systems iconize modern technology becoming autonomous, global, and out of control (Winner, **4977).** When stone axes and thermonuclear weapons are compared, **the** contrast usually loads all power and complexity on to contemporary technology. A transductive account of technologies and bodies **again** suggests an alternative to this picture. Other kinds of topological and temporal complexity need to be considered. In the case of the **handtool,** those complications concern the process of corporealization: **the** technicity of a hand-axe, and specifically its capacity to be mobilized **apart** from the sites of its production, implies patterns of gestures and **perceptions** which cannot simply be regarded as natural. In the case of **the** thermonuclear weapon, the complications concern the practices of **inscription** and calculation which participate in its technicity. The force of **the** bomb as a technical mediation is difficult to signify except in **apocalyptic** terms, but this force is intricately interwoven with an **organization** of traces and inscriptions. Just like the hand-axe, the **bomb** is embodied in a collective. The apparently relentless historical **expansion** of modern technology should be rethought.

The third chapter also relies on a contrast, but this time between a seventeenth-century pendulum clock built by the Dutch scientist Christiann Huygens, and a late twentieth-century clock system, the **global** positioning system (GPS) deployed by the United States Department of Defense. Again, the choice of example is not arbitrary. Clock-**time** surfaces in a wide stream of historical and theoretical work on **Modern** technology as responsible for a kind of loss of social or lived **tithe.** It figures as the prototype of a global technological imprinting **and** speeding-up of collective life. It would be futile to deny these **affects.** Yet viewed transductively, this way of posing the problem **moves** too quickly to separate technology and collective life. Rather **than** simply colonizing lived time, clock-time articulates a diverse **set**

of realities on each other. It brings different orders or domains into

relation in ways that neither social construction nor technological determinism can grasp. The technicity of the pendulum clock, I will argue, resides at the intersection of geographic, political, military and economic realities. Mutability, metastability and eventfulness are a direct consequence of the transductive processes associated with originary technicity. The notion of transduction has important implications for any experience of *speed*. Recent theories of technical change tend to attribute an absolute value to the speed of contemporary technology. Technological speed is regarded as assaulting subjectivity and life. Prominent theories (e.g. the work of Paul Virilio) speak of a radical break or disjunction in our experience caused by speed, particularly the celerity of media teletechnologies. The consequences are usually presented as catastrophic, apocalyptic or revolutionary. From the standpoint of originary technicity, there is a need to be careful about how we evaluate this experience of speed. As Chapter 3 proposes, drawing critically on Heidegger's work on time and technology, there can be no pure experience of speed, only of differences of speed.

The fourth chapter considers a work by the performance artist Stelarc entitled *Ping Body* and provides one way of moving more slowly around the question of speed. That work, in which a living body transduces a flow of data measuring network response times into gestures and images, shows that any experience of speed already deeply embodies a technical apprehension. There is no pure, non-technical apprehension of speed, nor any non-technical access to time.

The problem of what kinds of collective emerge from contemporary ensembles of computation and communication surfaces as an altered problem for thought in the next chapter. It takes the example of an online, real-time computer game. Computer games often count as a debased and thoroughly commodified cultural form, at least for critical theories of culture and society. They are seen as impoverishing sociality, rather than as generating new forms of representation. This blanket rejection would blind us to any constitutive role for games and play in the formation of collectives. Treated a little more seriously, these toy artefacts also figure in some of the ways in which the emergence of real-time collectives are coupled to technical infrastructures. The specific temporal dynamics and disjunctions of real-time computation and communication challenge political and cultural theory to invent different ways of conceptualizing collectives.

