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The social representation of telecommunications

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1 Introduction

For a long time now, sociologists have spoken of the domestication of ICTs to indicate the process of integration of information and communication technologies in domestic life, in the organization of work inside and outside the home, in the fabric of interpersonal relations among family and friends, in the flow of the various modes of communication with all their unstable balance [1–4]. But the studies carried out so far have dedicated little time to exploring how the domestication of technologies of information and communication (ICT) has taken place at the socio-cognitive level, even though this is a fundamental element for understanding the domestication process as a whole. In this paper, we wish to concentrate precisely on this crucial aspect of the domestication process. In other words, our aim is to reconstruct how these technologies have been metabolized in the system of social thought, and the way in which they have been integrated conceptually. At the same time, we wish to propose the methodology of social representations as being particularly suitable for investigating the social meaning of telecommunications.

Our initial assumption is that it is possible to find out about common knowledge of telecommunications, because it has now become 'historiable', to use an expression by Labov (cited in Pratt) [5, p. 141], and has been absorbed into our everyday way of thinking and behaving. And it is crucial to probe into common knowledge of telecommunications, because it serves to illuminate not only the social dynamic of the concept, but also some important features of attitudes towards it and its use. Just think, on one hand of the importance that common knowledge has in the complex negotiations between social subjects entering any technology in the everyday world, and, on the other, of the extent to which today's cultural production is inseparable from the processes and products of technology [6].

The theoretical framework that the present work takes as its point of references, as has been said, that of social representations [7, 8]. This is no new notion in the social sciences. Its origin is Durkheim, who spoke of 'collective' representation, a concept that was reelaborated by Moscovici [9], who placed it on the boundary between the social and psychological.

According to Moscovici, representations are systems of values, ideas and practices with a double function: first, that of defining an order which allows individuals to get their bearings in the material and social world and to control it; secondly, of making communication possible between members of a community by supplying them with a code for unambiguously naming and classifying the various aspects of their world and their individual and group histories [10, p. XIII]. So, all representations tend to transform what is extraneous into something familiar. In the act of being represented a product is generated and transmitted by progressively being elaborated in innumerable places. In all this a primary role is played by communication, which enables us to transform something individual into something social, and vice versa, but also by the information, knowledge and models of thought that are received and transmitted through social communication [11].

How are representations formed? By two processes: anchorage and objectivization, explains Moscovici [12]. Anchorage enables us to incorporate something with which we are not familiar into our network of categories, integrating it cognitively in the pre-existing system of thought. Objectivization, on the other hand, helps to make something abstract concrete, to give ideas a material consistency and to embody conceptual schemes.

Moscovici thus sees representation as an act of thought, by means of which the individual relates to the surrounding environment. The ideas selected in the formation of a social representation are integrated into the 'figurative nucleuses, that is, into a coherent configuration of images that gives them concrete shape and imposes order on them. The figurative nucleus has the characteristics of stability, materialization, specialization of the elements, and these confer on it the status of frame of reference for perceptions and judgements of social life [13].

Various authors have been interested in the relationship between means of mass communication and social representation (see for instance, Rouquette) [14], but studies in this field have generally analyzed how, and to what extent, mass communications influence and reflect social representations. Others have also studied the representation of individual technologies, especially the computer [15] and more recently the mobile phone and the Internet [16, 17]. This research intends to study the representation of telecommunications (and so also mass communications) in se, in an attempt to discover what meaning they have in our everyday reality, people's interpretation of them, and so indirectly what attitudes they have towards them.

The study of social representations seems difficult to pursue on the level of empirical research. This should indeed analyze all the forms of elaboration and reflection which society as a whole produces in relation to an object in all its manifestations: from the media to social and political institutions, from small, medium and large groups to couples, and interpersonal relations in general. In reality, an analysis of this kind is so complex as to make any inquiry and exploration of representation utopian. And yet social representations remain an intuition, which holds a strong attraction for many researchers because, although utopian, it is very useful as a guiding idea. And it is as such that we have applied it to our research.

In the next session we shall describe our methodology and the data gathered, illustrating the strong and weak points. Then we shall go on to present the results of the research and describe first the similarities that emerged among the various information and communication technologies, then the field of representation and then its structure, in the end drawing together all the threads.

2 Method

To describe and understand the level of metabolization of these technologies before the great exordium of the Internet, we used a set of data collected in the course of a telephone survey of telecommunications carried out in Italy in 1996 based on a national sample of 2,100 people over 14 years of age. From within this sample, a random subgroup of 210 interviewees was selected (105 men and 105 women), resident in the four Italian geographical areas, according to the Nielsen division (North-west, North-east, Centre, South and the Islands). These interviewees were asked to freely associate two terms with certain cue words (or inductors). These, apart from

'telecommunications', included 'fax', 'television', 'telephone', 'computer', 'mobile phone', 'radio', 'video-recorder', 'stereo' and 'newspapers.

