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Digital Culture: Pragmatic and Philosophical Challenges

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Over the coming decades, the so-called telematic technologies are destined to grow more and more encompassing in scale and the repercussions they will have on our professional and personal lives will become ever more accentuated. The transformations resulting from the digitization of data have already profoundly modified a great many of the activities of human life and exercise significant influence on the way we design, draw up, store and send documents, as well as on the means used for locating information in libraries, databases and on the net. These changes are transforming the nature of international communication and are modifying the way in which we carry out research, engage in study, keep our accounts, plan our travel, do our shopping, look after our health, organize our leisure time, undertake wars and so on. The time is not far off when miniaturized digital systems will be installed everywhere – in our homes and offices, in the car, in our pockets or even embedded within the bodies of each one of us. They will help us to keep control over every aspect of our lives and will efficiently and effectively carry out multiple tasks which today we have to devote precious time to. As a consequence, our ways of acting and thinking will be transformed. These new winds of change, which are blowing strongly, are giving birth to a new culture to which the name 'digital culture' has been given.[1] It is timely that a study should be made of the different aspects and consequences of this culture, but that this study should not be just undertaken from the point of view of the simple user who quickly embraces the latest successful innovation, in reaction essentially to market forces. The major challenge for this culture resides not so much in the development of even more tiny microchips, faster processors or more refined software, but in the honing of conceptual instruments which will give us the ability to analyse and evaluate the radical changes that this revolution is bringing about and which it will continue to provoke in all of our lives.

As digital technologies progressively expand, their potential applications, but also the problems associated with their usage, will develop on an exponential scale. If in the past one could call attention to the possible dangers inherent in the information

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explosion,[2] today it is more appropriate to conceive a risk on the scale of a nuclear explosion, to which we are all exposed each time we surf the net or have to choose between the different operating modes of our PC. As knowledge emanating from more and more diverse sources becomes accessible, each one of us will be obliged to take responsibility for deciding how we are going to sort, select, evaluate, organise and store information coming at us from all sides. As in the past, governments and different groups will try, both today and tomorrow, to exert control in one way or another over the prodigious flood of information available to us by playing upon our natural desire for 'guidance' so as to avoid being overwhelmed by this surging torrent. In the face of these attempts, each person must be capable of exercising a choice from amongst this huge harvest and vast array of sources at his or her disposal and of selecting the types of knowledge that may provide him or her with the meanings and values able to give substance and shape to their lives. In the age of digital culture, more than in any other era, people must take upon themselves, every day and every moment, the duty of casting aside tutors of all kinds and of acting as mature adults taking full responsibility for their decisions and their actions, as Kant insisted they should.

The pace of 'technological evolution' is much more rapid than that of cultural evolution, which is itself much faster than biological evolution. Developments in technology result from the massive mobilisation of human creativity in the service of the search for profit. No one controls the direction that technological development is taking, it is directing us. We thus depend on a sort of 'invisible hand', like the one which Adam Smith wrote about, to ensure that, in the end, technological development will be applied in the service of humanity and of our collective happiness.[3] But how can we be certain that it will turn out this way? Do we have the right to sweep aside with a scornful flick of the wrist the possibility that such development may provide some *Big Brother* with the opportunity to rule as absolute master over a world as horrific as that described by Orwell in *1984*? By not paying heed to potential scenarios of this kind, are we not shirking our responsibilities with regard to the politics of technology and to the maturity that Kant demanded of us? Or would it be fairer to say that Kant and a great many others were completely deceived when they declared that man was capable and even desirous of carrying to fruition the intent of the Age of Enlightenment and of devoting his reason to the service of managing his affairs?

Could it not be perhaps that our inability to give direction to technological development results from the time-lag between cultural evolution on the one hand and technological evolution on the other? Although the computers that we have available today are sufficiently advanced to give us all the 'processing power' we require for our current purposes, we don't hesitate to buy new equipment that has even greater processing capacity, only a feeble proportion of which we are likely to use, as, infact, we do for all the devices we possess. The only reason we behave in such a way is because without these machines we could not use the extravagant softwares that Bill Gates and his like impose upon us. Our ancient habit of accumulating goods, born no doubt in times of shortage, is undoubtedly responsible for a large part of this financial and ecological wastage that characterizes our era of computerized superfluity. As adults we gaze with amazement at our children and

grandchildren who are growing up within a digital environment and who move within it with ease and facility. While to some of us this environment still seems artificial and sometimes even frightening, to them it seems perfectly natural. But this apparent normalcy should not lead us into error. Indeed, it is our values, our behaviours, our modes of thinking which continue to shape the outlook of our children, their behaviours and their ways of thought. We are simply left wondering whether as a result these will be sufficiently adapted to the new world in which they will be living.

