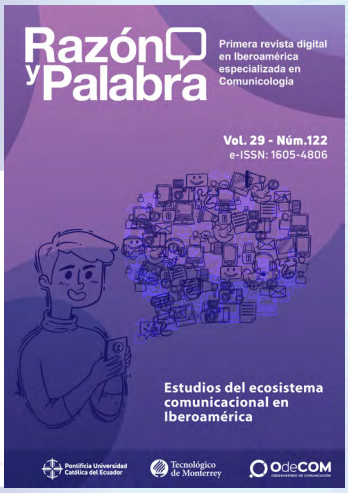
Razón y Palabra
Vol. 29 - Nº 122
Enero - Abril
2025

e ISNN: 1605-4806
DOI: https://doi.org/10.26807/rp.



Transformations of Communication Referents: from Iconicity to Virtualisation

Transformaciones de los Referentes de la Comunicación: de la Iconicidad a la Virtualización.

Fecha de envío: 01/12/2024 **Fecha de aceptación:** 25/12/2024

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DOI: 10.26807/rp.v29i122.2210

Introduction and summary

This text is a transcription of the lecture delivered by the author on 12 September 2024. It was presented as part of the tribute Manuel Martín Serrano received from the extracurricular seminar "Organisation, Communication, and Culture" at the Universidad Nacional Autónoma de México and was broadcast from the Auditorium of the Universidad Complutense de Madrid to the Conference Room of the Multidisciplinary Research Unit II at the Faculty of Higher Studies Acatlán.

The lecture tells the story of how the Theory of Communication became scientific, as the speaker has lived through and participated in these significant transformations. This printed edition preserves the colloquial tone of the oral presentation.

The thread connecting these changes is the transformation of communication referents, which the author terms "sociohistorical" (see section 2).

First, the author analyses the transformations of referents in the multi-referential and synchronous images of television (see section 2.1) and explains how and why the paradigm of social mediation emerged (see section 2.1.1).

The following alterations of referents are carried out by users of virtual networks (see section 2.2). The author discusses how cybernetics concepts and methods have been applied to the virtual uses of digital technologies (see section 3). These applications make it possible to control the effects of communication according to the communicators' designs, thus creating future scenarios from which choices must be made, some more desirable than others. Cybernetics, future scenarios, and utopias (see section 3.1) have established connections to guide these designs.

The Theory of Communication has been restructured to fit new scenarios. It is shown that it now shares affinities with other disciplines that work with information (see section 4). It is indicated that the Theory of Communication is clarifying the anthropological dimensions and sociohistorical effects of communication uses (see section 5).

The text concludes with reflections on the teaching and learning of the Theory of Communication in a virtualised world (see section 5.1).

In the "References" section, the bibliography used for the oral lecture has been expanded with freely accessible publications from the Universidad Complutense de Madrid repository. Notes have also been added.

1. Innovations in Information Technologies that Produce "Sociohistorical Changes"

In this presentation, I will explain why the conception of information and communication, as it was understood until the 1960s, has transformed. I will outline how it has changed and describe the technological innovations that have promoted these transformations...

...It is an intriguing story about the reconstruction of knowledge. Knowledge related to the Theory of Communication, and consequently, all knowledge that operates with information. A story that will be lost when those of us who participated in these transformations are no longer around, as it is not reflected in our writings.

Those who have invited me to speak to you wish for me to share my role in these transformations. So, I will tell you the story of how the Theory of Communication became scientific, as I have experienced it.

.....

The innovations in information and communication technologies that I will mention have been so influential as to generate "sociohistorical changes". "*Sociohistorical changes*" *are the irreversible social transformations brought about by these innovations*.

For example, the invention of writing and reading were sociohistorical changes[1]. This invention was preceded by pictograms[2]. In Eurasia, writing and reading emerged during the Neolithic period. They coincide with the time when societies, previously hunter-gatherers, began organising their lives into settlements, transforming into agricultural and pastoral societies[3]. The Sumerians –ancient inhabitants of what is now Iraq– are believed to have

1 The first sociohistorical changes are associated with the invention of external memory. "External memories" are the mediums on which information is preserved. The earliest media were made of wood, bone, and stone. Later, they were made of clay or papyrus, and subsequently of leather and paper. The information stored in "external memories" endures after those who stored it have disappeared (Velarde, O. and Martín, M. 2022).

2 It is necessary to distinguish two stages in this production of information:
The first engravings discovered so far were made by our ancestors in South Africa, believed to be around 120,000 years ago. It is possible that they were not the beginning but rather the continuation of a practice of objectifying information on durable and transportable media, which may have been practiced by other human species before ours. The content of these messages has not been deciphered because we are unaware of the things they symbolise (Henshilwood Ch, et al. 2002).
The sapiens continued producing these proto-writings for over 100,000 years and left behind their wooden and bone media, as well as painted testimonies on the walls of the spaces they occupied during that time.
The next stage began sometime before 3000 BC. It was when alphabetic symbols were invented, and with them, writing, which at the same time marked the invention of reading. The reading of these messages is possible because the alphabetic symbols represent how words are pronounced.

3 Our species, Homo sapiens, has been in the world for more than 315,000 years. If the existence of sapiens were equivalent to the 24 hours of a day, we have been able to write and read for only the last three and a half hours.

been the first writers and readers[4]. In America, this invention also occurred independently[5].

2. Transformations of Communication Referents

The sociohistorical changes I will mention begin at two key points in time:

- The first, when the theories emerged. The theoretical foundation for these changes has existed since 1948, when Norbert Wiener described cybernetics and defined the scientific concept of "information" in a book I will refer to later.
- The next date marks when these theories were applied to technologies. This application began approximately 40 years later, around 1990, when virtual networks began using these theoretical concepts for the analysis and communicative practices.

Notice that theory has preceded its applications, as often happens when knowledge is reconstructed.

Describing the sociohistorical innovations brought about by these technologies provides an opportunity to explain how the Theory of Communication became scientific. To present this change, it is best to start with the transformations of technology.

Well then:

The technological modifications that must be taken into account are related to transformations in the referents of communication (which is the title of this lecture). "Referents" –as many of you know– are *the entities about which communication occurs*[6].