The cue words used were chosen both from the field of telecommunications in the strict sense and also from that of mass media and means of reproduction.[1] In using the word 'telecommunications', our choice was guided by the assumption that the precise meaning of a term is usually arrived at not only through similarities with analogous terms (so-called family similarities) [18] but also through differences from contrary or dissimilar terms (that is, saying what the concept is not) [19]. This choice enabled us to understand at the same time not only what telecommunications were according to the common idea, but also to see how important the weight of every single communicative technology was in them.

This was particularly important, given that the increasing tendency in the sector was to develop synergies between various technologies, thus making this quantification problematic.

The strong point of the data provided by this research is that they were obtained through a sample that although limited in size was composed of individuals who represented the general population. The weakness is that they were collected in the course of a telephone interview, which is not a priori the ideal instrument for this sort of survey because, as it consists of the spontaneous production of terms elicited by cue-words (chosen in relation to the object under study), it is of a projective kind.

In general, on the methodological plane, most works on social representation are based on language material: interviews, questionnaires, free association, and, even if other methods have been used, we may conclude that as representations move in a sphere which is "firmly anchored to the linguistic-verbal medium as a channel of expression" [20, p. 108], the lexical approach constitutes an excellent technique for the study of representation among populations or groups of differing interests. Many of these studies use content analysis of the single base units, which is easier to conduct today, because it has accumulated quite a good technical/statistical body of knowledge. But this methodology perhaps ends up by creating more problems than it solves, seeing that expecting to understand and catalogue the meaning of a word, outside the context in which it is found—that is, the sentence—is, in the light of de Saussure teaching, an illicit and risky operation. A language can be defined as a system of signs, in which every sign takes on a meaning through its position in respect to other signs. Its value must be defined not in substantial or extralinguistic terms, but contrastive and differential ones. Therefore, content analysis, starting from the headword, that is, from the word's base unit, is not only unable to reconstruct ideas, processes and the articulation of meaning in the sentence, but is not even able to establish with any rigor the meaning of individual words at all. Their meaning no longer belongs to them, as it is the sentence that is the only depository of meaning.

It is starting from these considerations that we choose from among lexical techniques free association, because it gives us access, through its protectional character, to the

[1] We used "telecommunications" as a general cue word because at the time it was the most comprehensive of all the means of communication that we wished to investigate. In that context we had decided to exclude the Internet because it was still so little known that we would not have had sufficient figures to be able to analyze the new meta-medium adequately. In another research project carried out on ICTs at a European level, of 6,609 respondents only 2.7% had access to Internet at home [1].

figurative core. This technique brings out the latent or implicit dimensions (which would be denied or masked in the production of the discourse) but articulates the structure of the characteristic semantic universe of the representations studied, and furthermore enables us to probe into the knowledge and opinions of the object of representation [21].

However, the method of free association, if only because it is based on words elicited through association, limits itself only to reconstructing, not ideas and values harnessed by a concept as a whole, but more modestly the primaeval meanings or the semantic area of the object of representation, observed in a kind of verbal vacuum. By discarding the possibility of analysing expression (relation between form and substance) and thus referring only to the paradigmatic plane, we thus automatically eliminate the level of connotation.

3 Results

The interviewees understood and accepted the technique of free association well, as is indeed always the case [22]; we had a very low percentage of non-answers or "do not knows". For every cue word a 'dictionary' was built up containing all the terms the interviewees had produced; this dictionary was created after certain preliminary operations, in accordance with the classic rules of content analysis [23]. Examination of the dictionaries clearly shows how 'computer' (with 121 different terms) and 'TV' (with 119) were the ICTs whose meaning was explained in the most complex way. On the contrary, 'fax' (with 81 terms) and 'video-recorder' (with 85) were those that were poorest in definitions.

3.1 Similarities between communicative technologies

The object of the initial analyses was to obtain a measure of similarity among the communicative technologies as far as the informational aspect of content was concerned. All possible pairings based on the ten cue-words were considered, and in order to measure the similarity, Ellegard's association index was used.[2]

The similarity matrix between the two dictionaries of terms is given in Table 1.

We applied hierarchic cluster analysis to this matrix, using the Ward method [24]. This method, often used

Table 1 Matrix of similarities between the dictionaries of "Telecommunications" and other nine cue-words

	Fax	Telecommunications	Television	Telephone	Computer	Mobile phone	Radio	Videorecorder	Stereo	Newspapers
Fax	1.00	–	–	–	–	–	–	–	–	

[2] This index is calculated according to the following formula:

$$\frac{n_c}{\sqrt{n_1 \times n_2}}$$

where n_c = number of words common to the two dictionaries; n1 = number of different words in the first dictionary, and n2 = number of different words in the second dictionary. The index indicates values between 0 and 1; the higher the proportion of common words, the closer the index comes to 1.