All these questions suggest that we need to undertake a thorough revision of the fundamental hypotheses on which our lives have been based over the last few centuries. The revolutions in culture of a breadth and depth comparable to the one which we are witnessing today have not only radically transformed our approaches to life, our concepts and our behaviour. They have also obliged the greatest thinkers to seek new answers to the basic questions relating to our individual and collective identities (who am I? who are we? what kind of culture do I/we have?), to the reach of human knowledge (what can I know?), to ethics (what is it right for me/us to do?), to politics (what is the optimum social structure to ensure proper relationships between the citizens of a given country and between states?), to our mortality (what can I/we look forward to?), to the definition of human life and its place within the animal kingdom (what is man?). It was in such a manner, for example, that the scientific revolution of the 17th and 18th centuries thoroughly changed the conception of the world of 'modern' man and led to a re-examination of all these questions. Indeed, as a result of this revolution, it was no longer possible to be satisfied with the answers accepted since the Renaissance. Kant even envisaged the need to establish a new discipline, which he had called 'philosophical anthropology', to provide answers to such questions.

Yet it appears that the answers given then and which still guide our lives are no longer appropriate for the new culture in which we are now living. The ability to create 'virtual identities' on the net raises questions as to the fixed, monolithic concept of the self, the conscious subject in whom all the experiences of the individual are synthesized. In the digital era, where each time a computer is used a 'trace' is left which others can access, it seems that the protection of privacy, considered a fundamental right and one of the principal properties of the individual, is no longer assured and must yield to other characteristics. The existence on the internet of discussion groups and other on-line forums transcending all territorial boundaries calls into question the centrality of traditional modes of community grouping – whether in structures based on ethnicity, politics, family, language or other factors. The plethora of voices emerging from the web which are expressing different, and even conflicting, truths and values are reducing to nothing the classical notion of the existence of a single and unique moral imperative, valid for all people wherever they may be found. It remains uncertain whether this ever-increasing range of voices will encourage the establishment of mutual recognition and understanding among various groups and cultures. To the contrary, it might well stimulate attempts to protect oneself from 'otherness' and lead us into hermetically sealing ourselves off within 'our' truth and 'our' values. The free and cumulative flow of knowledge – one of the ideals of the Enlightenment culture – gives no guarantee that each person will have

available the tools necessary to distinguish what is essential from what is merely accessory, what is tendentious from what is objectively established, what is useful from what is harmful. It is even hard to know what tools there will be to assist in establishing such distinctions, and how they will be developed and made available to everybody. It is not even clear that the digital age will usher in a fairer distribution of resources between the haves and the have-nots, within countries or between them, or whether it will not just simply perpetuate and aggravate the existing imbalances. It is hard to know whether the digital revolution is of itself a causal factor for greater democratization, or if the globalization inherent in it on the other hand is not simply reinforcing the power of certain groups and imposing a uniform lifestyle on the whole world, disregarding in the process the different models of living and social organization.

The digital revolution has created an urgent need to reopen the debate on the basic questions of philosophical anthropology and to develop alternatives to the traditional answers. These tasks cannot be realised within the framework of narrow and self-contained disciplines, nor even within the broader bounds of philosophy, for by their very nature they demand cutting-edge technical and empirical knowledge as well as a broad and extensive vision of the problems involved.

Collaboration between areas of competence and different perspectives is equally necessary in relation to more specific questions, including those associated with the development of the new generation of digital products and applications. Up until now, the development of technologies linked to telematics has been limited to the creation of reliable and efficient infrastructures (both hardware and software) for the 'processing' or manipulation of information-bearing signs – in other words, to what engineers Claude Shannon and Warren Weaver, the founders of the mathematical theory of information, had called the 'technical question', to distinguish it from the 'semantic question', both of which were involved with the processing of information.[4] Now that the technical question has been to a large extent resolved, attention needs to be given to the semantic question, that is, to the maximum responsible exploitation of the content of these signs which present-day systems are capable of processing reliably and efficiently. It becomes all the more urgent to address this problem as the information sources from which we must extract the content corresponding to our needs continue to grow ever greater and more complex.

And it is imperative that this be done urgently, all the more so as we comprehend that the new digital technologies are not just simple passive instruments which we can manipulate from a position of all-powerful control, but are interactive systems which are radically modifying our cognitive capacities. It is to a particularly important aspect of this relationship that we wish to turn our attention, so as to subsequently draw conclusions of not just a practical nature.

Communicating with computers: from the Turing Test to the Chinese room

To provide an answer to the question 'How will man and computer (or computer and man) be able to communicate?' this question must be reduced to one which is more specific but just as essential: 'How will man and computer work *together*?' It

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was in such terms that this question was formulated in an advertisement published several years ago by the firm Daimler-Benz in *Time* magazine. As might be expected, the ad also suggested a reply, one not entirely lacking in interest and which did not really correspond to what one might have thought at the time: 'There exists a promising answer to this philosophical and functional question: through speech.'

The reason invoked by Daimler-Benz to justify the importance attached to language was even more interesting. It did not just hark back to the old argument by which language is the principal tool of human communication. It declared: 'Language is the reflection and the partner of thought.'