Finally, `life', a term threaded into the background of many different "mounts of technology, can be considered from a transductive perspective. Contemporary developments in biotechnology accentuate the key role and significance of life in technical mediations. Life in its speciated variety, and in its accumulated site-specific history of accidental mutations and variations, has become a primary resource for iopolitical industrialization and commodification. Biotechnological processes, as they have unfolded over the last several decades, have emerged in close relation to informatic and computational technologies. All of this is fairly well known. But a number of problems remain. This chapter addresses two of them. The first is how to formulate the technicity of the ensemble of biotechnical practices. The relations unfolding within that ensemble are not easy to represent, since they entwine strands of heredity, kinship, reproduction, health, property and race, to name a few, with technical systems. In Simondon's terms, the problem can be framed as one of how to think through the technicity of an ensemble whose elements are assembled from non-living and living milieus. As a way into this problem, the chapter examines how genomic information is organized and manipulated in computer databases. The genomic and proteomic databases that store and retrieve sequence data form a sub-ensemble of the complex processes of reassembly involved in biotechnology. The organization and processing of sequence data there can be read as a symptom of a specific kind of technicity. Those manipulations have a singular texture and inscriptive materiality which plays an important part in biotechnology. The second problem is more thematic, and Concerns some of the general implications of a transductive approach. The curiously half-living, half-non-living status of biotechnological mediations heightens in important ways the instability of the borderline between life and death. From this angle, biotechnology and what is happening through it might be addressed differently. Rather than seeing biotechnology as threatening the propriety of life, we might see It as making explicit some of the consequences of the technicity of collectives.

The problem addressed in the book can be formulated as a question: how can we acknowledge the powerful global extension of modern technology, with all its dislocating effects of speed, and yet remain responsive to the specific historical layering of collectives composed of humans and non-humans in that event? When Martin Heidegger (1977) talks about reflecting on the essence of technology as a way to face these difficulties, he insists on the necessity of clearing away any contamination of that essence by the merely technical. That insistence, although taken to its limits in Heidegger's work, typifies an important strand in existing responses to technology. When technologies and sociotechnical collectives are read in terms of originary technicity, it may be that this clearing away and decontamination of technology need not be pursued so relentlessly. That could be important in a number of ways. It would mean, for instance, that thought, even philosophical thought, could begin to affirm its own technicity. It would imply that our collectives could begin to articulate their own constitution and limits more explicitly. A reaction that flattens out technical mediations risks moving too quickly. *Transductions* explores some grounds on which we might move a little more slowly. It broaches some ways in which that experience of speed and change indissolubly attached to contemporary technology can also be understood as a collective slowing down.

NOTES

1. Although rarely cited explicitly, it could be argued that Simondon's work also lends impetus in several ways to the accounts of human—non-human agency developed by Bruno Latour, Michel Callon and others under the term `actor-network' theory (see Chapter 3). These accounts have been influential in recent social studies of science and technology and, more broadly, in cultural and social theory (e.g., Lash, 1999). Very importantly for this book, Simondon maintains that technicity *and* collectives need to be *thought transductively* because they are transductive processes. Any theory that responds to technicity will need to itself be transductive. (Incidentally, Simondon's notion of *transduction* as a way of understanding the temporal and corporeal individuation of living and non-living entities also surfaces in Gilles Deleuze's work (Deleuze, 1994).) Hence transduction designates both a process that lies at the heart of technicity and a mode of thought adapted to thinking how collectives are involved, as Deleuze puts it, in the `establishing of communication between disparates' (1994, 246). Transduction names the process that occurs as an entity individuates or precipitates in a field of relations and potentials. Although we could approach Simondon's understanding of transduction from various directions (including physical, biological, psychical and collective processes), the most direct path in this context is via his account of technicity.
2. **It** should be clear by now that `technicity' therefore means something radically different from `technology', understood in the usual English sense **of** the term as the loosely defined tools, machines and systems mainly associated with human, and to a much lesser extent, non-human actions. The **term** 'technologie' does play a significant role in Simondon's work, and has done in French and German thought over the last century or so, but it refers mainly to the systematic study of the transformations and correlations that characterize technical objects (Simondon, 1989a, 48; Mitcham, 1994; Siguat, 1994).
3. Even if we cannot readily evaluate the technicity of large-scale technical ensembles, we can say that technicity is in principle the temporal and spatial network of interactions between technical elements which to some degree resolves a specific disparity or incompatibility within a given domain. The notion of transduction opens unusually far-reaching connections between questions of technology, corporeality and time. It could allow both the more **or** less recent ideological loading of the term `technology' and the widely varying yet undeniable technicity of human collectives to be held in tension.