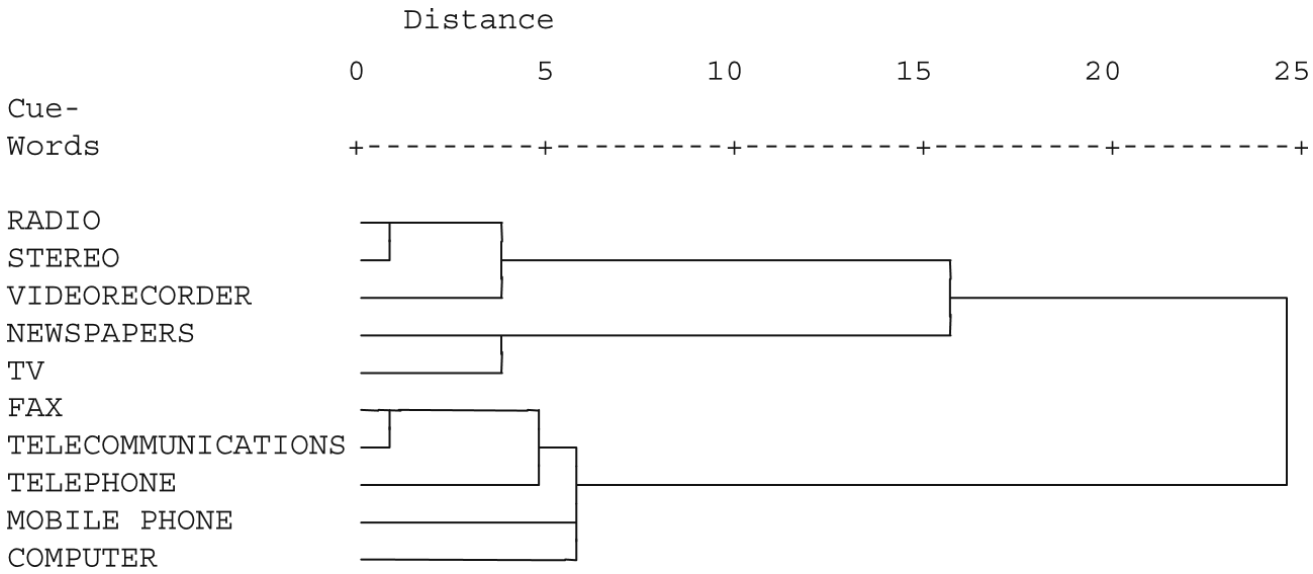
Telecommunications	0.331.00	–	–	–	–	–	–	–	–
Television	0.130.22	1.00	–	–	–	–	–	–	–
Telephone	0.240.30	0.19	1.00	–	–	–	–	–	–
Computer	0.230.28	0.24	0.23	1.00	–	–	–	–	–
Mobile phone	0.280.23	0.18	0.25	0.24	1.00	–	–	–	–
Radio	0.200.23	0.28	0.24	0.25	0.16	1.00	–	–	–
Video-recorder	0.160.19	0.27	0.20	0.27	0.20	0.29	1.00	–	–
Stereo	0.170.16	0.15	0.21	0.18	0.16	0.34	0.29	1.00	–
Newspapers	0.150.18	0.27	0.17	0.17	0.16	0.21	0.21	0.14	1.00

Fig. 1 Cluster analysis: denrogram of the similarities between the ten cue-words

for the analysis of social representations, tends to maximize group homogeneity (Fig. 1).

In the tree diagram of clusters there emerge two distinct groups: the first is made up of the pair 'radio' and 'stereo', the technologies that are most similar to each other, followed by 'video-recorder', and at a lower level of similarity, the pair 'newspapers'– 'television'.

The first ramification of this hierarchical tree actually included the communication



technologies that were furthest away in 1996 from the concept of 'telecommunication'. 'Radio' and 'stereo', in fact, are, the first, a mass medium, the second, a means of reproduction/duplication, which go with a sound message that is listened to. It is a kind of listening that does not require any direct production from the listener. In this context, music, a non-verbal language, is the undisputed queen.

The fundamental attitude of reception, united with the practice of listening, was the link between 'videorecorder' and this sub-cluster. Even though 'video-recorder' is very popular, it is not as popular as 'radio' and 'stereo'; in compensation it brings with it the image and so also implies viewing. However, the dominant sphere remains that of quite passive use.

This first part of the cluster is connected to a second pair, the concepts 'newspapers and 'television'. The ties between the two were quite articulated: they drew their strength from information, chronicle news, current affairs and news. After music, therefore, the other central element in this group was 'information'. With this pair

reading broke in on the scene, drawn in by 'newspapers', and pre-supposing a more specific competence than listening, but which is assimilated to it, in that his own communicative production is not required of the consumer here either. This is in fact a reading that limits itself to the decoding of the message, permitting the subject a certain, if mitigated, passivity.