The significance of the modification of referents can be seen by comparing how they were perceived in 1948 –the year Wiener's book was published– and how they are presented now, in 2024, in "Artificial Intelligence":

- In 1948, audiovisual communication existed in motion pictures. The referents were found in entities that existed in the real world[7].
- If we return to the present, algorithms in "Artificial Intelligence" sometimes do not show their referents, or they create referents that do not exist and are indistinguishable from the existing ones.

The idea that the transformation of communication referents would generate sociohistorical changes was already explained in the book *"Teoría de la comunicación: epistemología y análisis de la referencia"*. It was published in 1981 and introduced the newly founded Department of Theory of Communication at this Madrid-based Faculty from which I am speaking to you. It has been the most widely published book on the Theory of Communication in Spanish[8].

It was just 2,600 years ago that literate societies began writing narratives in which they documented the events that occurred to them.

4 The Sumerians, ancient inhabitants of what is now Iraq, are believed to have been the first writers and readers. It was then that these earliest written sources described the collective identities with which these groups sought to perpetuate themselves, differentiating themselves from other groups. At the same time, the information contained in these written sources marks the beginning of History and the end of 312,000 years of Prehistory (Durant, W. 2010).

5 In Mexico, around 900 BC, the Olmecs invented a syllabic writing system, independent of the alphabets of the Old World (Pérez, T. 2012).

6 n *Theory of Communication: Epistemology of Communication and Analysis of Reference* (Martín Serrano, M. 2007a), the concepts "Objects of Reference" and "Data of Reference" are presented (pp. 177-190).

7 Learn more: (1990) Martín Serrano, M. *Social Transformations Linked to the Audiovisual Era*.

8 1981 (1982...2011) Martín Serrano, M. *Theory of Communication: Epistemology* of Communication and Analysis of Reference. Includes three chapters written by other authors. Cuadernos de Comunicación Alberto Corazón (Ed.)

In this book, I explain that the way of testing the objectivity of information since the advent of writing was going to be disrupted. This verification consisted of comparing what is said with its referents. I wrote that if the referents are manipulated, the objectivity of the information cannot be verified. In fact, that is what has happened, and this comparison has been broken. "Disinformation" –which is, in reality, information that falsifies the referents– is the consequence of that referential manipulation.

The two innovations in communication technologies that transformed the relationship between messages and their referents and have had sociohistorical effects are as follows:

- The first innovation began in the 1960s when televisions were introduced into households.
- The second emerged in the 1990s when virtual networks began operating.

First, I will explain the epistemological adventures, as interesting as they were unpredictable, that were promoted by the introduction of televisions into households.

2.1 Transformations of Referents in the Multi-referential and Synchronous Images of Television

Television is an audiovisual medium, just as cinema was, and in both, users can choose between the referents offered by the images; these are as numerous as the different entities being reproduced. For example, in the broadcast of a parade, some people may focus on the military uniforms, while others may focus on the horses.

The images in television and cinema are multi-referential[9]. However, television introduces two innovations that no other audiovisual medium has:

- First, television is viewed in households: there is no need to go to a public place, such as a cinema hall. This domestic setting for televisions changes not only the spaces but also the times and criteria with which referents are chosen. For example, while the television is on, people talk, move around, and engage in other activities.
- Second, television messages can be broadcast in real-time, synchronising with the events being captured and reproduced.

Television broadcasts unforeseen events, as happened when the assassinations of Kennedy and later Oswald were aired. In such cases, television narratives can be synchronous with the unfolding of their referents... (but it is important to note that this synchronicity is lost if there is a loop that introduces a pause between what happens and what is broadcast).

When there is no such loop, those watching the *multi-referential and synchronous* images of television can understand the information presented to them, making it unnecessary for professional mediators to interpret the events.

These referential modifications introduced by television have had consequences for the functions of communication: specifically, they have affected the effectiveness of public communication in maintaining consensus. Recall that public communication is used, among other things, to provide shared views of what happens, especially when unforeseen events occur for which no shared perspectives previously existed, such as when the 9/11 attacks occurred[10].

The weakening of consensus occurs in television when users themselves interpret the meaning of the messages. To the extent that the population applies this cognitive autonomy,

Madrid, Mexico, Colombia, Cuba, Honduras, Nicaragua.

9 Learn more in *Las transformaciones sociales vinculadas a la era audiovisual* in Martín_Serrano_(1990)_Transformaciones_era_audiovisual.pdf (ucm.es)

10 Public communication is one of the institutions that socialise, alongside family, churches, or schools. This control function has been facilitated while public communication was printed, achronous, and unidirectional. All forms of public communication, since its operation in assemblies, have used communicative strategies that influence collective representations to maintain social reproduction. These strategies promote certain representations to interpret what is happening and aim to discourage views that are considered disruptive.

representations of what happens are divided into a greater diversity of interpretations.

2.1.1 Emergence of the Social Mediation Paradigm

In the 1960s, while television was being introduced into households, it was understood that consensus is the bond that unites members of a community. If it is lost, social cohesion fractures. Shared identities dissolve. Collective projects fade away[11].

Communication theorists were asked to clarify whether the visions of societies disseminated in television programmes could still maintain social consensus, as printed texts had done up until then and for centuries. The way to determine whether television still fulfilled this consensual function was clear: *analyse the content of its narratives*.

However, the content analysis techniques available at the time were designed for written and oral texts. New methodologies had to be created to analyse audiovisual narratives.
In this task, a variety of specialists from multiple fields, who had never before nor have since gathered, became involved:

Semioticians, disciples of Ferdinand de Saussure; cultural anthropologists; critical sociologists; genetic psychologists; culturalist psychoanalysts; existentialist philosophers...

All of these perspectives, and more, were bubbling with creativity in the same place and at the same time –in France, from 1966 to 1974.

I was fortunate to be in that place and time to participate in these theoretical and methodological explorations. I developed content analysis models based on logic[12]. With them, I identified "The Narrative Structures of Television Narratives"[13].

In approximately three out of four cases, these narratives corresponded to one of these two models: either they were *parables, or they were epics*.

