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The Grammar of Things

Alfred Nordmann (✉)
Darmstadt Technical University, Karolinenplatz 5, Darmstadt, 64289, Germany
nordmann@phil.tu-darmstadt.de

Abstract
This essay for the inaugural issue of *Technology and Language* programmatically proposes that „technology“ and „language“ are two sides of the same coin and that one cannot talk about one without the other. Everyone agrees that technology cannot be defined as the application of science to the engineering of specific devices. Instead, it includes all the ways in which *homo faber* has always worked to transform the naturally given world into a technosphere. And everyone agrees that language cannot be discussed without consideration of the technical media and communicative practices that make up an infosphere. And yet, our traditional ways of thinking make it difficult to treat language as a kind of technology and technology as a kind of language. Once the obstacles are removed, however, multiple research perspectives open up for linguistics, philosophy, cultural studies, and engineering. These can theoretically illuminate and practically contribute to our lives in a socio-technically multilingual world.

Keywords: Philosophy of technology; Philosophy of multilingualism; Composition; Working knowledge

Аннотация
В этом эссе для первого выпуска журнала *“Технологии в инфосфере” (“Technology and Language”*) программно заявляется, что “технология” и “язык” – это две стороны одной медали, которые неотделимы друг от друга. Не подлежит сомнению, что технологию нельзя рассматривать как применение науки для разработки конкретных устройств. Технология включает в себя все способы, которые использовал *homo faber* для преобразования первозданного мира в техносферу. В свою очередь, язык не может обсуждаться без учета технических средств массовой информации и коммуникативных практик, составляющих инфосферу. Однако, наше традиционное мышление мешает рассматривать язык как разновидность технологии, а технологию как разновидность языка. Между тем, как только это препятствие устраняется, перед лингвистикой, философией, культурологией и инженерией открывается множество исследовательских перспектив, которые могут внести теоретический и практический вклад в социально-техническое обустройство нашего многоязычного мира

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The tradition of Western philosophy and the many people who grew up within this tradition, tend to divide the world into separate spheres. These spheres interact with one another, they are complementary, but most of all, they are totally different. In this tradition, technology belongs to one of these spheres, language to the other. They cannot be united simply by placing an „and“ between them.

This is what we tend to say: It is one thing to talk and think, to learn and write, to express ideas – and quite another thing to build and make, to construct and design, to create material devices. In the division between head and hand, between mind and matter, language belongs to the former and inhabits the sphere of ideas. Philosophical commonplace assigns the work of the hand – the „manipulation“ of matter – to the other sphere of technical practice.

Technology and Language defies this tradition by exploring their interactions in many fields – teaching and communication, scientific research and artistic creation, typography and semiotics, engineering education and digital humanities, multilingualism and science fiction. It is also the place to reflect fundamentally on technology as language and on language as technology. Indeed, it may well turn out that they are like Siamese twins or two sides of the same coin, and that one cannot be considered without the other. This is what I want to argue here.

I. „TECHNOLOGY“

What is technology? There are many ways of defining it. Some of these ways keep technology separate from the sphere of mind and language, others exhibit their symbiotic relation. There is no right and wrong as we compare definitions, but some may prove more productive than others.

According to one family of definitions technology concerns our ways of effecting things in the world – technology has to do with means and ends and „instrumental rationality.“ On this account, there can be a technical employment of language especially in the rhetorics of persuasion and the many ways of manipulating people through a clever choice of words. But there are many uses of language which appear to have nothing at all to do with purposes and calculated effects, means and ends. For example, the languages of truth and expressive beauty, story-telling and love-making do not appear instrumental at all or only at second glance.

Another family of definitions associates technology with the creative process, thus with the poietic activity of bringing things forth, of making, weaving, sculpting, shaping, moulding, and building. Again, there are some uses of language that accord with this, many others do not. This account emphasizes that we use language to conjure the imagination, to build worlds, and to create the concepts and categories by which we bring phenomena to light. At the same time, language provides the frame of reference that allows us to formulate theories which describe or represent features of the world. We can agree on our shared reality when language is not used creatively but when it secures a form of life and system of knowledge.