The close link between language and thinking has not escaped the attention of philosophers over the generations. Some 40 years ago, my intellectual mentor, Yehoshua Bar-Hillel, asserted that the day when computers could understand and reproduce expressions in any natural language, they would then have the right to be called 'intelligent'. If his assertion was correct, which I believe it is, then what Daimler-Benz was announcing as imminent was quite simply the acquisition by computers of intelligence: 'And the machines will understand words and will reply. They will weld, they will tighten screws, they will write. They will even be able to understand different languages'. However, the German car-maker showed a praiseworthy modicum of restraint by not naming the date on which it would be able to produce all these miracles. It was happy just to set out the efforts it was exerting in undertaking research into the subject: 'To convert language into a form that the computer is able to understand, the research department at Daimler-Benz is developing new complex systems which are based on speech. Man will speak to the machine and the machine will answer him, for the greater good of the human race'. We are still impatiently waiting for this marvel of technology, which will eclipse by far the most luxurious of all the vehicles manufactured to date by the famous firm – but it seems that the research and development or the construction phase may have met with certain delays.

The French philosopher and mathematician René Descartes had already put forward around 400 years ago an assertion that strongly resembled that of Bar-Hillel concerning the close link existing between the use of language and human intellectual capacities: 'No animal has ever been observed which has reached the stage of using a true language, that is to say, the ability to indicate with the voice or a gesture of the hand something which can be attributed to thought alone and not just to its feelings.'[5] But, in contrast to Daimler-Benz, he was pessimistic about the possibility of seeing such an idea actualized one day, for he considered that the organs of animals as components of machines that were useful for only one kind of activity:

> For, whereas reason is a universal instrument, which can be applied in all sorts of circumstances, these organs require a certain particular disposition for each particular action; by which it follows that it is morally impossible that there should be sufficient variety in the machine to allow it to act in all the occurrences of life, in the same way that our reason causes us to act.[6]

Descartes, of course, was acquainted only with *mechanical* machines. His idea of a machine was based upon that of timepieces, which were already quite sophisticated

in his era. But such machines are only capable of accomplishing what their mechanism – the hardware – is designed to carry out. He had no knowledge of computers, machines in which there exists, in addition to hardware, a software which allows the hardware to be programmed to enable it to carry out diverse and changing tasks. But one can imagine that, even if he had known computers, Descartes would have still defended his assertion by pointing out that the computer will never accomplish other than the actions for which it has been originally programmed. That is why it will never manage to react to unforeseen situations (such as 'unexpected' sentences).

This was the reason why Descartes saw in the ability to use language the essential criterion which determined not only the presence of an intelligence, but also the existence of a mind and a soul. He declared that, just as animals, machines do not have a soul because they are incapable of using language as humans do, that is, in a manner appropriate to an infinite number of diverse and changing circumstances.

Whereas Descartes considered the use of language to be an *external sign* of the existence of the thinking mind and of the soul, other thinkers of his period had drawn language 'within', considering it as a tool by which man could not only communicate (transmit his thoughts to others) but also to be able truly to think (to formulate thoughts). It is in this sense that Thomas Hobbes, for example, has described 'reason':

> For reason in this sense is nothing but *reckoning*, that is, adding and subtracting, of the consequences of general names agreed upon for the *marking* and *signifying* of our thoughts . . . But it appears that reason is not, as sense and memory, born with us; nor gotten by experience only, as prudence is; but attained by industry; first in apt imposing of names; and second by getting a good and orderly method in proceeding from the elements, which are names, to assertions made by the connexions of one of them to another; and so to syllogisms, which are the connexions of one assertion to another, till we come to a knowledge of all the consequences of names appertaining to the subject in hand; and that is what men called *science*.[7]

It transpires therefore that the declaration according to which 'language reflects thought', which may well sum up the advertisement published in *Time* magazine, can be understood in different ways. Language reflects thought through a relationship which may be *external* or *internal*. Descartes holds the external relationship (language as a sign of the existence of thought or the mind). On the other hand, it is possible to understand the internal relationship between language and thought as being *instrumental* (language is the most important instrument of thought but it is not indispensable to it) or as *constituent* (without language there is no thought). The first approach is represented by those who recognise how important language, or any other sign-system, is for the amelioration of our intellectual capacity within a particular domain (as for the storage and retrieval of information, the definition and determination of complex concepts or those whose definition may be ambiguous, the elaboration and analysis of extremely tortuous arguments) but does not consider language as an essential element of all these activities. Hobbes, on the other hand, takes the constituent position, by which language is deemed indispensable for the realisation of the higher mental activities. Other thinkers are very close to this constituent conception:[8] among them was the great 18th-century French chemist

Antoine Laurent de Lavoisier, according to whom scientific thought could not evolve without the creation of a sound language of science.

Some thinkers have gone even further by declaring that language was not only essential for thought but for the very existence of the human being. The contemporary philosopher Martin Heidegger, for example, has described language as 'the house of experience'. According to him, being, that is, what has been lived through (being the whole of existence) unfolds within the 'framework' of language. It is an interesting approach that I have not the leisure to develop here, despite the influence that it has had not only on philosophers but also on computer scientists.[9]

For my part, I find an element of truth in each of the approaches of Descartes, Hobbes and Heidegger, and I think there are grounds for studying the *uses* (or effects) of language on these three planes. Each deserves to be examined within the bounds of a particular subdiscipline of pragmatics, or science of language use:[10] socio-pragmatics, which studies the social uses of sign-systems, including language (and notably inter-personal communication and mass communication); psycho-pragmatics, which studies personal uses (essentially mental) of sign-systems; and onto-pragmatics, which studies the existential underpinnings of language and the linguistic foundations of human existence. I will focus my analysis on the social and communicative dimension of language (even though I accord great importance to each of the three domains of the study of language use) for in this context we are dealing with the relationship between man and the computer – and such relations are, for the moment, of a social and cognitive nature.