The second cluster was instead made up of technologies, more precisely 'telecommunications. At the greatest level of similarity we find the pair 'fax'– 'telecommunications', followed at a lower level by 'telephone', then 'mobile phone' and 'computer'. So, we are in the opposite sphere to the first cluster; with 'telephone' we have entered the field of active production and the circular message, which implies management of communication in a complete sense. It is to be noted that among the communicative technologies considered, the most similar, and hence the most representative of the very concept of telecommunications, was unexpectedly the 'fax'.
This first part of the cluster is connected, as we have said, to a second part with 'mobile phone' and 'computer', technologies which in a certain sense could represent a further development and extension of the first part, the 'computer' in respect to the 'fax' and the 'mobile phone' in respect to the 'telephone', but which have tended also to ''hybridise'' among each other. So, the 'mobile phone' was becoming the 'computer' and the 'computer' the 'telephone' through the Internet. It was however difficult to say whether their peripheral nature was to be ascribed to their recent appearance in the panorama of means of telecommunications, or if it was their structural range itself.

In conclusion, the analysis of the similarity between means of communication shows that in 1996 there already existed a scission between the real telecommunication technologies, that is, 'fax, telephone, mobile phone and computer', and technologies which were not telecommunication, such as mass media or means of reproduction of sounds and images. The first were based on technologies that carried circular communication, the second on uni-directional communication technologies. Furthermore, in the first cluster (not telecommunication), we must note the clear distinction between technologies that reproduce sounds and images and those that carry information. The position of the 'radio', assimilated as it was to 'stereo', was yet a further indication that this medium was experienced essentially as music.
From this first analysis what emerged is that the profiles of the different forms of telecommunication and the division and cooperation among them were reflected with clarity and precision in common knowledge.

3.2 Field of representation

These first analyses, however, although they were effective in grasping the similarities between technologies, told us too little about what is really the content of the representation. So, starting from the associations supplied by the interviewees and considering their semantic analogy we constructed some content categories. The responses were then classified according to these categories by two independent judges, and cases of disagreement were resolved in discussion. The semantic categories decided upon were 69.

If we consider all the means of communication and the body of associated terms (2,600) as a whole, the category which in 1996 most frequently defined their semantic area was that of States of mind and Positive impressions (735 terms, equivalent to 28.3%), while in second place we find the category Negative states of mind (209, equivalent to 8%; note that these were less than a third of the positive ones), followed by Information (5.9%). The impact of ICTs was therefore an impact made up of pleasant and gratifying emotions (even if there was also a smaller component of negative emotions and assessments) and Information was an important content in them.
If we now consider the concept 'telecommunications', we find that the most frequently associated categories were Positive states of mind (24.8%) and World of the telephone (19.6%); much lower down we find Rapidity (5.6%). The strong core of 'telecommunications' was, at the level of technology, 'telephone', its accessories and instruments.

Let us now proceed to analyze the technological devices one by one. 'Fax' was above all Rapidity (17.5%), Positive states of mind (15.1%), World of the Telephone (13.1%), Paper and Communication (both 6.4%), Handiness (5.6%) and Mail (5.2%). So, the 'fax' was perceived as a handy and rapid telephone, which sent a postal message on paper on matters of business.

The terms associated with 'television' belonged first of all to the category Positive states of mind (24.5%) and secondly to the opposite, Negative states of mind (11.7%), thus highlighting the existence of an ambivalent relationship with this device. There followed the categories Information (9.5%), Genres (7.3%) and World of TV (6.2%). 'Television' was also very much defined by its accessories, as well as the content modes it carried with it, that is genres, which were the keys to access to TV. The emotional impact of the telephone was without doubt positive; indeed the category most frequently attributed to this instrument was Positive states of mind (32.6%). Way behind we find the categories Communication (10.7%), Handiness (10%) and Dialogue (8.2%). In contrast to 'television', 'telephone', defined less by its accessories, is referred to above all by the concept of handy and dialogical communication.

'Computer' was defined in terms belonging to the categories Positive states of mind (32.2%), World of Information technology and Work (both 8.6%), Negative states of mind (7.4%) and Science and Technology (6.3%). The relationship with 'computer' was therefore positive, as in the case of 'telephone'. Even more than 'television', it relied on its accessories for its definition of itself and was well inside the area of advanced and innovative work. The quota of Negative states of mind associated with it should probably be attributed to the difficulty in using it, and with the accompanying frustration and irritation.

The mobile phone was on the other hand more frequently associated with Negative states of mind and emotions (26.4%), closely followed by Positive ones (23.8%). We also found categories like Handiness (14.2%) and Work (5.7%). The mobile phone was the only instrument whose emotional impact was more negative than positive; in compensation it was considered very handy, above all, at that time, in the work sphere.

'Radio' also elicited mainly Positive states of mind (35%); there followed Music (14.6%), Company (8.1%), Information (7.7%) and Negative states of mind (5.8%). 'Radio' was therefore the instrument that attracted the maximum number of positive

evaluations and emotions and a relatively low number of negative judgements. It was seen essentially as Listening to music, Company and Information.

As for 'video-recorder', the most frequent associations belonged to the categories of Positive states of mind (32.9%), Genres (17.5%), Negative states of mind (8.5%), Cassette (8.1%) and Handiness (6.5%). So this instrument, apart from the positive emotions and judgements, had a stronger connotation of handiness inasmuch as it was used with television and was characterized by the cassette, its mobile physical support. 'Stereo', which was second only to 'radio' in its receiving a high percentage of Positive evaluations (34.9%), was furthermore defined as Music (18.7%), Musical instruments and equipment (7.9%).

