# Open Codes

# Open Codes:

## *Skills, Participation and Democracy in New Technology Development*

By

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Skills, participation and democracy in new technology development.

Written by Guido Nicolosi, designed by Francesco Falsaperna.

*Technology is neither good nor bad; nor is it neutral.*
*(Kranzberg's first law of technology)*[1]

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I dedicate this book to Urbana and Riccardo Jr. They are our future and hope.

# Introduction

In the general understanding, and also in scientific practice, technology and society are viewed as two distinct entities. Related to this view is the assumption that technology and human experience are quite different and unconnected and also the idea that modernity has uprooted, de-contextualized and disembodied technical rationality. Taking a contrary approach, this study represents a theoretical exploration aimed at showing that in the domain of technological development, there are significant margins for maneuver in which to recuperate and valorize human and social action.

As a work of theoretical sociology or social epistemology, this book approaches its subject from the theoretical background of the philosophy and sociology of technique. The historical and conventional assumptions of this theoretical background, it is argued, have been and continue to be characterized by a hegemonically defined essentialist paradigm. This paradigm has been fiercely counteracted by two opposed approaches, *critical theory* and *pragmatism*. The present work combines these approaches, usually considered mutually incompatible, for the development of a new theoretical gaze or perspective. The aim has been to engage in a theoretical research oriented to a new *philosophy of praxis* in order to instigate a critical and constructivist approach to technology. The main result expected of this work is the provision of a problematized and multifaceted semantic map leading to a multidimensional conceptual re-integration of skilled experience in human technical action.

**Chapter 1** comprises the methodological presentation of this research. It introduces the problem statement and the research questions, the thesis structure and the rhizomatic method of this work. It is also explained the conceptual process leading to the selection of the unit observation (skills).

**Chapter 2** explicates the theoretical background to the research. The *first section* discusses the hegemonic determinist paradigm (an essentialist inclination) within the field of the philosophy of technique that has sought to demonstrate how *the passage from technique to technology* (from ancient

to modern society) has brought about the understanding of *the separation of the role of experience and human acting* (hence of perception, action, intentionality and praxis). In its idealized form, this underwrites the narrow interests of elites, while the darker version presents dystopian visions of alienation and apocalypse. At the root of this paradigm is an analysis of modern technology as having i) disembedded and detached technique from the social and cultural fabric that had safeguarded it for centuries, and thus ii) rendered it an autonomous *corpus*, a neutral and independent ensemble, linked to "inner" logics and dynamics and answering exclusively to linear principles of efficiency, effectiveness, functionality and rationality.

The *second section* briefly overviews the philosophy of praxis, with the intent of showing that this may offer a real alternative to the determinism of the essentialist paradigm. It is suggested that it was precisely the sidelined concept of praxis that Marx's thinking had set center stage in his critical analysis of technique, and that this led to a logical paradox in the history of Western thought which continues to heavily condition philosophy: technique, the essence of man, expands in modernity out of all proportion, to end up by negating man in his essence. The *third section* explores how the paradox has transversally conditioned not only conservative currents of thought but also progressive ones, with particular reference to the Frankfurt School, which has been very influential in the social critical thinking of the Left. This influence, it is suggested, has damaged the revolutionary potential of the philosophy of praxis that the Frankfurt School, as a neo-Marxist tendency, should have developed and diffused.

The *fourth section* discusses how Andrew Feenberg's thinking has brought *a* philosophical vision to the field of the analysis of technique that is able to rehabilitate Marx's concept of praxis and thereby introduces a possible way out of the blind alley of needing to choose between the two unsatisfactory visions: the determinism of the philosophy of essentialist technique or the insufficiently critical potential of constructivism. Constructivism recognizes the fundamental role played by society in determining the very nature of technique but has a limited vision of social conflict mediated by science, technology and technical expertise. Sagaciously combining the anti-essentialism of constructivism with the analyses of socio-political dynamics linked to power relationships and class conflict produced by the Frankfurt School, Feenberg has managed to revalorize the role of experience and praxis in technical action. This is a revaluation, moreover, oriented to supporting the possibility of changing technological development in the direction of a

*democratic rationalization* and a greater *participation from below* (bottom up). Finally, the fifth section introduces the new theoretical perspective of a critical pragmatism oriented to stimulating a new materialist philosophical orientation that emerges from a fecund (albeit difficult) encounter between the anti-essentialist current of critical theory and pragmatist philosophy.