Parables and epics narrate *the social identity recognised for each character, and the existential security* offered to them... But "identity" and "security" are granted on the condition that the character –for example, the hero of the narrative– ends the story integrated into his/her belonging groups.

The reward the hero receives is that "his/her group accepts him/her"; or more precisely, the hero acts to prevent "his/her group" from excluding or rejecting him/her[14].

11 Learn more in Martín Serrano, M: 2012a Cuándo y cómo se hizo científica la Teoría de la Comunicación. Desarrollos y funciones previsibles en un mundo que se virtualiza (ucm.es).

12 Learn more in Martín Serrano, M. 2008a:"Los modelos de la mediación se identifican mediante su puesta a prueba con modelos lógicos". En *La mediación social. Edición conmemorativa del 30 aniversario* (pp. 71-81). Madrid: Akal. Martín_Serrano_(2008)_Modelos_mediación_lógicos.pdf (ucm.es).

13 Martín Serrano, M. (1974). *Structure du discours iconique à la Télévision.* Université Louis Pasteur, Strasbourg, France. In *Razón y Palabra*, *72*. http://eprints.ucm.es/11055/. Spanish translation: *La estructura de la narración icónica en la Televisión*. http://eprints.ucm.es/11056/) .

14 Learn more in Martín Serrano, M. (1998): *La gesta y la parábola en los relatos de la comunicación pública.* En C. Bargalló et al. (Coords.), *La lengua española y los medios de comunicación. Primer Congreso Internacional de la Lengua Española* **(pp. 357-375). Spain: Instituto Cervantes; Mexico:**

Parables and epics operate with the human need to belong to a community.

At their core, they are oral narratives, preserved in the stories that Vladimir Propp refers to as "fairy tales," including Cinderella, Snow White, and Tom Thumb. These are stories we tell our children, perhaps without realising that we are reproducing very ancient myths, some of which were created over eleven thousand years ago, to pass down to successive generations of hunter-gatherers – who lived in small, highly mobile, and vulnerable communities – examples of cooperative behaviour[15].

By the way, for students wishing to specialise in the anthropology of communication:
Imagine how fascinating it is to follow the analysis of fairy tales made by Vladimir Propp, as well as to dedicate oneself to interpreting the rest of the myths that describe the beliefs, hopes, and fears of all civilisations; analyses carried out by cultural anthropologists, such as Levi Strauss.

Let me go back to my presentation:

Imagine the surprise when I showed that parables and epics were the narrative structures used to promote consensus in public communication, at a time when the expressive resources of television were available[16].

Secretaría de Educación *Pública/*Siglo XXI. First published in 1986). http://eprints.ucm.es/11061/.

15 In fairy tales, the representations of the oldest ethnocentric bonds that have survived to this day are preserved. They are intended to help the youngest internalise the idea that they must prioritise the existence, permanence, and continuity of their group over the satisfaction of their personal needs: both material and emotional. The priority of community reproduction, to which the children belong, is illustrated with stories as threatening as that of Tom Thumb and his siblings, abandoned by their parents in the forest during times of famine; or with the story of Hansel and Gretel, condemned to be fattened and eaten for having strayed from their village without permission (Martín Serrano, M. 2004 and 2012).

16 Content analysis clarified that the narrative structures of epics and parables, in both television and print media, adapt to reproduce worldviews that align with the social system emerging at the time. It was the 1970s when industrial society transformed into a monopolistic capitalist society. See the examples of these transformations, among others, described in Martín Serrano, M. (1977) *La Mediación Social*.

Industrial society rests on universalism. Parsons, T. (1966). Television has rooted itself in particularism.
Industrial society demands neutrality in affectivity. Weber, M. (1967). Television imposes compulsive affectivity.
Industrial society is a system of approvals. Fromm, E. (1967). Television offers love instead of prestige.
Industrial society stimulates initiative through competitiveness. Schumpeter, J. A. (1968). Television rejects initiative. A competitive character struggles against definitions and norms alien to their group, not against other members of the group.
Industrial society justifies effectiveness through scientific direction, not through the existence of exceptional individuals. Taylor, F. W. (1911). Television places security in the actions of charismatic leaders.
Industrial society imposes particularism in desires and submission to norms. Veblen, T. (1964). Television demands that desires be universalised and norms relativised. It bases solidarity on "the community of desire".
Industrial society proposes hedonism as the motive for behaviour. Veblen, T. (1964). Television proposes security.

- Industrial society fears sexuality. Horney, K. (1964); opposes sex to culture. Freud, E. (1968); subordinates pleasure to productivity. Reich, W. (1952); and transforms eroticism into luxury. Sombart, W. (1965). In contrast, television employs sexuality as an ethnocentric bond. It frees Eros from productivity and places it at the service of consensus. It democratises eroticism and offers it as a technique for being accepted. Sexual pleasure – understood by industrial society as a domain of private satisfaction – moves to the domain of collective activities in television.

As I have mentioned, parables and epics reproduce in the narrative the bond between the characters and the social organisations to which they belong – for example, with their family or their group of belonging. This bond is presented as a necessary condition for the characters' actions to be legitimate and successful.

The integration of these three dimensions into a single narrative:
- Information, organisation, action -
was, as I proposed, a form of mediation...
The oldest form of mediation, which I termed "social mediation".

Here is a definition of social mediation that helps clarify its nature:

> *"To mediate" is "to operate simultaneously*
> *with the action that transforms,*
> *with the information that shapes,*
> *and with the social organisation that links, to introduce a design"*[17].

This definition highlights that mediators strive to control changes *according to their designs*. "*Designs*" are the purposes pursued by the eight human species that, as of now, are known to have preceded Homo sapiens, our species.
All of them modified the environments in which they operated and organised their societies according to their own designs...

Since designs respond to values, they are specifically human actions with which humans adapt to the worlds they create. In these worlds, they thrive for hundreds of thousands of years as long as the physical or social modifications they generate remain compatible with natural laws.

This confrontation between the alterations of natural and social ecosystems and the tolerance limits for such changes set by nature is the permanent condition of humans. When it became clear that incompatible alterations were taking place, these eight species became extinct[18].