Last of all, 'newspapers' were perceived as Information (32.3%), Positive states of mind (26.2%), Culture (10.4%), World of the Press (7.2%) and Negative states of mind (6.1%). Furthermore, like 'computer' and 'TV', 'newspapers' were also defined by elements in their sphere of action (World of the press). It must also be noted that the presence of Culture was quite strong here.

3.3 Structure of the field of representation

To recognize and properly illustrate the structure of the field of representation and its dimensions, we subjected the frequency matrix (with 69 lines, the categories, and 10 columns, the cues) to factorial analysis of simple correspondences [25]. This analysis enabled us to also give a synthetic picture of the meanings attributed to 'telecommunications and the individual technologies considered. Now, given that meaning is attained in the mind—we repeat—by oppositions such as 'beautiful' or 'ugly', 'good' or 'bad' (that is, through dissimilarity) or by aggregations (that is, through similarity), the oppositions and aggregations that we are now going to describe in reality serve to illustrate how the semantic space of these concepts was organized in 1996.

From the correspondence analysis six dimensions emerged which together explain 85% of the total inertia. If for the interpretation we consider the means of communication and the semantic categories that explain a significant quota of the variance of each dimension, and which therefore had a considerable weight in the origin of the dimension itself, we see that for the first dimension (21.5% of the total inertia) the technologies involved are 'fax', 'telecommunications' and 'newspapers', and the semantic categories are World of the Telephone, Rapidity, Information, Music, Mail, Message, Culture, World of the Press, Transmission, Paper, Genres, Communication, Work and Company.

Observing now the co-ordinates which enable us to position the technological devices and the categories at the positive and negative poles of the dimension itself, we notice an opposition between 'fax' and 'telecommunications' on the one hand, and 'newspapers' on the other. This opposition reconfirms both the special role played then by the 'fax' in the field of telecommunications, and that 'newspapers' were not perceived as 'telecommunications. As for the categories, the World of the Telephone, characterized by Rapidity, Transmission, Message, Communication, Mail and Work, was situated at the antipodes of Music, Information, Culture, Genres and World of the Press. This opposition reveals what the characteristics and important elements were in the world of telecommunications—the first—and which ones were not—the second.

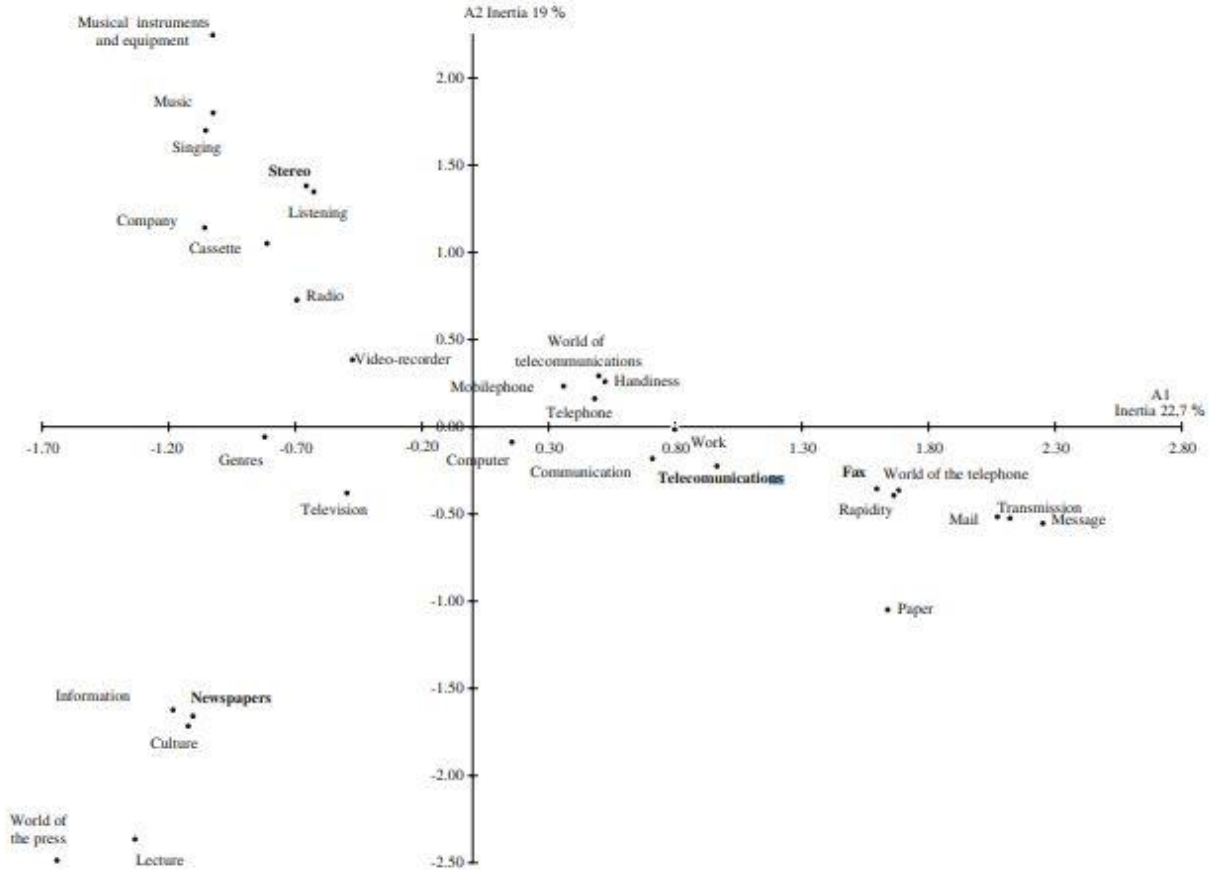
The second axis (20.4% of the total inertia) opposes, as far as the devices are concerned, 'stereo' to 'newspapers', shedding light on the fact that the non-