**Chapter 3** investigates the possibilities of a *bio-anthropological foundation* that can explain and justify the importance of experience in human culture and presents an overview of a contemporary epistemological paradigm that seems to be able to represent such a foundation in the life sciences. The paradigm suggested is that of *epigenetics and its conception of the organism*, regarded as scientifically supporting a socio-anthropological idea of man as a real *being-in-the-world*, an intentional body that lives out a relationship of reciprocity with the surrounding environment (physical and social).

The last three decennia have seen an intensive debate in science and wider society on the development and impact of genetics and genomics. This debate had important scientific, philosophical, economic and symbolic implications. The general assumption of the third chapter is that in spite of the wide range of actors and institutions (scientists, politicians, churches, bio-ethicists, etc.) animating this discussion with a variety of (often opposing) views, the debate in itself takes place within a hegemonic scientific and cultural framework built upon specific conceptual interpretations of life that demands the development of a critical reflection. This chapter reflects both on the basic epistemological pillars of this hegemonic paradigm and on the emergence of a new scientific and epistemological turn that leaves the gene-centric paradigm in serious crisis.

**Chapter 4** presents a reflection on the advent of modern technology, focusing on a discussion of whether this has really ended the relationship between bodily experience and material reality, or whether, in fact, an innovative and skilled handicraft experience of the world still exists in the context of contemporary technological developments. This chapter thus represents a *socio-anthropological* approach to the subject at hand, with the approach being informed by two different theoretical contributions or perspectives.

Supported by the work of British anthropologist Tim Ingold, the first perspective highlights the "ecological" principle according to which it is never a single organ (quintessentially, the hand) that represents the privileged locus of technical skills, insofar as these are generally nested within a "tech-

nicity", namely, in the particular alignment (tuning) between corporeity, the situational context and the materials and tools used. Supported by theoretical contributions of a pragmatist and phenomenological inclination, the second perspective here seeks to illustrate how the reduction of the manual dimension of work (whose demise is seen, in fact, as highly improbable) does not necessarily imply a complete retreat of the innovative nature and singularity of action preserved in human experience. For this reason, the development of mechanical and electronic technology—including, now, the digital—has not, in fact, brought about many of the pessimistic prophecies that over the years have foretold the end of creative handicraft skills tied to the expert use of tools.

The line of reasoning developed aims to highlight that, if technicity is not defined in terms of a single organ representing the privileged locus of technical skills (since these are, in fact, linked to the tuning of our body with the surrounding environment), then the advent of modern technologies cannot do away with such a locus in absolute terms by transferring it to a technological design encapsulated in a set of rules and defined algorithms. Indeed, the user is still and will always be a body operating within a context. Moreover, as is stressed using insights from Richard Sennett, the advent of new (digital) technologies is actually opening up interesting potential margins of recovering a dynamic feedback between operator, tool and environment (the physical and social). And while dextrous (finger) manipulations may characterize this at present, it is surely no longer primarily centered on the manual and corporeal dimension of the gesture (which indeed can be re-valorized) so much as on the intellectual and socio-relational dimension of design. The consequence of this argument is that today there are (at least potentially) relevant theoretical and practical margins around the hegemonic center within which to stimulate a recovery of the value of experienced and skilful technical action.

**Chapter 5** presents a concrete case through which it is possible to perceive and develop this room for maneuver to recover and give value to experience and social skills in modern technical action as proposed in the argument of the previous chapters. The relevant literature for this chapter is anchored more to a *socio-political analysis*, primarily because the rediscovery of skills and experience within technological innovation processes inevitably oblige us to reflect on the issue of *participation*. Thus, the question is addressed of whether these practices give voice to the possibility of a better *democratization of technology*. In particular, focus is placed on a specific

technological practice, that of open source, as potentially paving the way to a new participatory development model of technology, one that is more democratic and open to human action. This model is able to establish a participatory approach that makes the hegemonic "technical code" discussed by Andrew Feenberg an open entity in which it is possible to realize creative processes, including those of re-appropriation designed to literally re-invent used technologies.