It is clear that Social Mediation is an anthropological paradigm that analyses how human decisions influence their evolution.

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17 In Martín Serrano, M. (2007c pp. 9-27) Prólogo para "La mediación social" en la era de la globalización (ucm.es).

18 Human designs correspond to religious beliefs, political programmes, or economic models that regulate the existence of communities. Social mediation, either explicitly or implicitly, takes these regulations into account to ground its designs.
The paradigm of social mediations identifies a macrosociological process that operates in all societies and throughout all eras.
They are involved in guiding actions that, when transforming the world, either preserve it or put it at risk; in the formation of organisations that liberate or oppress; in the representations that humanise or dehumanise. As an "activity," it is not subject to evaluation, but the designs and the applications made of it by mediating institutions certainly are.
Martín Serrano, M. (2019) "*Cuándo y cómo se hizo científica la Teoría de la Comunicación*" [When and How the Theory of Communication Became Scientific] (https://doi.org/10.32870/cys.v2019i0.7477).
Martín Serrano, M. (1974a). *L'Ordre du Monde à travers la T.V. Structure du Discours Électronique* (Doctoral Thesis). Lille: Presses Universitaires.

Two conclusions were drawn from these studies, which are now part of the Theory of Communication:

- The first: **It is not possible to analyse communication without considering the designs of the communicators.**

  This is an important observation for content analysts.

- The second: **Communicators, through their designs, establish the link between the information they exchange with the organisations they involve and the actions they undertake.**

  This is a necessary observation to understand that communication cannot be analysed as an isolated activity.

The paradigm of social mediations was applied to the television narratives in the thesis I presented at the University Louis Pasteur in Strasbourg[19]. It is used to investigate how institutions, organisations, and groups mediate and are mediated in socialisation, education, culture, identities, and behaviours.

These are the changes that simultaneously transform ways of life, mentalities, and communication. The thesis, along with this paradigm, was published in French in 1974; and in 1977, I published the book dedicated exclusively to "Social Mediation" in Spanish (Martín Serrano, M. 1977). Ten years later, Professor Jesús Martín Barbero, a dear and much-remembered friend, began an interesting development of mediations in the field of communicative reception in Latin America.

The control of consensus based on parables and epics worked surprisingly well for three decades of the last century, from the sixties to the nineties. These were the years when post-industrial capitalism –which was said to "have a human face"– disappeared, replaced by neoliberal and monopolistic capitalism, which, as we know, has no face[20].

Those of us who are between eighty-five and fifty years old in 2024 belong to those generations. I believe that the maintenance of consensus for 30 years is partly due to two factors:

- The first, that the epics and parables of television address the most important of human needs: the conscious and unconscious need to belong to a community.
- And the second factor, that television viewers can choose between the referents captured by the camera, but they cannot alter them.

2.2 Transformations of Referents by Users of Virtual Networks

This last limitation disappears when virtual networks open their previously unmodifiable content to user intervention.

As is well known, users can introduce, modify, disseminate, or even delete the materials circulating on the network.

The informative and communicative functions that were previously reserved for professionals are now also carried out by users. Any internet user –in principle– can exchange information

19 Martín Serrano, M. (1974a). *L'Ordre du Monde à travers la T.V. Structure du discours électronique* **(Doctoral Thesis). Lille: Presses Universitaires.**

20 Learn more in Martín Serrano, M. (2004a). *El modo de producción de comunicación en las formaciones sociales Capitalistas* . Chapter of *La producción social de comunicación* ***(pp.105-130).***

with anyone else. Virtual networks put an end to the functional division between those who produce and those who consume information. It is the innovation that *transformed one-way communication into multi-directional communication*.

When information becomes a transformable object on the network by any recipients, whether individual or collective, their designs decide the content of the information. These decisions are generally diverse and even divergent. In any case, it is clear that service and application providers, in order to analyse these purposes and maintain control, incorporate complex algorithms into the network, sometimes covertly. Or they condition services on the collection of personal data.

It is worth remembering that the use of virtual networks has required the population to have a computer and a mobile phone to navigate –such devices were acquired during the 1990s. Moreover, their use has long occupied a significant proportion of daily spaces and times for interaction, leisure, and work[21]. Since their appearance, virtual networks continue to innovate –*they do so through the virtualisation of referents*.

The virtualisation of referents can be described from several perspectives[22]:

1) *From the perspective of its social applications*, "virtualisation" refers to the use of communicative and informational resources to accompany or replace face-to-face activities.

   In the virtual space, activities are carried out that previously could only be done in person, in the real world; for example, this conference.

2) *From the perspective of human development*, virtualisation culminates an evolutionary orientation, leading to actions in which things are done to others or with others, being complemented or replaced by other actions in which things are indi-

21 The time spent participating in virtualised activities is increasing. However, as existential time is not elastic, this increase in virtual space occupations results in a reduction of face-to-face activities in the physical space.
The substitution of action by information is like a coin: it has two opposing and inseparable sides. It simultaneously generates advantages and disadvantages:
The main advantages brought about by the virtualisation of actions are already known: the number of participants in interactions and their frequency have increased; albeit, in the virtual world.
The disadvantages arise when people stop being active agents in activities that materially change the world, and instead become mere observers online of what happens in the world; or when they become followers who approve or disapprove online of what others do. These substitutions of executive behaviours with indicative ones exclude in-person participation in social action.

22 Digital networks have provided the conduit through which information can act in the configuration and control of any system, activity, or relationship that is programmable. Since then, these programs have become a necessary virtual practice for the organisation and functioning of our societies.
In *"La Producción Social de la Comunicación"* (Martin Serrano, M: 2004), the modalities of public communication that have succeeded one another are analysed, according to their technological components, organisational aspects, and social applications.
The book provides a detailed analysis of the transition from the audiovisual era to the virtual era. It describes the changes brought by synchronous and multidirectional communication and how these innovations have made it possible to integrate information and relationships into a single virtual system. The book also analyses the sociohistorical effects of these transformations.
The UCM repository reproduces publications in which I write about *"Las modalidades y desempeños sobre la comunicación"* (https://eprints.ucm.es/13289/).

cated[23].