communicative area was internally not seen as homogeneous. In fact, the collocation of 'stereo' in the semantic space in a position opposite to that of 'newspapers' showed that they were very different means of communication even though they belonged to the same non-telecommunicative area. Indeed, as far as the categories are concerned, this second axis opposes the elements which distinguish 'stereo', that is, Listening, Song, Music, Musical instruments, Company, Cassette, Sound, to those which characterise 'newspapers', that is, Information, Culture, World of the Press and Reading. And in fact this is where one category, Reading, became relevant, a category which was not made explicit in the preceding dimension. In other words, this opposition, accepting the fundamental characteristic of 'stereo' as Listening, also brought out the mode of fruition of 'newspapers', that is, reading.

These two orthogonal axes create a plane in which means of communication and categories group together in 'semantic clouds' enabling us to explore the meaning of the individual technologies (Fig. 2).

Fig. 2 Plan of the space defined by the first two axes: correspondence analysis is in a file apart EXCEL

From an analysis of this field, it emerges that 'telephone' and 'fax' were experienced as the only depositories of telecommunication in the strict sense, furthermore representing one of the modern versions of Mail, that is, Transmission of Messages. On the other hand, 'newspapers' were the only ones to have the prerogative of Information:



what is meant by this is that even at that time real information was considered written information and was transmitted through reading, not viewed (on TV) or listened to (on the radio). Secondly, they were the means of communication, which more than any

other were perceived as the vehicle of Culture (but, it must be remembered, books did not come into this research). On the same plane a cloud was also delineated by what we might call Musical reproduction, close to 'stereo' and Musical instruments and equipment in general. It is a semantic area characterized by Listening, Music, Song and Sound.

In particular, the plane originating from these two first axes also shows a juxtaposition between interpersonal, verbal and circular communication on the one hand ('fax' and 'telecommunications') and, on the other, uni-directional mass communication, ('newspapers' and 'stereo'), which was either verbal-written or audio-oral.

The third dimension was placed at the Antipodes—still inside the non-telecommunication field—of video-less technologies, that is, 'radio', 'stereo' on the one hand, and video technologies, such as 'video-recorder', on the other. This time it was the physicality of the technological device, the having or not having a certain physical support—video—that illustrated the potentiality and characteristics of communication technologies, which at the time were creating new similarities and dissimilarities among themselves. The intrusion of 'radio', which took its place in this dimension together with 'stereo' owing to the elements that it had in common with it, such as Music, Listening and Company, added an informational connotation to the picture (news broadcasts) through Information and Rapidity (of the same), as well as close relations with the World of the Press (another great pole of information) and the 'telephone'.

The couple 'radio' and 'stereo', which linked a mass medium—the radio—with one which was more exactly centred on the reproduction of music, were opposed in this dimension to another means of reproduction, but supplied this time with a screen—the 'video-recorder', which brought with it apart from Genres two categories which had not appeared so far: Image, its structural mode, and Handiness, a characteristic of how it works. The use of the video-recorder furthermore was also accompanied by Negative states of mind and brought into the limelight its material support: the Cassette.

The fourth dimension describes an opposition between 'fixed telephony' and 'mobile phone' on the one hand (it explains the 50% variance of 'mobile' and 29% of 'telephone') and 'video-recorder' and 'fax' on the other. So this dimension cut across telecommunication technologies such as 'telephone', 'mobile' and 'fax' with non-communicative technologies, such as 'video-recorder'. It revealed important similarities between technologies which perhaps belonged to opposite fronts, such as 'fax' and 'video-recorder', and differences, even important ones, between technologies which belonged to the same front ('telephone' and 'mobile' vs. 'fax'). In respect to this axis, the semantic cloud in which we found 'mobile' included the categories Costs, Clothing, and Vehicles. The 'mobile phone' furthermore shared with the classic 'telephone' Dialogue, Friendship, and Communication, and inherited from it, at the same time enlarging them, categories such as Emergency, Handiness, Work and Negative states of mind. In respect to the same axis, at the opposite pole 'fax' revealed a close connection with Paper, Speed, World of the telephone and Transmission of messages. 'Video-recorder', on the other hand, took its place in the area of World of TV, Musical instruments and equipment, Reproduction, the Cassette, Genres, Radio and TV programs, Image, and Company.