This chapter attempts to apply the participatory re-appropriation principles to the emblematic and controversial case of *biotechnology development*. In particular, it is suggested that there is room for maneuver in order to conceive of and also materially produce *re-skilling practices*. The argument made is that it is possible to develop practices aimed at the *re-encapsulation of technology within social relations*, practices aimed at an *empowerment* of communities and the participatory and shared rehabilitation of technological production ex-ante and with the aim of supporting a more *democratic endogenous development* that has the potential to more closely *bind technological innovation to the goals of social sustainability* and reduction of inequalities.

**Chapter 6** concludes by reviewing the study structure and key issues and presenting the main conceptual results as an original semantic map. The particular value of this map lies in its visual presentation of semantic links and connections among the issues developed. As a second main aim, this chapter also engages in a general discussion aimed at sketching out new questions representing proposals for future lines of research. This overview critically defines the outline of a theory of democratization of technology related to the advent of open source. Specifically, it looks forward to the possibilities for re-skilling practices as a new form of democratic participation based on the social sharing of technology. These questions are related to anthropological, sociological, philosophical, political and ethical domains of reflection. Issues discussed include reciprocity, technical creativity, self-exploitation, technological elitism, do-ocracy, mutualism, open-source unionism and ethical-governance reconfiguration. Finally, a brief synopsis is provided linking all these possible research directions to the democratic implications of open source re-skilling practices.

# Chapter one

## The concept of experience

This work has developed within the on-going scientific and socio-political debate on the issue of the relationship between technology and society. In common understanding, and also in scientific practice, these are very often viewed as two distinct and quite separate entities. Against that, this study presents a theoretical exploration aimed at showing that there are significant margins within which to maneuver in order to recuperate and valorize human and social action in the sphere of technological development. The principle of interwovenness between technology and society has been an important contribution of the sociology of science and technology. It has enabled what in sociological terms is usually referred to as the debate on the "social construction of technology". This issue, therefore, is not new or original, but rather a major and ongoing debate that has characterized social studies of science and technology (STS studies) for some forty years on. Thus, the "interwovenness" principle seems to be broadly accepted nowadays in humanities and social sciences. Nevertheless, if one looks at the way in which technology is developed by engineers and technicians and applied in policy (sometimes also by sociologists and philosophers)—that is the *practice* of science and technology development—it seems that this principle may indeed be formally recognized within one field but substantially denied or misunderstood in another.

It is important to emphasize that although STS studies have been able to express this interwovenness, the politico-economic aspects of technology development have tended to be neglected. They have been deeply elaborated, but in a rather essentialist and determinist way (as I will discuss in Chapter 2). For this reason, I think, a critical reflection on the issue of the interwovenness remains important; in particular, it is necessary to explore the margins of human and social action in the technology of today. One objective of this work, therefore, is to make a contribution to the actual interwovenness debate, indicating that a new cultural horizon is needed to

reflect critically on technology-society interaction, especially on the relationship between human experiences and technology design.

This new cultural horizon is explored by analysis of the role human experience plays in technical action. This focusing on human experience is directly inspired by Andrew Feenberg's teachings on technology. In supporting his thesis of the possibility of a democratic rationalization of technology, Feenberg aims to develop Marcuse's argument of the need to reconcile the rationality implied by science and technology with experience of the *lifeworld*.[2] For Feenberg, science and technology should also be constrained by values and human needs recognized in experience and validated in political debate. In this, Feenberg seems to be recovering the phenomenological approach of Gadamer and Merlau-Ponty who, while not wanting to endorse an impossible and regressive re-enchantment of nature, did want to defend the role of experience against the naturalistic reductionism of science and technology in modern society (Feenberg, 2010: 208-10). It is clear that demonstrating the possibility of reconciling experience and technology means opening significant margins within which to maneuver in order to recuperate and valorize human and social action within the sphere of technological development, democratic participation and potentialities included (as considered in Chapter 2).