It is worth recalling that pragmatics is the aspect of language theory that concerns itself with language usages and is complementary to semantics and syntax. This latter discipline is devoted to the composition and identification of signs and also deals with the rules which determine which patterns of sign linkage are 'correct'. Semantics, for its part, is interested in the meanings of signs in isolation or of strings of signs, whereas pragmatics has to do with the interpretation of sign sequences in the context in which they are employed.[11] I have chosen to emphasize pragmatics because, until now, researchers trying to provide computers with skills in language have devoted a lot of attention to semantics and to syntax while completely neglecting pragmatics, whereas, without taking into account pragmatics, these efforts are doomed to fail.

The three philosophical approaches referred to above do not just belong to the past. Recently they have found new applications in computer science and in the cognitive sciences: Heidegger's view has influenced the specialist in artificial intelligence Terry Winograd who, taking that as a base, has proposed the design of computers formed around revolutionary new principles embedded in the use of natural language.[12] Hobbes' position has inspired what has become a central metaphor in the cognitive sciences, that is, the image of the soul or the mind as a sort of computer which carries out processes of calculation by means of mental symbols, a position of which one of the most prominent defenders is the philosopher Jerry Fodor.[13] As for the Cartesian notion that the use of language is a sign of the existence of thinking, it has become the 'Turing Test'.

Alan Turing was the British mathematician who succeeded in decrypting the German secret message code during the Second World War. In an article published

in the journal *Mind* in 1950, Turing proposed a method for determining whether computers were endowed with intelligence or not. This method is now known under the name of the Turing Test. The idea is based on the 'game of charades' in which a man tries to impersonate a woman. There are three participants in the game: a man, a woman and an interrogator. The latter stays in a separate room and has the task of determining which is the man and which is the woman. He asks questions of the other two participants by means of a teleprinter, and whereas the woman tries to help him, the man does all that he can to deceive him. The intelligence test devised by Turing is based on replacing the man by a computer in the charades game. In this case, asks Turing, will the interrogator be deceived in the identification of the man and the woman as often as if he was dealing with two actual people? To what extent will the computer be able to prevent the interrogator from reaching a correct identification? It is the answer to this question which permits one to know 'whether the machine is able to think'.[14]

It should not be forgotten that Turing's objective was above all scientific. He proposed replacing the vague question 'can machines think?' by an operational test: 'if the machine wins the game, that means it is capable of thought'. It was a parallel approach to the operational procedures for IQ tests intended to measure human intelligence: instead of asking whether a person is intelligent or not, IQ tests examine his or her capacity to solve a given series of problems, among which are questions which establish the existence of acceptable language capabilities. But, in contrast to the psychologists who devise IQ tests, Turing, along with Descartes and Bar-Hillel, understood the decisive importance of a competent use of language as a sign of intelligence, even in contexts little favourable to transparent communication.

The test Turing proposes is identical in its principle to that of Descartes. The difference resides in its 'technical' limitations: in Turing's test, the questions are limited to certain types; communication is established through the intermediary of a teleprinter and not by direct face-to-face contact. These limitations create a very artificial 'extra-contextual' communicative situation, which raises doubts about the conclusions that may be drawn from it in relation to communication that is established under normal conditions and to the intelligence that it requires.

Despite all these technical limitations, however, there can be no doubt that if a computer were able to carry on, within the context of the game of charades, a conversation which would lead the interrogator to the conclusion that he was dealing with a human being, the computer would have achieved an impressive success. Contrary to Descartes, Turing believed that, in theory, the computer or 'Turing machine'[15] could come out winning in this test. He thought also that within a period of 50 years (that is, by the year 2000), there would exist computers equipped with sufficient memory to win this test in practice: these computers would be able to 'play the game of charades so well that the average interrogator would not have more than a 70% chance of reaching a correct identification after five minutes of investigation'.[16]

There are now in fact computer programs which have already succeeded in passing Turing's test. One of the most well-known examples is that of ELIZA, a program which plays the part of a psychoanalyst questioning a patient. When the patient utters a phrase of the type 'Yesterday I dreamed about my father', the machine answers, for example, 'Tell me about your dream' or 'Tell me about how you got on

with your father'. Not only are the patients sure they are in the presence of an intelligent and empathetic psychoanalyst, but even professional psychoanalysts invited to read the transcripts of the dialogue have given ELIZA very high marks and did not realize it was in fact a machine. However, this program was able to deliver such results thanks to the application of quite simple means devoid of any form of 'language comprehension' and *a fortiori* of any intelligence. It came about, for example, that the above-mentioned responses were obtained by the identification of certain words in the patient's discourse and their association by the computer with response patterns prepared in advance (like 'tell me about . . . ' or 'what do you mean by . . . ?'). It is thanks to the input of the programmer who set up in advance lists of 'meaningful' words like 'dream', 'father', 'mother', 'fear' or 'rape' that this dialogue gives the impression of being a professional interchange.[17]

For the American philosopher John Searle, the success of ELIZA and of other programs of the same type proves to the contrary that there is no relation between success in the Turing Test and human intelligence. Searle has vigorously contested the Turing Test and the notion of a computational model of the mind. He justified this attack by an 'intellectual experiment' known in the specialist literature as the 'argument of the Chinese room'.