This fourth dimension displays the salient features of 'mobile', that is, the importance of its collocation in the sphere of Clothing, with its harmonization with a person's look. It also underlines that it is perceived as a nomadic technology on the body: in fact, this

instrument is still seeking a place on the human body (inside the pockets, small pockets, behind the belt, in the bag, in the case, the man's bag?). The mobile phone seen in this dimension is still a technology that accompanies mobility everywhere (commuter travel, business trips, work, tourism). This same dimension reveals the great incidence of costs in using it and stresses the aspects that the 'telephone' and 'mobile phone' have always had in common, their value, that is, dialogue, friendship and communication. Examination of this dimension reinforced the aspects that traditionally belonged to the 'telephone', but which then shifted to the 'mobile phone', such as their importance in emergencies, their handiness and work. This dimension therefore also illustrated the negative aspect which seemed to be growing steadily with the 'mobile phone': the negative states of mind and emotions that it caused owing to its having upset the rules that governed public communicative spaces.

The opposite pole of this fourth dimension shows new aspects not so much of the 'fax', as the 'videorecorder', which was positioned here between the World of TV and the World of Reproduction equipment.

The fifth dimension is generated by 'computer' (whose 74% of variance it explained) and 'telephone', to which it is opposed. So this is an opposition that exists inside the field of telecommunications (inasmuch as both 'telephone' and 'computer' formed part of it), and which revealed further information about these two technologies, specifying in particular the profile of 'telephone'. Observing the semantic categories, in fact, we saw that 'computer', apart from the World of Information technology, was associated with values such as Energy, Science and technology, Work and Games. On the opposite side, next to 'telephone' (whose dimension covered 31% of variance) we find categories like Friendship, Human body, Cable, Dialogue and words, Communication, Handiness and World of the telephone.

'Telephone', compared to 'computer', put the category Emergency in the shade, while it acquired three more categories which appeared for the first time: the World of the telephone, Cable and Human body. As for the first, it can be explained by the fact that the accessories and extensions of 'telephone' had come into the foreground, recalled first of all by the fact that 'computer' was also supplied with printers, modems and so on (World of Information technology). The 'telephone' furthermore also had Cable, as it was an element able to strongly condition 'computer' in its most recent extensions (the Internet, for example), in that the 'computer' could go on expanding only thanks to the telephone cable. And last of all 'telephone' was explained by the category Human body, and in particular by the voice, which humanizes it, representing, in Ong's words [26, p. 44], 'the connection with the most intimate aspects of human existence, its inner life and its opacity'. On the contrary, 'computer' had to compromise with the absence of this category.

This dimension furthermore tells us that the involvement of 'computer' in Work was greater than that of 'telephone', which was also, as we saw previously, characterized by a strong association with the world of work. In fact when these two technologies were compared it was 'computer' that maintained this category, not 'telephone'. Furthermore, 'computer' turned out to be an instrument that needed and was able to release energy, and which is the instrument par excellence of science in all its forms. The future of science and technology, and not only in the present, is strongly associated with 'computer'. To save it from too much seriousness it took on the category of Game, the contrary of Work, but functional to it as a moment of relaxation, which also became

a moment of learning new kinds of competence, and training to use a certain kind of interface. Game in this case therefore had become a play-functional moment.

However standing in opposition one against the other these instruments also came to have a negative identity, not only positive. The computer, for example, in 1996 was neither communication nor information. It had not yet passed over to communication, notwithstanding e-mail. So 'computer' was placed among 'telecommunications' more as a potential presence than real, a 'means of telecommunication in the process of becoming'.

What is more, the computer was not associated with the human body, because, as opposed to the telephone, which is supported by the body (we hold the phone in our hand and we put it to our ear), it stays a certain distance away from the body, which thus tends to be forgotten, annulled.

The following contribute to the sixth dimension in an important way: 'television' (only 22% of whose variance it accounted for), 'telecommunications' (only 20% of whose variance it accounted for) and 'fax'. Here, the opposition was played out between the first two cues 'television' and 'telecommunications', and 'fax'. As for the semantic categories, we find that Image, Programmes, Game, Invective, World of TV and Screen, together with Science and Technology, Friendship, World of Information Technology, Dialogue and Words revealed an intense affinity with the first two cues; on the contrary, Rapidity, Message, Paper, Handiness and Work accompanied, as usual,
'fax'.

This dimension developed therefore into a mixed telecommunicative and non-telecommunication sphere and shows which of the non-telecommunicative means of communication would in the near future become 'telecommunication': 'television'. It is the first time 'TV' appears, and it would be well to focus on this instrument.