Virtualisation is a technological process that increases the transfer from execution to indication[24].

This transfer operates in nature. However, our species is the only one with the ability to replace *any action* with indications[25]. This capacity plays a role both in our evolution and in our history:

- *In our evolution*, virtualisation has contributed to hominisation. *"Hominisation" refers to the biological characteristics that differentiate humans from non-human anthropoids*. For example, it hominises the translation of the hyoid bone, which facilitates the articulation of sounds. These are "anthropogenetic" transformations.

At the same time, in our history, virtualisation contributes to the transformations of social organisations. These modifications are reflected in humanisation. *"Humanisation" refers to the organisation, functioning, and change of our societies based on the various norms, beliefs, and values that regulate the relationships between their members*. For example, it humanises the use of shared knowledge in the division of labour. These are "sociogenetic" transformations[26].

3) *From the perspective of social mediations*, virtualisation controls the performance of activities based on any designs, using information and communication[27].

23 More information in Manuel Martín Serrano (2007): *"Teoría de la Comunicación; la comunicación, la vida y la sociedad"*. Feel free to consult the following summary: *"La transferencia de la ejecución a la indicación en los comportamientos humanos"*: (https://eprints.ucm.es/13105/). To learn more about these effects: in the cited book, refer to Chapter 24 *"Las modalidades y desempeños sobre la comunicación"* (pp. 301-321).

24 Throughout the course of evolution, communicative indications control and even replace physical actions and movements. This is evidence that the use of shared information serves an adaptive function.

25 Technically, mediators can now virtualise according to their designs:

- Any interaction that does not require physically affecting others;
- And any activity that does not require physical presence in a specific place and time.
- These are activities that do not involve actively participating in the transformation of the environment. However, it should be considered that face-to-face relationships cannot be virtualised when they fulfil functions in human development. For example:
- Face-to-face interactions are necessary for the development of biological and cognitive abilities (among others, all abilities that require physical contact, including the development of gestural and verbal communication);
- And during the developmental period of children, corresponding to ontogenesis, face-to-face interactions are essential for the configuration of identities and social distances; furthermore, all social rituals by definition require in-person participation;
- In rituals of birth and mourning; initiatory, courtship, betrothal, festive, expiatory, and prayer rituals... a catalogue as extensive and varied as life and death in each society.

26 There are physical activities in managing the environment that are essential for the development of spatial and temporal orientation. These activities should be preserved from inappropriate virtualisations.

The deficit of face-to-face interactions in some fields will have sociogenetic effects at the level of social organisations. This will happen when these mediations affect the ways in which relationships are formed among their members. They can also have anthropogenetic effects on the nature of our species when they affect the patterns that regulate interactions between human beings.

27 Since virtualisation exists, information, social action, and organisations appear not only as related dimensions, but also, at times, as interchangeable. Martín Serrano, M. (2019). For example:

These transfers are generated when face-to-face communications are replaced by virtual ones;

And when action is replaced by information, and vice versa;

And also when institutions become computerised and thus transform from physical organisations into online programmes.

The effects of these mediations can be material, cognitive, or institutional, but they divert, diminish, annul, or eliminate numerous determinations that once constrained the intervention of social agents.

> Virtualisation has eliminated technical and mental barriers that limited the development of social mediations[28].

This mediatory perspective[29] is what I am going to develop. Allow me to first mention the sources I will use:

- I have been following the changes of virtualisation since 1990 with successive research and publications[30].

- I now revisit printed texts that I introduced to my doctoral students, with the theoretical and methodological content I was producing.

- I also take into account chapters I incorporated into successive editions of *"La Producción Social de la Comunicación"* (2004).

But the essence of what I am about to share now comes from the book *Mirando hacia el futuro: Cambios sociohistóricos vinculados a la virtualización*. I edited this book last year together with Professor Olivia Velarde, who, in addition to teaching at this Madrid-based Faculty of Information Sciences at the Complutense University, leads a research group there. In this book, Professor Velarde and I describe the paradigms and designs for analysing four dimensions of virtualisation that are already shaping the future[31].

These are the sources of the presentation that follows.

3. Application of Cybernetics Concepts and Methods to the Virtual Uses of Digital Technologies

As I have indicated, cybernetics has been available since 1948 when Norbert Wiener published *"Cybernetics or Control and Communication in the Animal and the Machine"*. This publication changed the way we understand and operate with information and

28 With virtualisation, the use of mediated communication has increased as never before, but in many cases, it has lost its autonomy. Communication accompanies other informational sources in the virtual space and integrates into face-to-face actions carried out in physical space. This integration facilitates the social control function that communicative mediations have.

29 The articles I have written about virtualisation, which have been included in e-Prints, are related and can be accessed in *"Sobre la información y la comunicación cuando el mundo se virtualize"* (https://eprints.ucm.es/57628/).

30 The theoretical analysis and research on virtualisation continue previous contributions. The follow-up is provided in *Martín Serrano, M: "La Producción Social de la Comunicación"* (2004) and in the reading of e-prints *Modalidades y desempeños sobre la comunicación* (https://eprints.ucm.es/13289/). (BORRAR LOS NÚMEROS SOMBREADOS QUE SIGUEN).

31 The book "*Mirando hacia el futuro: cambios sociohistóricos vinculados a la virtualización (2022)"* by Velarde O. and Martín Serrano, M. (eds.) is published by the Centre for Sociological Research (CIS) with both printed and digital editions (Mirando hacia el futuro E-Book cis.es). It is part of a five-year research project commissioned by the Spanish State for the generation of fundamental knowledge. It is based on a very broad content analysis. Nineteen authors contributed to this work. Professor Velarde and I present the first chapter of the book, titled *"Presentación de los cambios sociohistóricos vinculados con la virtualización"* (pp. 10-37). In this chapter, we outline the paradigms and designs to analyse the following dimensions of virtualisation:

a) The transformations of virtual relationships between individuals and organisations;
b) The virtualisation of politics;
c) Robotisation;
d) Genetic alterations and implants in human beings.

communication[32].