> Imagine that a bunch of computer programmers have written a programme that will enable a computer to simulate the understanding of Chinese. So, for example, if the computer is given a question in Chinese, it will match the question against its memory, or data base, and produce appropriate answers to the question in Chinese. Suppose for the sake of argument that the computer's answers are as good as those of a native Chinese speaker . . . Imagine [now] that you are locked in a room, and in this room are several baskets full of Chinese symbols. Imagine that you (like me) do not understand a word of Chinese, but that you are given a rule book in English for manipulating these Chinese symbols. The rules specify the manipulation of the symbols purely formally, in terms of their syntax, not their semantics. So the rule might say: 'Take a squiggle-squiggle sign out of basket number one and put it next to a squoggle-squoggle sign from basket number two.' Now suppose that some other Chinese symbols are passed into the room, and that you are given further rules for passing back Chinese symbols out of the room. Suppose that unknown to you the symbols passed into the room are called 'questions' by the people outside of the room, and the symbols you pass back out of the room are called 'answers to the questions'.[18]

Searle drew from this the conclusion that, as for the Turing Test, operational success in this type of experiment teaches us nothing about comprehension, intelligence or any other mental process.

> There you are locked in your room shuffling your Chinese symbols and passing out Chinese symbols in response to incoming Chinese symbols. On the basis of the situation as I have described it, there is no way you could learn any Chinese simply by manipulating these formal symbols.[19]
>
> Now the point of the story is simply this: by virtue of implementing a formal computer program, from the point of view of an outside observer, you behave exactly as if you understood Chinese, but all the same you don't understand a word of Chinese . . . Understanding a language, or indeed, having mental states at all, involves more than just having a bunch of formal symbols. It involves having an interpretation, or a meaning attached to those symbols.[19]

Searle is thus emphasizing the difference between the syntactic manipulation of signs and semantics. 'Content' and 'comprehension' cannot be based on the 'formal' and 'external' properties of signs. These aspects are linked to concepts like 'being about something' and depend on the person by whom the sign is conferred its meaning. A creature who is not able to understand what is represented by the signs that he moves from one place to another does not comprehend anything about anything, even if he turns out to be perfect at transmitting the signs. The mere juggling with signs does not allow itself to be seen as a model for the mind and, *a fortiori*, one cannot attribute a 'comprehension' ability to it, nor any other mental skill.

Even if it turns out to be right, should Searle's argument give cause for concern to those of us who are interested in a model for communicating with computers rather than in the use of computers as a model for the human mind? Is it of any real significance to know whether the computer 'really understands' what we are telling it, in the sense of 'being aware of the content carried by our words', for example? In the end, all that interests us in communication with computers is that they carry out what we want them to do, that they function according to our instructions, our requests and our words. It hardly matters to us to know whether behind the curtain are hidden obtuse robots which can move around Chinese symbols without according any meaning to them, or just electric currents which cause signals to be passed from one place to another. The only thing that counts is that the result is 'right'.

So it seems that the 'Turing machine', however simple and 'syntax-bound' it might be, if it replies appropriately to the interrogator's questions, it successfully passes the Turing Test, even though we cannot attribute to it a form of intelligence or comprehension in the metaphysical sense of these terms. Nevertheless it may well have achieved what Daimler-Benz is seeking to develop: a communicative state which allows us to work with the machine. But are we really any closer to reaching this level?

Searle is perfectly correct when he emphasizes that syntax alone is insufficient to create content. It is not enough to attend to the form of a language to ensure communication. If all that I can do in relation to a Hebrew sentence is to divide it into its component words and to classify each of these terms in their precise grammatical categories, it is hard to claim that I would therefore be able to communicate with someone who said to me (in Hebrew): 'it is cold in the room'.

But what happens if, as Searle recommends, I add semantics to this approach, that is, the meanings of the words and syntactic structures? Will that be enough? Let's suppose I understand that 'cold' relates to low temperature, that 'in' establishes a relationship between the temperature and the place, and that 'room' is a particular type of construction. In cases like that, I could translate for myself the sentence 'it is cold in the room' by something like 'The temperature attributed to construction X, which is closed in by walls and other partitions, except for a few openings, is low'. But does this semantic translation guarantee the comprehension of the sentence in its operational sense, and will it let me know what I should do after hearing it?

The answer is in the negative. Semantics does not suffice either in providing us with the 'operational comprehension' which we are in need of. It is more or less certain that the person uttering such a phrase does not only intend to pass on to us information about the room's temperature. In the majority of cases, one might

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presume that the person having recourse to the phrase 'it is cold in the room' is not simply satisfied with establishing a fact or passing on a piece of information, but is expressing a wish or a request, seeking, for example, that the person he spoke to should close the window.