When we go and see what 'television' was then, we discover that it was endowing the world of telecommunications with the screen, the physical support capable of carrying images (apart from that, nothing new in respect to 'computer', a means of communication that already possessed a screen and image), but above all the programs, that is, the management of the palimpsest, a rich supply of entertainment and information programs, ready for consumption. In this context even the Game, which TV could offer was different from a videogame, because it did not form part of the individual-machine interface, but of the sphere of artificialized interpersonal communication (it is no accident that we take part in games on TV by phoning in....). 'TV' was strong in its accessories, such as the remote control, etc., but it also contained a disturbing category: Invective.

At the same time, 'TV' shared with 'telecommunications' elements such as Satellite, Cable and Brands, and values such as Friendship and Dialogue, which are exactly those that explained the relationship between 'TV' and 'telecommunications'. And it is in this precise common area that we must look for the reasons and explanations why 'television' becomes 'telecommunications'. So, this dimension, apart from explaining the telecommunicative aspect of television, (that is, a more communicative and interactive kind of television), also described the dynamics and the transformations in progress in the telecommunicative and non-telecommunicative spheres. This analysis offers us a description of the structural meaning of the telecommunicative world and the dynamics existing among the various ICTs, by giving a profile of the individual means of communication in a precise historical moment. What emerges is an articulated fresco of

middle- and long-term dynamics in this sector, which seems very little influenced by the heated critical debate, as results also in other research [27], over the functions and social consequences of the use of these technologies.

4 Conclusions

A great deal of interesting data emerged from this research. Above all, in 1996, although many of these technologies were quite recent and not very widespread, the process of their conceptual integration into the system of social thought had already taken place. Perception of ICTs was on the whole very positive and social knowledge showed that it had absorbed a precise and articulated structure of ICTs, as well as the characteristics and weight of each single technology. In particular 'radio' was the means of communication that attracted the largest number of positive judgements, while 'mobile phone' and 'TV', for different reasons also attracted negative emotional reactions. But the most representative element of the concept of telecommunications itself was the telephone, with its accessories, especially the fax, whose role indicated the permanence of the importance of writing (see the subsequent explosion of SMSs). The telephone and fax were the 'known', which was like a bridge to metabolize the 'unknown', that is, the computer and mobile phone.

Secondly, information and communication technologies at first impact were experienced on an emotional level. That is, it was the emotional and unconscious world that was the door through which these technologies entered the collective experience and it was therefore the emotional fabric that was the way in which they were anchored to the network of preexisting categories. This process shows why persuasion techniques (advertising, but not only) are so effective in means of communication, and why these latter can be used so effectively and dangerously to manipulate people.

Third, basic elements in the process of objectification of information and communication technologies, such as the processes of tautology, of reducing the whole to one of its parts and of using a word with a wider meaning for the more restricted one, probably created a favorable terrain for the development of synergy and hybridization. It is no accident that we find them again also in later research on the mobile phone
[28].

But this methodology has not only supplied a detailed description of the cognitive integration of the various means of communication, but also shown, which is much more important, a notable predictive capacity. The fact that the listening/reading dimension turned out to be clearly separate from the writing dimension revealed important middle- and long-term trends in the communicative sphere, such as the invasion of the Internet by the press, the transformation of TV into telecommunication but also the failure of the internet in TV, ICTs taking over music and the inclusion of the mobile in the fashion system.

(a) If, on one hand, reading has always remained firmly connected to the printed page (newspapers), not to the computer (because we still read mainly on the printed page, not on a video screen), on the other, it is also true that paper was a concrete support for the fax, not for newspapers. Which means that newspapers were already showing a certain level of independence from paper, prefiguring important developments on the Internet. At the same time, the fact that ''newspapers'' were

not perceived as "telecommunications" already showed then the difficulty that there was going to be in the development of interactivity, also in the electronic version.

(b) Among the non-communicative technologies, there is one, TV, which was also perceived as attempting to change into 'telecommunication', that is, into becoming more communicative and interactive. At the same time, the persistence of the separation between the dimension of listening/reading and writing was also a presage that attempts to introduce the Internet into the small screen would not have any great success.

(c) Telecommunications in general, and the computer in particular, were also making strong inroads into the non-telecommunicative field, attracting for the moment not so much other means of communication, as a specific content: music. This was particularly true in the case of the 'computer', which not by accident has been enriched by loudspeakers, in the same way as a stereo set, and has allowed us to listen to background music, like a radio.

(d) Another important result was that for the first time the mobile phone was frequently associated with clothing and fashion, thus emphasizing the need that the wearable communicative technologies had had to harmonize with people's way of dressing [29–31]. This result was to be confirmed by further research [32].

Last of all, if we wish to draw up a balance of the effectiveness of the methodology of social representations proposed and applied here, this can only be positive, as this method has shown that it is an effective strategy for studying the domestication of information and communication technologies at the socio-cognitive level. And so studies such as this could actually be complementary to those carried out on a large scale, such as the big "Virtual Society" project, which has developed and put into use a large variety of methodologies and approaches to the investigation of the role of electronic technologies in changing social and organisational behaviour [1].

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