Thus, the main area of critical reflection in this book is on "human experience and technology". The reflection is guided by the following key issue: Have technology and human experience really become two mutually exclusive entities? This theoretical question will be discussed from various perspectives, developing a socio-anthropological and socio-epistemological research that proceeds from a specific social *unit of observation*, that of *skills*.

## 1.1 The concept of experience and research methodology

### 1.1.1 Skills, lifeworld and the sociality of technical action

In taking skills as the specific unit of observation of this work, I am obliged to underline that the main object of this work is *not* skills. I do not want to develop a research model or paradigm for skills. Rather, I will "use" this category in an "instrumental" way, employing skills as the main indicator of a more general dimension of investigation: *experience in technical action*. In order to explain the reason for this choice of instrument, I use a classical

conceptual distinction made within the methodology of social research.

In quantitative and qualitative social research, there is a difference between the *unit of observation* and the *unit of analysis*. The former is described by the data one analyses, whereas the latter is the major entity that is being analyzed, the "what" is being studied. The two should not be confused. A study might, for example, work with a unit of observation that is situated at an individual level but have as the unit of analysis something at a neighbourhood level, and thence drawing conclusions on neighbourhood characteristics from data collected from individuals. In the case of the present work, since it is focused on delivering theoretical insights, the focus is not on collecting empirical or statistical data. Nevertheless, I will collect conceptual data produced by the unit of observation of skills, with the aim of drawing more general theoretical conclusions on the unit of analysis (experience in technical action).

But why skills? In the epistemological point of view of ancient Greek culture, experience was expressed with the word "ἐμπειρία" which coupled the terms "ἐν"/ "ἦν" (inside) with "πεῖρα" (practice). This meant that with experience, according to ancient Greeks, man was able to essay or practice reality from within. This etymological meaning expressed a vision of knowledge open to personal and social (and also contingent) experience.[3] The scientific revolution of modernity split these two formerly interwoven domains (rationality and experience). Today, in the hegemonic mainstream meanings, ends, practices, traditions, that is *sociality*, are considered as subjective, non-rational, non-scientific, against which there is nature, means, abstraction. No mediation is accepted.

This work, on the contrary, refers to an idea of experience linked to the concept of *lifeworld*. For this reason, I discuss the *sociality of technical action* and interwovenness of these two domains (rationality and experience). In order to do this, from the methodological point of view, a sort of operationalization[4] process of the concept of "experience in technical action" is developed (Fig. 1-1).

This diagrammatic representation expresses the semantic operationalization of the concept of experience (as referring to technical action). The different rings express the different level of abstraction: the more external the ring, the more general the concept considered. The generality of the concept of the first (outer) ring (experience in technical action) is reduced in the se-

cond ring, where it is specified in more concrete terms as social quality (of technical action). Specifying that social quality of technical action suggests analysis in more concrete terms as the classical concept of *habitus* (or *hexis*).[5] This conclude in more operational terms with the analysis of the concept of skill in the final ring, a concept endowed of concrete, visible and measureable social characters.

This operationalization process and the final choice of adopting skills as the main unit of observation is deeply influenced by the work of the French anthropologist Marcel Mauss. Mauss indicated the existence of an inseparable link between man and technique, affirming that it is the human body that is the first *technical means* we have at our disposal, and that it is this which we must learn to master in order to survive:

> I made, and went on making for several years, the fundamental mistake of thinking that there is technique only when there is an instrument. I had to go back to ancient notions, to the Platonic position on technique, for Plato spoke of a technique of music and in particular of a technique of dance, and extended these notions.[6]

For Mauss, technique is a traditional (social) and efficient (productive) action perceived by the actor as an action of a mechanical, physical or physical-chemical order. The body is the first instrument of man, his first technical object. The primary form of technique is therefore that of the body. Skills are guided by a *habitus*, Pierre Bourdieu's conceptual development from Aristotle's *hexis* indicating an ensemble of culturally transmitted, enduring dispositions, anchored to the human body (Bourdieu, 1980).[7] More recently, François Sigaut (2007) has confirmed this principle of fundamental association between technique and the body, reminding us that the etymological root of the term *organ* (of the body) is the Greek word "*ὄργανον*", meaning "tool".