Only pragmatics can furnish the tools allowing a contextual interpretation to be given to the expressions we hear. Semantics provides 'deep-frozen' meanings which are stored on the shelves of the dictionaries that we carry around in our heads in the form of 'semantic rules'. Pragmatics is interested in the particular meaning that should be given to the phrase in the use that is made of it in the here and now. And this actualized meaning can always turn out to be different from the shelf meaning.

In earlier times, expressions whose pragmatic meaning differed from the semantic meaning were thought to be departing from the norm. Today we realize that that is not at all the case. In an everyday conversation, we tend to speak by allusion rather than in any explicit manner, and this is not just for the sake of brevity. We habitually make use of metaphor, irony, twisted meaning and a thousand other ways of conveying hidden or implied content. And, marvellous to say, we understand each other very well. This marvel results from the fact that we adhere to a system of pragmatic principles and rely upon information drawn from the surrounding context in order to arrive at mutual understanding. It is only by this means that we can confer the correct pragmatic interpretation on to the majority of the expressions that we hear and not fail in our communicative effort.

The main problem for programs processing texts in natural languages isn't the lack of syntactic or semantic knowledge (though, in this latter domain, much remains to be done), but the almost total absence of pragmatic tools able to guide their activity. One consequence, among others, for existing programs is that we are limited to fixed formats. Take, for example, the dialogue boxes in current software applications. These applications (or more accurately, the people who created them) want our dialogue with them to remain on the purely semantic level, without involving pragmatics. We can compare the 'conversations' we have with these machines to the 'conversations' had with two- or three-year-old children who have already absorbed certain rules of semantics. Each time that you move away from these rules – whether through metaphor, humour, irony, or where the phrase is somewhat mixed up – there is a danger of miscommunication with them. What relation is there between this insecure communication and the Turing–Descartes test?

A well-known story, going back to the period when large amounts of money were being invested in the development of programs for 'machine translation', illustrates the comprehension problems that confronted these ambitious programs. They came about because the pragmatic dimension was absent, even a surface-level pragmatics of the type that characterized ELIZA.

Researchers at a leading university, who had invested enormous effort in the development of a programme for automatic translation of Russian to English and English to Russian, had organized a demonstration of their product before government officials in Washington in the hope of obtaining further grants. But no one present at the time of the demonstration could speak Russian. For that reason, one of the assistants proposed feeding into the machine an English sentence to be translated into Russian, and then to get it to re-translate the Russian sentence so generated back

into English. If this re-translation turned out to be identical to the original, it would prove how high the quality of the program was. The machine was asked to translate into Russian the English sentence *The spirit is willing but the flesh is weak*, and the sentence which issued forth from the retranslation back into English was the following: *The vodka is fine but the meat is rotten*.

After permitting ourselves a smile at the charming story, we should try to imagine how the machine managed to come up with this curious translation. We have lots of semantic and pragmatic means of explaining how the misunderstanding of the initial sentence could have led to the second. To my great regret I will not have space to set them all out in detail, so I will limit myself to one example. Suppose that the computer had begun by choosing (for contextual reasons or otherwise) to give to the word 'spirit' the (semantic) meaning linked to alcohol. As a result, the expression '*willing*', which is generally associated with the semantic field of 'mental activity', would have had to take on another meaning. This expression bears a 'positive' connotation. It is sometimes possible to use an expression in such a way as to abstract from it its base meaning, leaving only its connotations (the terms 'right' and 'left' are generally employed in this way in politics). The machine proceeded in somewhat the same way when it tried to reconcile the meaning of '*spirit*' (which it had selected) with that of '*willing*'. Other contextual reasons (association with a restaurant and not with a hospital, for example) led it then to select the idea of 'alcoholic beverage', and the resultant 'vodka' emerged from the Russian cultural context in which the translation was embedded. The interpretation of the second half of the sentence followed on consequentially in opposition to or in parallel with that of the first half.

One of the methods employed to provide the machine with 'contextual knowledge', which should help it to give a 'broader semantic interpretation' (a sort of pragmatization) and in particular permit it to allocate a specific meaning to a word which can carry several, is giving it recourse to 'scripts'. One might conclude that the 'restaurant script' had been activated in the process described above. We have numerous scripts of this type at our disposal which pinpoint our expectations in a particular direction as far as communication is concerned.

The various menus that the computer and the software make available for us represent scripts prepared in advance, within which the programmers strive to have us enter. Even if the user is able to exercise choices within the script, this still remains nonetheless a series of linked operations programmed in advance, within which only existing options are regarded as legitimate. Yet, what characterizes human beings above all is their ability to pass without fuss from one script to another, or from one referential framework to another as circumstances require. It is perhaps the ability to use language in this complex way that Descartes wanted to identify as specifically characteristic of humankind.