Note the equivalence Wiener establishes in the title of his work: *"Cybernetics, or Control and Communication..."* The *control and communication"* he refers to is applied to self-regulating systems. Self-regulating systems counterbalance an action that disrupts them with an opposing action that re-equilibrates them. This process is known as *feedback*, as you likely know[33].

The concept of "feedback" is an epistemological watershed. It represents the return of final causes to science. "Final causes" explain how beings function in relation to the final state they tend to be balanced against[34].

Wiener calls "organisms" self-regulating systems[35].
For example, biological "organisms" are bodies;
physical "organisms" are planetary systems with their rotations;
mechanical "organisms" are traditional clocks, with bearings and hands...
Social institutions such as kinship, whose norms regulate permissible and prohibited marriages, are also organisms.

As the behaviours of the organism transform, feedback reduces the repertoire of subsequent states that the organism can adopt. In Wiener's terms:

The change options for each organism are limited *"to the repertoire of behaviours or alternative states that are possible for the organism to maintain its being"* (Wiener, 1971: 89).

It is understood that the prediction of an organism's future states will depend at each moment on the number of different states that are still possible[36]. In cybernetics, these are referred to as "degrees of freedom"[37].

32 Available in open Access in Wiener, N. Cibernetics or control and Communication in the animal and the Machine | Portal de libros | Prensa del MIT.

33 Feedback was discovered in 1834 by Heinrich Lenz. Lenz realised that he had identified a regulation of universal validity, which explains how systems of various natures function. He described feedback as a law, which states the following: "The direction of the induced currents or electromotive force is such that it always opposes the cause that produces it, that is, the variation in the flux." In other words: Lenz showed that in a magnetic field, a positive charge generates another negative charge.
In biology and psychology, feedback is referred to as "homeostasis". Homeostasis refers to the internal balance of biological organisms, for example, to maintain blood pressure. Jacques-Lucien Monod (1970) uses the term "teleonomy" to refer to the fact that, as a consequence of feedback, the evolution of organisms is oriented towards certain organisational forms. Jean Piaget (1967/1971) calls "teleonomy" that mechanism whereby, in the evolution of behaviour, "consequences" react by opposing the effect of the causes.

34 That finalism was precisely the accusation that Galileo and the founders of the positive sciences sought to expel from the conception of the world. However, the finalism produced by feedback has no thaumaturgical meaning. It is simply the recognition that there are processes in self-regulating systems whose stages of change are predictable.

35 The meaning that Wiener has given to "organism" is unusual, but it recovers the original significance of the term. Organisms, like all other systems, are composed of various elements, *organised* in a specific way. This organisation enables the system to function as a whole.

36 Cybernetics predicts the future states of organisms because, by definition, their variations are limited and programmed.

37 The control that can be exerted over the behaviour of organisms depends on the degrees of freedom. The information used to know the degrees of freedom of the organism is the programme. The programme reflects the

Cybernetic models describe "modes of operation," which is why they can be applied to organisms of different natures. These "modes" are based on universal laws that are reflected in general models. Models are applied to all organisms that are functionally equivalent (isomorphic organisms)[38]. Since the specific nature of the object does not limit the validity of cybernetic models, it is possible to apply the same model to analyse various systems that are isomorphic, whether natural or manufactured, biological or social, physical or mental.

By 1950, Wiener was already confident that cybernetics was applicable for controlling societies[39]. This was when cybernetics incorporated communication and information as the resources that make such control possible. Wiener wrote that cybernetics is *"the science of control and communication in the animal, the machine, and in humans, through the transmission of information"*. Notice how Wiener equates "control" and "communication" by using information:

- Control in cybernetics is the transmission of information.

This transmission is carried out with the intention of intervening or interfering in the functioning of the organism to which the information is transmitted:

- "*Information*" is the knowledge used to perform that control[40];

- And "*communication*" is the activity in which information is transmitted to control the transformations of the organism.

Communication adapts the evolution of self-regulating systems to the designs of mediators. Since the behaviour of an organism being controlled is susceptible to variations, the controller must choose one of the transformations from the possible options. Their choice leads the organism towards a specific result. Therefore, the design of the controller is involved in the final outcome of their intervention. Whatever that design may be, it can affect social organisations or specific individuals. In such a case, the intervener is choosing between values. In other words, in cybernetics, it often happens that information, values, and control are integrated into the action.

3.1. Cybernetics, Future Scenarios, and Utopias

Three types of "future scenarios" can be distinguished, which are a direct or indirect consequence of the actions of mediators:

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organisation and functioning of the organism, taking into account its components and their interdependencies. It contains a code, which is the information that reflects the functioning of the organism's programme.

38 For example, if the way a computer functions is equivalent to the way a certain neurological system operates, a general model has been identified. The process can even go in the opposite direction: first, a functional form is designed, and then organisms are created in which it is applied, as is done in robotics.

39 In a book titled *The Human Use of Human Beings: Cybernetics and Society ("El uso humano de los seres humanos; Cibernética y sociedad")*.

40 In cybernetics, "information" is the knowledge used to intervene in the behaviour of the organism by controlling its programming. Cybernetics operates at the level of how things are shaped, or in other words, how they are informed. Information and control in cybernetics are integrated within the same programme.

- First, the *"possible scenarios"*. To make these projections, the resistances and tendencies to change within social systems are taken into account;
- Next, among the possible future scenarios, there are *"probable scenarios"*. To identify these, the demands and conflicts that compromise the functioning of societies, for which no solutions have yet been found, are examined;
- Finally, among those probable scenarios, it remains to decide –and achieve– the realization of the *"desirable scenarios"* in the future. Martín Serrano, M. (2019).

One of the most useful applications of cybernetic interventions is when they are employed to make the desirable possible, contributing to "future options" the transformative potential of technical innovations.

Among these desirable scenarios are *utopias*. If utopias are understood as I have proposed, they are *states that do not yet exist but could exist if transformations that are both possible and desirable are carried out*[41].

A part of social progress was once utopian aspirations. It is enough to recall the role played by the Encyclopedist programmes during the French Revolution. And there are still utopias pending since the Renaissance. Recovering these proposals as the world virtualises may be a task for students specialising in the history of ideas. Utopian thinking is a necessary reflection for building viable and desirable future scenarios[42]. I have tried to contribute to this reflection, and part of the writings in which I have addressed this topic are available to you in the Complutense repository[43].