Here, technique is understood as that which employs tools other than (additional to) the body. It is assumed that it develops from this fundamental relationship, known by terms like "skill", "ability" and *savoir-faire,*[8] and that it is linked to qualities such as perception, action, intentionality, corporeity and context. These elements will thus reappear frequently during this reflection: analyzing technique, as I see it, means starting off from these. Highlighting the relationship between these phenomena and technique in itself involves a demonstration that technique and society are not separate

entities. Indeed, technical skills are not the property of any single body, but are qualities arising from the entire system of relationships that constitutes the presence of an agent in an extensive and structured physical and social environment.

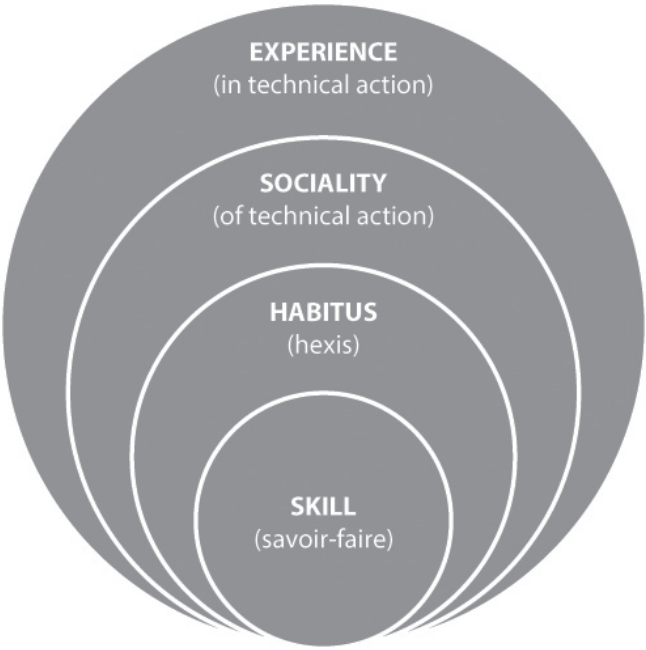


Fig. 1-1 Operationalization process of the concept of "experience in technical action"

### 1.1.2 Transdisciplinarity, the encyclopaedic approach and semiosis

But if the interwovenness of technique and society can be easily understood on the basis of these very common and (in sociology) shared evidences, why another work on this issue? As emphasized above, although in sociology the principle of the "interwovenness of technology and society" is accepted, this principle seems to be somewhat confined to and within that discipline. Moreover, STS studies, which were born as a *field* of interest with a strong interdisciplinary orientation, nowadays seem having acquired a new disciplinary configuration, with its own exclusive borders and gate-keepers (schools, masters, literatures, etc.), with a closed jargon and with

a rather poor critical gaze.

There is still a huge lack in interdisciplinary research with the philosophical and sociological debate on this issue apparently remaining within the narrow limits of single disciplines and even research areas (humanities, social sciences). At the same time, interdisciplinary research is itself not always able to overcome the limits of mutual understanding and communication. Interdisciplinarity may easily be—often is, or at least seems to be—a communication between deaf people. The communication is generally simulated for satisfying ministerial requests of bureaucrats and the desire for the display of innovative medals. However, everybody knows that really careers, power and professional satisfactions are still assured within the reassuring (single) disciplinary borders (publications, journals, committees, appointments, etc.) and suchlike.

It is clear that a new cultural horizon is needed. With this work, I try to suggest that a possible way forward is represented by the idea of trans-disciplinary research. Actually, trans-disciplinary research means that individual researchers should themselves make an effort to overcome disciplinary isolation through their own border crossings in order to emphasize the principle of the *unity in diversity of human knowledge*. This requires a huge effort, however, a passage across inhospitable lands that is certainly difficult and may seem dangerous. Despite these risks which are several—including accusations of and resistance to presumed field invasions, ambitious pretentions, jealousies, criticisms of inevitable oversimplifications, difficulties in managing unknown concepts and terms, reduced margins for empirical research, etc.—trans-disciplinary research is nevertheless a risk worth taking.