It is also this faculty that above all characterizes humour. Humour arises when, for example, there is created the possibility of perceiving something as belonging simultaneously to two distinct frames of reference which provide different and contrasting meanings, one more foreseeable than the other. In the case we have reported, we have set out the whole story (which gives a certain plausibility to the computer's 'translation') within the context of a joke script, the butt of which is none other than the computer itself (and indirectly, the 'boffins' who programmed it). That allows us

to have a hearty laugh at its (their) dourness. Is the computer able to laugh at itself? Is it endowed with a form of humour? Even further, is it able to laugh at us? The examples here given are not intended to add a new proof for the Turing's Test – something which is particularly difficult – by demanding that the machine, to show that it is intelligent, demonstrate that it is able to understand jokes. They are aimed simply at showing that, in general terms, the language that we use does not fit within a single semantic framework but connects with several registers which are activated at the same time, and that we are able to choose the interpretative framework which best suits in accordance with changing circumstances and in response to thousands of contextual clues (such as tone of voice, facial expression or what is going on around about) which we perceive in addition to the language itself. Such is the remarkable pragmatic ability that we possess, incomparably more complex than the semantic competence that Searle demanded of the sleepwalkers turning round and round in the Chinese room.

So, to just what extent is it possible to achieve, as effectively and naturally as possible, a communication based on reasonable comprehension between man and machine? A first point in favour of this possibility is that pragmatic information is neither arbitrary nor the result of chance. It may be achieved by applying certain rules – more or less rational principles of communication – that a linguistic community is bound to respect. For example, the principle of relevance: saying something that is congruent with the communicative situation experienced. If what is said is apparently not relevant, an indirect meaning must be sought which might then lend relevance to the remark.

But there are also some less encouraging aspects. They result from the nature of these rules: they are not relatively simple algorithmic rules, but heuristic rules whose mode of functioning is not very precise. The machines we have at present are very good at applying rules of the first type, but much less effective at engaging rules of the second type.

There is, however, some other good news. The first piece is that computational models reproducing neuron networks seem particularly apt at simulating heuristic rules, and hence offer the possibility of providing computers with the pragmatic abilities which were missing in the 'classical' calculation models. The second is that information scientists have finally begun to understand the importance of pragmatics as a component of the study of language, and to grasp that without it, there is not the slightest chance of progressing towards the establishment of communication between man and the computer.[20]

Digital culture and studies in the humanities

It is difficult to imagine that the digital revolution could progress towards the solution of the 'semantic question' without exploiting to the maximum the existing knowledge relating to the semantics of natural languages, so as to develop this knowledge with a view to applying it to the technological field. This knowledge, and the skills associated with it, is to be found for the most part in the different departments of arts and humanities faculties. Indeed, to what do historians, literature

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specialists, philosophers, Biblical or Talmudic scholars or archaeologists devote themselves if not to systematic research into the meaning of 'texts' and to the development of reliable methods for determining this meaning? To what do philologists devote their time if not to the study of natural languages of which semantics constitutes an organic part? And to what is directed the philosophy of language – which was the standard-bearer of research in philosophy throughout the whole of the 20th century – if not towards the theory of meaning and its relationship with the other branches of philosophy? It would thus be inconceivable that the knowledge accumulated in all these disciplines were not engaged in the service of that essential task of finding a solution to the 'semantic question' as well as to the 'pragmatic question',[21] which today is obstructing the path towards the digital revolution.

It is a recognizable fact that up till the present the semantic potential of the natural languages has scarcely been exploited at all by technology. Most existing applications perceive words and phrases solely as chains of signs, passing completely over their most important property, which is meaning. That is why the search engines found on the net locate material by recognizing *matching symbols* and not by identifying *matching contents*. In consequence of which they provide us on the one hand with large numbers of references which are irrelevant to our request, but on the other hand they are not capable of locating many relevant sources which may be expressed in different terms and whose semantic link with the words used in the search formula every human person knows. That is why the user of these primitive search engines is obliged to sort through the responses to locate the relevant material and to undertake numerous other searches, formulated each time in different terms, in order to find it. The exploitation of the rich semantic structure of language, which every human being undertakes without any problem, seems at first sight as though it should be very simple, but its application by a computer system is not at all trivial and in fact has turned out to be extremely complex. That is why it is necessary to turn to the most advanced linguistic research, which takes into account the constraints linked to the processing by telematic technologies of language-based data and is working towards adapting linguistic understanding to these necessities.

The leading software producers have already realized that they need to bring into their research and development teams linguists who are specialists in computational linguistics. Companies and research institutes are now proclaiming loud and long that we will soon be able to converse freely with tiny computers[22] which will be installed everywhere.[23] But as long as the necessity for inter-disciplinary cooperation – necessary for the correct processing of meanings and of the other modes of expression proper to natural languages – is not recognized and adopted as it should be, the dream of unhindered conversation with computers or for an on-line search formulated in our own language without the slightest artificial constraint will not be close to being achieved.

A modern university at the cutting-edge of research and teaching, which takes care not to be cut off from what is going on in its own local social environment as well as in the 'global village', and which aspires to play a dynamic part in technological and cultural development, must take energetic measures to give concrete realization to the potential found within each of its academic units, not considered solely in isolation, but above all for the immense potential that can result from their

co-operation. It must set in motion the revolutionary processes in reflection, research and teaching that will be necessary to come to terms with 'digital culture'. And this task can be founded only on an approach which is thoroughly pluridisciplinary and holistic, tied into precise knowledge and actualized out of technological and theoretical developments.