Apparently, the cybernetic interpretation of the nature of communication represents a change when compared to the interpretation of the utopian humanists of the 16th century[44]...

But only apparently. In reality, there are no discrepancies between the two conceptions.

The humanists believed that communication referred to activities in which *maximum innovation* operates and, therefore, communication would be where human creativity is manifested.

What the humanists overlooked is that "*maximum innovation*" and "*no innovation*" are the opposite extremes of the same variable. In cybernetics, this dimension is measured, for example, between *one hundred* (maximum innovation) and *zero* (no innovation). The extremes of the variable are referred to *as "Information / versus / redundancy"*.

41 Utopias in the field of communication analyse the social uses that are possible for the capabilities of new instruments. They relate what can be done with what needs to be transformed.

42 Utopias have been and continue to be part of anthropogenesis and humanisation. They humanise what technocracy dehumanises and encourage the theoretical creativity that instrumentation suppresses.

43 See: *"Sobre cambios sociohistóricos, utopías y contrautopías"* (Publicaciones de Manuel Martín Serrano sobre cambios sociohistóricos, utopías y contrautopías disponibles en E-Prints (ucm.es).

44 For cybernetic interventions to contribute to making the desirable possible, it is important to consider how they affect social reproduction, and the social uses of new technologies. In this utopian perspective, ultimately, what is desirable and necessary is that these uses are overdetermined by values that promote anthropogenesis and humanisation. The Enlightenment proposed that the social uses of knowledge be based on the values promoted by "enlightenment," which consists of "developing the ability to use one's own understanding" (Kant, 1964), and "humanism," which consists of "linking our self with the world (so that) the concept of humanity acquires the richest content possible in us" (Von Humboldt, 1993).

- "*Information*" counts the elements of the message that *do not repeat*, or if you will, the "innovative" components;
- While "*redundancy*" counts how many elements *are repeated* in the message and therefore do not contribute any novelty.

The Shannon index calculates the "information / versus / redundancy" of messages[45]. This algorithm is applied to signals, which are the physical components of information[46]. It is used in programmed artificial systems, such as robots.

If you wish to calculate the information –or the innovation– in messages directed at human populations, you must use the formulas of Abraham Moles.

Abraham Moles is the creator of the Sociocultural Communication Paradigm. And for me, he was the highly esteemed director of my French thesis.

Moles states in *Sociodynamique de la culture* (1967) that, in messages, the information that is informative or novel is that which is added to what the receiver did not know; and that the information that is redundant or repetitive is that which is added to what the receiver already knows. He writes:

> *"The paradox that dominates the entire theory of information is the dialectic between the perfectly banal message, completely intelligible, and the completely original message, with the highest density of information, totally unintelligible to the receiver." (Moles, A,1967:117)*[47].

It follows that in human populations, the information / versus / redundancy of a message must be calculated depending on who its recipients are; this calculation indicates its potential influence, depending on the number of recipients who understand these messages.

4. Affinities of the Theory of Communication with Other Fields that Operate with Information

I have mentioned the two sociohistorical innovations that have promoted an epistemological

45 The Mathematical Paradigm of Information was created by Claude E. Shannon in 1948 in *A Mathematical Theory of Communication*. It provides the operational procedures (based on the functioning of the physical networks through which signals circulate) and the calculation methods (based on binary logic and probabilistic mathematics) used for the control of these systems, operating with information.

46 The rate of information compatible with comprehension reproduces the concept of "innovation rate." The innovation that introduces a new configuration of the elements that constitute the social reality in the process of change can be measured by Shannon's index:

$$C = H = -\sum_{i=1}^{i=n} P_i \log_2 P_i$$

47 The critique of mass culture has described the negative dimensions of the repetition of redundant and stereotyped information that is understood by the greatest number of members of the collective. However, it is important to keep in mind that repeating what everyone knows, in the terms that everyone knows, often fulfils a necessary function for social reproduction, insofar as it is applied to collective understanding and performance.

revision of the Theory of Communication. To adapt to this new scenario, the Theory of Communication has shifted to the study of how information participates in evolutionary and social transformations. It is clarifying the role of information in the way our species exists and acts. For this reason, the theory now occupies a space where the life sciences and human sciences converge[48]:

- It shares study objects with Palaeontology and the Theory of Knowledge;

- And it has recently established links with Neurosciences, since the advent of artificial intelligence.

These affinities between the Theory of Communication and other fields that work with information are occurring because there is now a scientific definition that clarifies what it means to inform, and which is shared by all sciences.

My proposal for this epistemological revision has been to replace the communicative anthropocentrism, which prevailed among theorists until 1980, with anthropogenesis:

- *Anthropocentrism* is the thesis of Creationism, according to which evolution finds its purpose in the appearance of human beings, whose communicative capacities are not related to animal capacities.

- Anthropogenesis studies, using scientific methods, how human communication evolves from the communications of non-human species and acquires the traits that differentiate it.

This anthropogenetic perspective is developed in *"Teoría de la comunicación, la comunicación, la vida y la sociedad"*, a book that clarifies the evolutionary origins of information and communication[49].

This book was published 17 years ago. During this time, palaeontology has revolutionised its dating methods; the human genome has been sequenced, and the genomes of other species are still being sequenced. These developments continue to modify some evolutionary hypotheses and beliefs that were considered probable in 2007. This renewal now places palaeontologists at the forefront of knowledge.

In my view, this relevance requires that paleontological paradigms be on par with those applied in other sciences since 1865. It was then that Maxwell, following Lenz, expanded the Renaissance conception of the principles that transform nature and added information to materials and energies[50]. I will clarify why I believe that information should be taken into account in palaeontology:

Palaeontologists analyse fossils to expose evolutionary changes, which are material, organic, and inorganic; and they take into account the energies of nature that have intervened in the state of the natural spaces where human evolution has occurred.

48 The transformations of communication are inseparable from the construction of the present and the future. In communicative behaviours, the functioning of natural evolution is transmitted, and when humans appear, the transformations of their societies are also transmitted.