From the epistemological perspective, trans-disciplinary research should be based on a particular "picture" of knowledge. Particularly, trans-disciplinary research assumes knowledge to be a semantic network of meaning that can be hardly organized in a well-structured hierarchy of linear matches. Rather, knowledge is based on an unsteady, precarious and always contextually reconstructable network of semantic associations. This *implies a different methodology of inquiry* as provided, for example, by the so-called *encyclopaedic approach* which has been widely represented and described by Umberto Eco (1984) in terms of an opposition to the so-called *dictionary-like approach*.

The dictionary informs and defines a particular metaphorical representation

of knowledge based on the figure of the so-called Porphyrian tree (*Arbor Porphyriana*), a conceptual device intended to illustrate the "scale of being" (*scala predicamentalis*) elaborated by the Greek logician and philosopher Porphyry (Fig. 1-2 and Fig. 1-3).

Porphyry elaborated this "device" for presenting the Aristotelian classification system through a tree-like diagram based on dichotomous semantic oppositions. This device is considered the main model of the so-called "dictionary-like semantics", a classification system implying a "fall" from "genus to species", based on a formal, linear and hierarchical system of linkages between categories. This model usually informs the hegemonic methodology of (disciplinary) scientific research.

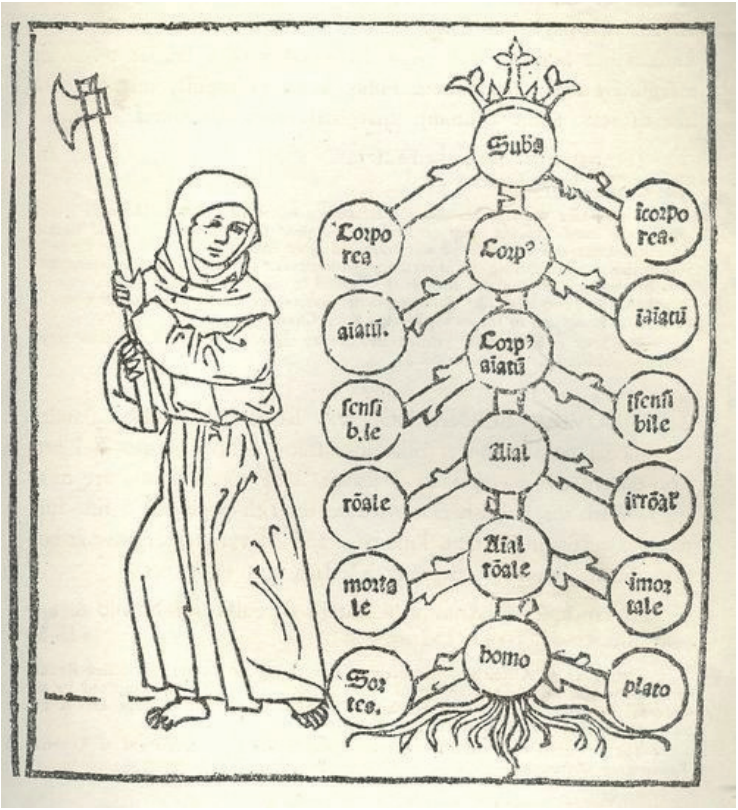


Fig. 1-2 Porphyrian tree (Arbor Porphyriana)