I am confident that the pressure of this demand will soon overcome the resistance inherent in the current disciplinary divisions within universities. In fact we are already witnessing the emergence of pluridisciplinary linkages, capable of solving some of the technical and conceptual problems we have discussed in this article. Without being excessively optimistic, and adding another 50 years to Turing's predictions, we can confidently look forward to the appearance of systems which will be able to *pragmatically* communicate with us. In this sense, these systems will be definitely intelligent. I still doubt, however, whether they will be able to replace us in the philosophical and anthropological task which falls upon us today, and with which we will probably still be confronted in another half-century, that is to say, the need to reflect on what we as humans are becoming and will become at the heart of this digital culture, the depth and compass of which still escape us.

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Notes

1. I prefer this term which accentuates the dimension of the technical infrastructure which is preponderant in the technologies concerned, over other terms like 'cyberculture' which refer to only one of their aspects.
2. As early as 1686, the philosopher Gottfried Wilhelm Leibniz was pointing out that 'this horrid mass of books that goes on constantly increasing is creating a confusion that is almost impossible to overcome'. 'The disorder', he wrote, 'will become almost insurmountable as the vast number of authors, which will tend to the infinite in a short space of time, will expose them altogether to the danger of general oblivion; the hope of renown that stimulates many people to undertake study will dissipate forthwith'. He added that this state of affairs risked turning people away from a taste for the sciences and could bring it about that 'through mortal despair, men lapsed back into barbarism' (Leibniz, 1999: 698). To confront this problem, he suggested, among other remedies, the development of a whole series of 'cognitive technologies' (see Dascal, 2002).
3. The metaphor of the 'invisible hand', which is a central tenet of Smith's thought, is also applied in his writings on morality: despite the natural greed of human beings who tend to act in pursuit of personal interest, Smith declares that an 'invisible hand' directs their actions in such a way that 'without so wishing and without being aware of it, they are serving the interests of society' (Smith, 2002: 295; book 4, chapter 1, § 10).
4. Shannon and Weaver (1949).
5. Letter to Morus, 5 February 1649. The original French version is quoted from Descartes (1966: 278).
6. *Discours de la Méthode* [*Discourse on Method*]. The original French version is quoted from Descartes (1966: 57).
7. Hobbes (1962: 82 and 85) part I, ch. 5.
8. Leibniz is the most important thinker of this school (see Dascal, 1978, 1987). On Lavoisier and the language of chemistry, see Crosland (1978).

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9. See Dascal (2003, ch. 18).
10. For an overview of language pragmatics and its functions, see Dascal (2003). On the three subdisciplines that I propose should be included within it, see the chapter mentioned in the previous note.
11. This classification of the theory of signs, or semiotics, under three categories was proposed at the end of the 19th century by the American philosopher Charles Sanders Peirce and taken up by Charles Morris in his contribution to the ambitious positivist project known as 'The Encyclopedia of Unified Science' (see Morris, 1938). Despite its age, extensive use is still made of this classification. Concerning its relevance, see Dascal (2003, ch. 1).
12. Winograd and Flores (1986).
13. See, among his many works, Fodor (1975, 1981).
14. Turing (1996: 246). The article was originally published in *Mind*, volume 59, 1950.
15. Turing defined the 'computer' as a 'universal machine' (today still called the Turing machine) consisting of three elements (or functions) and which is capable of calculating any algorithm by application of the simplest of operations (cancellation of signs, copying of signs, passage from one internal state to another). The importance of Turing's mathematical contribution is to be found in the thesis that states that it is possible to reduce any calculating machine or any complex software to a simple 'Turing machine' (see Turing, 1996: 250–2).
16. Turing (1996: 252).
17. ELIZA was created by Joseph Weizenbaum (see Weizenbaum, 1966). If this program was particularly successful in imitating therapeutic dialogue, it is in great part due to the fact that it was founded on the particular characteristics of 'non-directive' therapy developed by Carl Rogers. Programs can be found today on the Internet fulfilling the functions of 'automatic agents' which operate as though they were providing information to internet users. They function according to very simple principles similar to those of ELIZA, but nevertheless give the impression to a large number of users that they are conversing with real human beings. The best example of these is JULIA (see Maudlin, 1994; Foner, 2000).
18. Searle (1984: 32).
19. Searle (1984: 32–3). Searle defends this argument on different occasions in the face of criticisms coming from various directions. See for example Searle (1980), which addresses these criticisms and discusses the responses he makes to them; and also Searle (1992).
20. One of the most important aspects of pragmatic ability is that it makes use not only of the verbal dimension but depends also on a variety of information passed through other channels (facial expression, gesture, attitude, etc.). Over recent years, efforts have been devoted to creating computer programs capable of integrating information coming from these channels, and to producing verbal messages accompanied by elements other than words (cf. Cassell et al., 2000).
21. For other associations between the pragmatic dimension and digital culture, see Dresner and Dascal (2001), Dascal (2003: ch. 18).
22. As soon as the problem of language identification by the computer has been solved (and certain progress has been made in this direction), we will no longer have to communicate with it by means of our huge fingers, and the principal obstacle to the reduction in computer size will have been overcome.
23. The Massachusetts Institute of Technology, which claimed to have 'invented' the internet, has announced that its program called 'Oxygen', which has been under development for a certain number of years, will usher in a new revolution in telematics, thanks to broad exploitation of the communicative potential of natural languages.

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