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Both definitions of technology fall short not only by fortifying the division of spheres and by excluding most of linguistic practice. They fall short also in regard to technology. There are many technologies that do not satisfy means-end relations, that are not purposeful and efficient, but pleasurably wasteful – fireworks and fountains, for example, and many machines that perform mostly for our pleasure. Also, technology is not just about making and building an artificial second nature or humanly built world, it also involves rituals of use, protocols and procedures that sustain our ways of life.

Perhaps, then, we can define technology in a more comprehensive way (Nordmann, 2015): Technology is our way of relating to things, it is how we organize or pattern the material world – it is interested in what effects things can produce. As such, technology is akin to language, because language is our way of relating to people, it is how we organize or pattern social interactions – it is interested in what actions people perform with words. To be sure, often we use technology when we relate to other people by way of language – the technologies of the word, of print, of persuasion. The language of the law, for example, appears to be a technology as much as a language. Also, often we use language and involve other people when we relate to things by way of technology – the language of programming, of training, of maintenance. The technology of traffic control, for example, appears to be a language as much as a technology. And so we might say that language is a kind of technology in that it co-ordinates people, their words and actions, even their thoughts and habits of mind. And technology is a kind of language in that it makes things significant in what they can do and how they express their powers.

II. THE GRAMMAR OF THINGS

Let's hold on to this. Technology is how we relate to things, and as such it is a language of sorts through which we know the world.

How do we, how can we know the world? This is one of the oldest and most basic questions of philosophy. Over the course of time, and especially in the time since Kant and in the philosophy of Wittgenstein, a consensus emerged according to which we do not and cannot know the things directly, we know only how they appear to us. How a thing appears to us is a fact: It is a fact that water looks transparent. It is another fact that it has a temperature of 32 degrees Celsius, and another one that it freezes at 0 degrees Celsius, that it has no particular taste or smell, that it quenches thirst. We know what water is by all the facts about water. And this is how we know the world as a world of facts. Now, to the fact corresponds the sentence or proposition. The sentence captures, records, says that water is transparent, that it freezes at 0 degree Celsius and so on. As Wittgenstein pointed out, as Heidegger noted as well – according to our modern philosophical tradition we know not things but how things appear in our linguistic records of our experiences, in our statements of how things appear to us (Wittgenstein, 1922; Heidegger, 1967).

Surely, this is not the only way of knowing the world and knowing the things in the world. We know it not just by stating how things appear to us, we know it also by physically intervening in the world and by creating occasions in which the things can show what they can do. In a hydro-electric dam, water can demonstrate its power, quite literally. In pharmaceutical solutions water shows that it can keep certain kinds of

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chemicals in suspension. In a French press boiling water shows that it can prompt the release of flavor from ground coffee beans. In an envisioned hydrogen economy of the future, water is expected to show how it can store energy in hitherto unknown ways – perhaps it can function like a hydrogen-battery. Again, we do not know the things directly. An experimental system or technical device or socio-technical infrastructure provides a setting, in which things can effect other things and produce a specific performance. It was Francis Bacon in the early 17th century who pointed out that we know the world not simply by contemplation but by creating works in which the things exhibit their powers (Bacon, 1620/1902).

And thus we arrive at the grammar of things (Nordmann, 2018). A sentence, statement, or proposition is a linguistic structure which can express a fact and how a thing appears to us. A clockwork, waterwork, or steelwork also provides a structure in which things can express themselves – where they reveal not what they are or how they appear, but what they can do or effect in concert with other things. An experimental system, a machine, a programmed circuit of electrical switches, a management structure of work flows — each of these provides a grammar for things to show what they can do, to express their powers, to perform a prescribed motion.