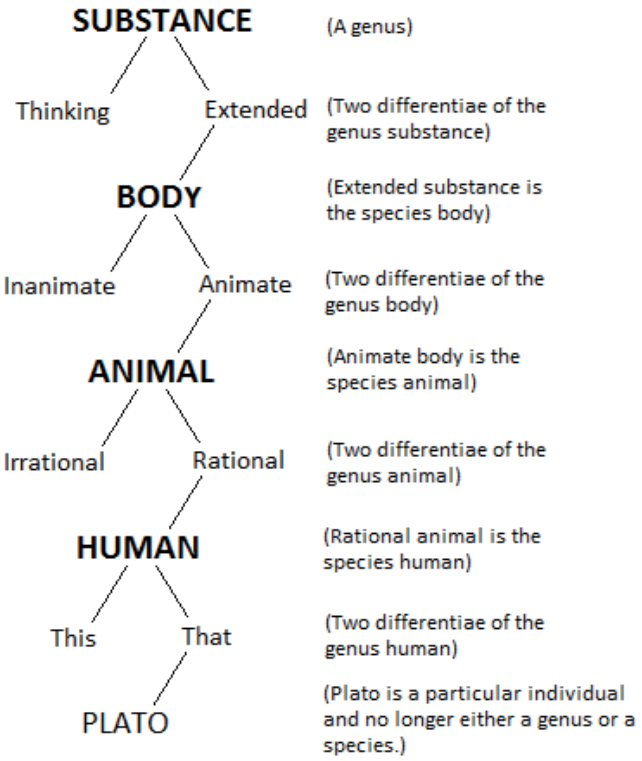


Fig. 1-3 Porphyrian tree

In opposition to this epistemological and semiological model, Umberto Eco presented a new model broadly inspired by Peirce's Theory of Signs (semiotics). Eco speaks of a *dynamic object*, the object itself, which we cannot never fully "grasp" because we never have a complete, comprehensive and total vision of reality. We can only ever see reality from a certain point of view. This way in which we see things, "caged" within our cultural system, is the so-called *immediate object*. But anything can be a sign as long as someone interprets it as "signifying" something, and signs can and must be interpreted. This interpretative process is termed semiosis and in Peirce's theory it is considered to be unlimited. Actually, when we meet a "signifier"[9]—a "*representamen*" in Peircean terms—a process is initiated

that leads to our interpretation of the representamen through another sign (Peirce calls this new sign: the "*interpretant*"). This last is another cultural unity useful to interpret, but one that will, in turn, call another interpretant, leading to a series of successive interpretants (potentially) ad *infinitum*.

For this reason, according to Peirce, the meaning of a representation cannot be anything but a representation. Any initial interpretation can be re-interpreted and so *semiosis* is not considered a *structure* but a *process*. In this idea of semiosis neither universal semantics nor metalinguistic entities are allowed. Here, the system is based on an indefinite series of content units that are mutually defined and with a different nature but without being hierarchically ordered. These units cannot be classified as essential or ancillary. Eco defines this system an "*encyclopedia*". Indeed, operationally and occasionally, within this system, local trees of meaning can be isolated. But the system has the complex structure of a *rhizome*, that is a network in which all the points are, more or less, directly connected to each other.

### 1.1.3 Rhizome semantics

The rhizome is a special kind of root (a subterranean stem of a plant usually found underground) that can penetrate soil due to a horizontal extended movement. In botany, this root is considered as opposite to the usual taproot growing downward vertically and in-depth. It became an important metaphor in philosophy as a result of the work of Deleuze and Guattari (1980). Referring to human knowledge, they opposed it to an arborescent conception of knowledge, which works with dualist categories and binary choices. A rhizome works with planar and trans-species connections, while an arborescent model works with vertical and linear connections (Fig. 1-4 and Fig. 1-5).

The rhizomatic method is particularly interesting. It opposes the idea that knowledge must grow in a tree-like structure from previously accepted ideas. New thinking need not to follow established patterns. It is interesting to notice that, as is clear from Fig. 1-3, the horizontal extension of the root not exclude the possibility of in-depth vertical movement. Using a process of analogical and semantic associations, a rhizomatic method of knowledge can help in creating an intellectual and semantic map whose originality consists just in the coupling of concepts usually kept separate. This is what is attempted in this book coupling, for example, *epigenetics* (bio-anthropological dimension) with *technicity* (socio-anthropological dimension) and

*open source* (socio-political dimension).

This semantic model is usually rejected because it challenges the myth of *expertise* of a defined and complete set of technical knowledge about a specific issue, idea which is directly linked to the tree-like structure of knowledge.[10] The rhizomatic model of knowledge requires a set of different research techniques reciprocally intertwined. The first technique is to use a language that is both logical and analogical through the use of so-called *nomadic concepts.*[11] For the purpose of this study, the concept thus employed is that of *epigenetics*, which has been already used very fruitfully in robotics.[12] The second technique is anchored to a process of comparing different literatures of different domains. Here, what is original is not the object of analysis in itself, but the process of comparing issues, concepts and literatures. In this work we tried to follow these methods and the three main chapters mirror this methodological effort.