We could also approach transduction starting from technical elements known as `transducers'. The terms `transduction' and `transducer' have technical meanings in biology and engineering. In electrical and electronic engineering, transducers convert one form of energy into another. A microphone transduces speech into electrical currents. For the process of transduction to occur, there must be some disparity, discontinuity or mismatch within a domain; two different forms or potentials whose disparity **can** be modulated. Transduction is a process whereby a disparity or difference **is** topologically and temporally restructured across some interface. It mediates different organizations of energy. The membranes of the microphone move **in** a magnetic field. A microphone couples soundwaves and electrical currents.

Simondon generalized the specialized engineering usage to give a transduct-**ive** account of machines. He reinterpreted cybernetic theories of information **and** technology according to transduction, and at the same time sought to develop a richer notion of information. Unlike the cybernetic mainstream represented by Shannon, Weaver, Wiener and von Neumann, Simondon does **not** regard machines as *producers* or *consumers* of information, but as *transducers*

of information. Following information theory, he understood `information' to refer to the indeterminacy or contingency in a series of signals. (The basic idea here is that more information is communicated by an unpredictable sequence of signals than by a predictable sequence. Information theory is a way of quantifying the level of unpredictability of communications within a given context.) Devices transduce information, understood as a margin of unpredictability in a sequence of signals, into determined forms. Any device that retains a margin of indeterminacy can transduce information: 'information supplies determination to the machine' (Simondon, 1989a, 144). Information literally in-forms a machine, or imparts a form to it (or, at least, to that aspect of it which remains open to determination). When that happens, the device transduces different forms or organizations of energy. Thus in contrast to pervasive and deeply rooted modern models of mechanism which regard machines as deterministic, Simondon views the relation between a machine and its milieu as structured by localized and singular indeterminacies:

> The existence of a margin of indetermination in machines must be understood as the existence of a certain number of critical phases in their functioning. The machine which can receive information temporally localizes its indetermination in sensible instants, rich in possibilities. (1989a, 144)

A machine, from this perspective, composes an ensemble of localized *suspensions* of determination, able at certain `sensible' instants to receive information as a temporary and variable determination. It is not fully determined by any particular present since it maintains a margin of indetermination that allows it to cycle repeatedly through the critical phases. That margin opens technical action to a future. It projects into what will happen. No doubt a non-living technical object is still more or less located in the present, since it cannot transform itself outside those critical phases, `rich in possibilities'. It must stand in relation to something other than itself in order to become something else. Yet, by virtue of its technicity, a technical object (especially a machine, but perhaps even more so an ensemble of machines) does not stand fully in the present. A device can transduce information repeatedly because it *suspends* its relation to the present or, put differently, because it retains a margin of indeterminacy through which it can keep receiving information without becoming an entirely different entity. By contrast, a less technical, perhaps non-living, object such as a rock tends to irreversibly absorb or undergo determination because it lacks the suspension or temporal localization of indeterminacy possessed by a machine.

4. The term `life', especially in association with `technology', is currently heavily overloaded. Making use of the term without reference to its complex biopolitical dimensions is risky. Simondon's work does not acknowledge this situation to any great degree. However, his transductive approach remains significant. Life's transductivity is more complicated, and less linear, than the non-living physical individuation of a crystal. It is more differentiated than the transductions staged in technical ensembles since it entails growth, reproduction and usually death. Nevertheless, the notion of transduction destabilizes the hierarchy which assigns inorganic entities to a lower rung, beneath organisms. The living does not come *after* the non-living, but *during* it. From the standpoint of time, the living can be seen as a suspension of the processes of individuation that occur in non-living ensembles. Simondon writes that `vital individuation would come to filter into physical individuation by suspending its course, by slowing it down, and by rendering it capable of propagation in an inceptive state' (1989b, 150). The contrast between living and non-living emerges through the delays, or desynchronizing processes that living ensembles unleash in themselves.