49 I had anticipated how I thought the theoretical re-foundation of communication sciences could be carried out in *"Teoría de la comunicación, epistemología y análisis de la referencia"*. I explain this in 1981 in the chapter on communicative biologisms and idealisms. Both paradigms are anthropocentric, as they establish an insurmountable divide between human and animal communicative abilities.

However, anthropocentrism had already ceased to be the foundation of the human sciences, and this collapse swept away the majority of the communication theories that had been in place up to that point.

50 Maxwell, J. C. 1865. A dynamic theory of the electromagnetic field available in maxwell-1997-viii-a-dynamical-theory-of-the-electromagnetic-field.pdf (royalsocietypublishing.org).

I have written that materials and energies are sufficient references to explain evolutionary processes that are not systematic... but *evolutionary processes are generally systematic and self-regulated*. For example, it is reasonable to assume that some human groups have managed to adapt to the same environments in which other groups have not, because they had the necessary information.

During evolution, situations arise in which communities that share the same ecosystem must choose between several options. Information, with a low energy cost, is an option for maintaining or recreating organisations, which operates in opposition to the entropy that dominates nature. When humans make the decisions, information based on values has been an alternative to adaptations that biologically transform organisms[51].

The incorporation of information in the field of human evolution is the work I have been focused on in recent years. I hope to publish the results next year in the new edition of *"Teoría de la comunicación, la comunicación, la vida y la sociedad"*.

5. When the Theory of Communication Clarifies Anthropological Dimensions and Sociohistorical Effects of Communication Uses

This presentation concludes with a reference to the possibilities of improving society as the world virtualises.
Virtualisation provides the technological infrastructure, and cybernetics offers the theory and techniques necessary to share what each person knows, alongside the vast intellectual heritage inherited from our ancestors (Martín Serrano, 2019).

This universal access to all available knowledge will lead to the enlightenment of minds, if the predictions made by the Enlightenment thinkers during the Age of Enlightenment come true.

An accessible knowledge, *urbi et orbi*, will probably be the most important sociohistorical innovation in the field of communication since the ability to transcribe information. And this enlightenment will be achieved without resorting to the genetic manipulations proposed by posthumanism, which would divide humanity into the super-caste of posthumans and the sub-caste of us, the current humans.

Such enlightenment is the hope we can have for Artificial Intelligence. We will have to wait for its establishment to see whether these expectations are confirmed.

Artificial Intelligence does not yet include self-cognition in its functioning. However, Bill Gates, one of the founders of Microsoft, writes that General Artificial Intelligence (AGI) will acquire this capability. This means that AGI will learn and use its knowledge in a way similar

51 In 2009, in the interview La Teoría de la Comunicación, la vida y la sociedad (redalyc.org),I state that the humanisation and transformation of animal communication into human communication are inseparable. The plasticity of the communicative patterns inherited from our animal ancestors has been the adaptations that made it possible for the resources and organisation of societies to be incorporated into our communicative production. In this way, human interactions, unlike animal interactions, are overdetermined not only by needs but also by values; and an abstract and axiological universe exists between our references.

to humans...

When General Artificial Intelligence analyses its own reasoning, it will have a fascinating performance. But if it reproduces the way humans make decisions, it will open its proposals to uncertainty... the same uncertainty that we humans face when making decisions based on our values.

I write that this reference to values is the trait of our behaviours that humanises the world and humanises us; and at the same time produces decisions that commit our destiny. *Martín Serrano, M. (2007).*

Even though sapiens delegate these compromising decisions –in the past, in the obscure proposals of Cassandra; and now, in the better-informed, yet no less risky, recommendations of Artificial Intelligence.

5.1. Teaching and Learning the Theory of Communication as the World Virtualises

I conclude by sharing with you some reflections that arise from the ongoing changes in knowledge production that I have outlined.

Students who will become communication professionals belong to generations that will have to make very important decisions. In such circumstances, theory is one of the most practical things that should be taught... because the Theory of Communication, like all theories, is a teaching for enlightenment. It provides rational support for social consciousness. An epistemological and ethical framework, so that instrumental teachings do not degrade into teachings that only instrument.
The Theory clarifies that both students and professors are involved in analysing the effects that new technologies operating with information will have; including analysing the uses that will be made of Artificial Intelligence.

This involvement can be expressed differently:

The teachers of the Theory of Communication are training the next mediators. This theoretical teaching seems to me now to be a scientific challenge for teachers and an academic privilege for current generations of students...

Now, when the Theory of Communication is clarifying the anthropological dimensions and sociohistorical effects of communication uses...

> -From an *anthropological* perspective, we should teach—and learn—that human communication, from its origins, was shaped so that affinity with our own would allow the weakest to live; and this has ultimately been the reason we have values and culture.
> -From a *sociohistorical* perspective, we should learn—and teach—that universal access to knowledge is now possible through the shared use of information.

Taking into account solidarity and the shared use of information are dimensions of teaching

and learning that humanise[52].

It *humanises* to make it known that the changes we can expect in our lives, and in the lives of future generations, are not prescribed by the capabilities brought by new communication and information technologies; but they are prescribed by the uses made of these capabilities.

These same capabilities can be used to reinforce domination and social control over individuals and collectives. Uses that dehumanise.

We can teach to differentiate such opposed uses by showing how mediators clarify or obscure the *connections*:

the connections between nature and society,
between the individual and the community,
between the private and the public,
the connections between creation and coercion,
between communication and intervention,
and finally, between social action and ethics.

You, students who are listening to me—the future mediators—may remember this lecture and consider, in your professional or academic work, what uses of technologies will need to be proposed and promoted so that desirable future scenarios become possible...

A scenario I consider desirable is that the changes to come, as new technologies are applied, continue to be compatible with the laws of Nature. Because, based on what I have shared, it is deduced that this compatibility is necessary to preserve our being and existence... and it is deduced that if this compatibility is preserved, our species will continue to advance toward the unfinished, never-ending humanisation of humanity.

A task in which our species has been engaged for at least 315,000 years, testing its values in the evolutionary path of anthropogenesis.

Thank you for your attention.

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