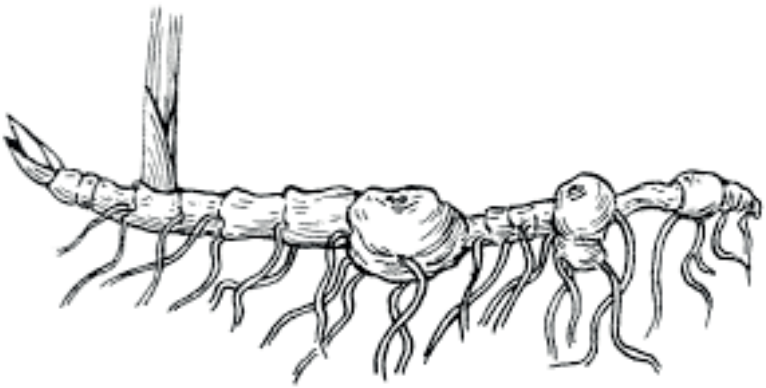

Fig. 1-4 Rhizome

## 1.2 Problem statement and research questions

While this book deals with the problem of the relationship between technology and society, it does so by developing research firmly grounded in the theme of the role of human experience in technical action. Moreover, it starts from the position that the root problem for any analysis of the so-called technology-society relationship concerns the definition of a specific per-

spective from which to examine such a relationship. For this reason, the primary objective is to develop this very perspective. Essentially, the aim is to combine a rhizomatic and associative working methodology in a novel fashion, together with a certain theoretical sensibility (outlook) which may be called "*critical-pragmatic*" (Chapter 2).

My hope is that this combination may enable a conceptual map to emerge from three selected access points—bio-anthropological, socio-anthropological, socio-political—which can then highlight and endorse the need to reassess the importance of human praxis in technical action.

The originality of this work consists, then, precisely in the associative combination of the elements in the making of this conceptual map, since it is with just this combination, I suggest, that we may express the specific perspective referred to.

Fig. 1-5 Taproot

In the light of this outline, the key problem of the research is to develop a theoretical perspective by which human experience can be reintegrated in technical action. The core problem is thus to contribute to the development of a new outlook (perspective) in which the role of human experience, praxis and skills in technical action can be re-evaluated, leading to a process of *bottom-up democratization of modern technologies*.

The main problem defining this focus is the possibility of understanding the ways and degree to which technology and experience (in the socio-anthropological and operating terms defined up to this point) have become two mutually exclusive entities. In order to do this, I will investigate how the primary relationship between body, society and technique has been transformed by the advent of modern technology and what kind of challenges this change implies.

This provides the overarching theme for reflection developed in the next chapters which are guided by the following three "study questions":

1. What is the bio-anthropological explanation and justification for the importance of experience in human culture? And is there an epistemological paradigm able to represent such a link in life sciences today?
2. What kind of socio-anthropological data can help us understand whether and to what extent the relationship between corporeal experience and material reality is still relevant in defining the idea of technicity?
3. Which practices of technological development are in a position to concretely recuperate human skills in the processes of technical innovation? And how can such practices be the advocates for a greater democratization of technology?

Together, these research questions provide a tool with which to critically investigate the main focus of the work from three different but complementary perspectives of analysis: the bio-anthropological, the socio-anthropological and the socio-political.

## 1.3 Overview

Chapter 2 presents the theoretical background of this work. The main aim is to show that this background has been characterized by the existence of an "essentialist paradigm", one that traditionally influenced the philosophy and sociology of technique. This, I argue, shaped a dystopian distortion of sociological interpretation of technical action (Section 1) affecting progressive currents of study (Section 3). The second section describes the philosophy of praxis as an antidote to the determinism of the essentialist paradigm outlined in the first. Section 4 presents Andrew Feenberg's thinking as a philosophical vision that is able to rehabilitate Marx's concept of praxis. In addition, this chapter tries to make explicit the "perspective angle" of this research, that is the theoretical gaze and sensibility that influenced him