III. PRINCIPLES OF COMPOSITION

Why refer to technical works and structures of things as grammars, why draw on this linguistic notion and suggest that we might end up talking of a language of mechanics, or a language of electrical engineering as a language for the things in which they express themselves?

The late 19th century mechanical engineer and engineering educator Franz Reuleaux (1876) leads the way. This, he would say, is what mechanical engineering is: to get a machine to perform a prescribed sequence of motions. When physicists study the laws of motion, Reuleaux argues, they find general principles by which they analyze the chaotic phenomena of motion as they occur, for example, when a feather falls from a tower. But when mechanical engineers build a machine, nothing is left to chance. They arrange mechanical elements in such a way that the force travels from one to another and performs a specific motion. In the machine, motion becomes domesticated or civilized, one state of the machine implies the next by a kind of logic. And the different machine elements are like a set of symbols where each has a specific meaning. They cannot be arranged at will but only in such a way that each element sustains and propagate the motion.

Three cogwheels, improperly arranged, can block each other and bring the machine to a grinding halt. But as the water pours into the waterwheel, the motion of the wheel can be translated into a motion by which a hammer ls lifted and drops on each of rotation. And this is what mechanical engineers learn: the grammar according to which wheels and gears, levers and clutches can properly translate rotary motion into linear or oscillating motion, by which heat can be translated into work, thermal into mechanical motion and *vice versa*. According to Reuleaux, therefore, machines are built from machine elements somewhat like sentences from words and somewhat like logical inferences from premises.

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There is a grammar, then, for mechanical engineers. It is a grammar of things and works in analogy to the grammar of words and sentences. It allows them to properly arrange elements such that they can form a meaningful whole. It also allows them to judge whether the resulting structure is well-formed. Once you know how to speak the language, the grammar fades into the background, it serves as an internalized standard of right and wrong. Those who know, can see or hear immediately what works and what doesn't. This is true also for electrical or software engineering, for architecture with its shape grammars and related concepts, but also for synthetic chemistry, pharmacy, and bioengineering.

These are grammars in the sense of providing principles of composition in spoken and written language, film-editing, mechanical and other forms of engineering, music. Music provides the most obvious example. There is counterpoint, romantic harmony, twelve-tone music – each with its own principles of composition that tell composers and listeners whether the tones are rightly arranged so as to carry the musical logic forward and so as to produce a desired effect. When we study our socio-technical world with its infrastructures, gadgets, and devices, we want to know how it is composed and how its principles of composition implicate us. This is how we study artworks, and this is how we understand our various languages in a multilingual world.

IV. THE MULTILINGUAL CONDITION

This is an invitation, finally, to look at „technology and language" not from the point of view of the philosophy of technology but from that of a complementary philosophy of multilingualism. When engineers are concerned to translate rotary into oscillatory motion, what kind of translation might we be talking about in our contemporary multilingual world?

In a world that divides between technology and language, the starting point was often enough a monolingual individual who goes on to acquire other natural languages, learning to say in a second, third, or fourth language what one knows to say in one's native tongue. Once we understand technology as language and language as technology, we can no longer take as our starting point the fiction of a literate monolingual individual. From the moment of birth we find ourselves in the midst of a cacophonous multilingual environment in which mothers and fathers, doctors, midwives, and nurses speak different languages, in which the bells and whistles of monitors, cell-phones, and alarms chime in, which is a highly codified built environment with signage everywhere (Aronin, 2018, Aronin and Singleton, 2013). In this world, we seek orientation not by acquiring this or that natural language but by seeking out the principles of composition that co-ordinate signs and actions. In many ways we are and remain illiterate in this world, and nevertheless learn how to negotiate, even to conquer it – in order to accomplish this, we mobilize many technologies and techniques.

For many years, philosophers and linguists have been debunking the notion of communication as an act of conveying representations from one mind to another. There has been an increasing awareness that communication has more to do with co-ordination,

with attunement to the principles of composition that inform a social order, a technical work, our symbolically and technologically constituted info-techno-sphere.

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