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CHAPTER 34

INFORMATION AND COMMUNICATION THEORIES

A Global History of the (Con)fusion

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Introduction

Information and communication theories are often intertwined, making the boundaries between them blurry. The most quoted and relevant paper at the crossroads of the two is Claude Shannon's *A Mathematical Theory of Communication* (1948), which is widely recognised as the founding text of what we call *information* theory.[1] But Shannon himself, in a dialogue with his wife captured in a 1987 interview, denied that he had ever fathered anything called "information theory":

> "In the first place, you called it a theory *of communication*" Betty Shannon reminded her husband. "You didn't call it a theory of information." "Yes, I thought that *communication is a matter of getting bits from here to here*, whether they're part of the Bible or just which way a coin is tossed," Shannon confirmed. […] Betty testified to Shannon's distress when scientists far removed *from the field of communication engineering jumped on the information "bandwagon,"* as he called it, and Shannon watched his work career out of proportion to the technical theory he had propounded.[2]

In the same year, 1948, Norbert Wiener published *Cybernetics: Or Control and Communication in the Animal and the Machine*, which is considered another milestone in the history of information. Wiener was interested in studying the forms of communication (that is, the messages) exchanged "between man and machines, between machines and man, and between machine and machine."[3] These two champions of information theory, Shannon and Wiener, are, as Colin Koopman has argued, actually champions of communication theory:

> The misappellation "information theory" carries as its unfortunate residue the implication that Shannon and Wiener's theories were primarily focused on information itself. *Yet, the central focus of their work was not information at all, but rather communication*. Both writers, of course, conceptualized information. But those conceptions were not so much full-blown theories of information as *they were limited technical models of information for the purpose of resolving problems endogenous to*

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communication theory. If information theory is a theory of information at all, then it is a theory of information only for the limited purposes of communication.[4]

Consistent and clear definitions on information and communication theory are also lacking in contemporary discourse. According to the Encyclopedia Britannica,

"*Information theory overlaps heavily with communication theory*, but it is more oriented towards the fundamental limitations on the processing and communication of information and less oriented towards the detailed operation of particular devices."[5]

Handbooks of information theory quite frequently use information and communication as synonyms, or devote a chapter to discuss the differences between information and communication and the relationships between the two.[6] Inversely, in handbooks of communication theory, Shannon and cybernetics are often quoted as the most relevant starting points to theorise about communication and the media. Robert Craig, in his famous paper on communication theory as a field, reminds us that among the seven most relevant "traditions," cybernetics is crucial:

Modern communication theory originated with the cybernetic tradition and the work of such mid-20th-century thinkers as *Shannon, Wiener,* von Neumann, and Turing. […]. *Communication in the cybernetic tradition is theorized as information processing* and explains how all kinds of complex systems, whether living or nonliving, macro or micro, are able to function, and why they often malfunction.[7]

Disciplinarily, we tend to consider communication theory as being closer to the social sciences and media studies, with information theory closer to hard sciences. But, again, this is debatable. When Alistair Black and Bonnie Mak locate information theory within history, they mainly focus on different media which fundamentally changed the quantity and accessibility of information over time: poetry, books, telecommunications, broadcasting, and the internet, for example, which changed human relationships with information.[8] Similarly, communication theory can be easily applied to non-mediated forms of communication, as the long-term traditions in linguistics, pragmatics, and rhetoric in communication studies make clear: the focus of communication theory could be in the human, face-to-face, and non-mediated exchanges. Conversely, this is also true, that a great deal of communication studies has been conducted in the realm of media studies, as several histories of the field have shown.[9]

The historiography of information and communication theory (and their connections to media studies) are fairly consistent in focusing on the United States, American scholars, and American perspectives. Not by chance, the two champions of information (or communication?) theory, Shannon and Wiener, both American scholars, worked for powerful American stakeholders of Bell Labs and MIT. And, with few exceptions, the history of communication and information theories has tended to be reconstructed in the United States, or by American scholars.[10]

This chapter is an attempt to de-Americanise the history of information and communication theories by focusing on four traditions of scholarship in this field: Chinese, Latin American, French, and Soviet/Russian. These four case studies aim to answer the following research questions: How were, or are, information and communication theories combined in the region? What were the most relevant concepts about information and communication

and who suggested them? What are the main connections with other disciplines and other theorists all over the world—and, specifically, with American theorists of information?

The Chinese Tradition

The US academic influence on Chinese information theory can be considered crucial. Indeed, the introduction of information theory in China was possible mainly through experiences of Chinese scholars in the United States, along with seminars and conferences of US communication scholars in China. All these activities contributed to reduce the differences between Chinese and American communication studies, but also had the consequence of partially losing Chinese identity in the field; between 1911 and 1979, there were no publications in the Chinese language which focused on information theory (信息论).[11]

An analysis of Chinese periodicals dates the first references to information theory to 1979, with the start of China "Reform and Opening-up" (改革开放) period. Angela Xiao Wu argues that, after Mao, during the Reform period, the Chinese media appropriated information theory and the "cybernetic notion of ontology and control."[12] Information theory was functional to CCP to distance itself from Maoism, but it was also to legitimate a process of media marketisation managed by the state.

The role of cybernetics is also crucial in the case communication theory. According to the *Chinese Dictionary of Propaganda and Public Opinion* (宣传舆论学大辞典), the term was imported in China from the United States mediated by Harvard professor Karl Deutsch, who referred to the principles of cybernetics to explain social and political phenomena.[13]

From an academic perspective, first attempts to define information theory in China date back to the mid-1960s; however, it is between the end of the 1970s and the beginning of the 1980s that the idea of "information fever" (信息热) begun to circulate also among the general public, after a systematic media reform took place.[14] From that moment onwards, the Chinese media system was not only asked to support propaganda activities but also national economic development.[15] This idea is evidenced in the official narrative, according to which China moved from a highly politicised media environment to a neoliberal model.[16]

Using the China National Knowledge Information (CNKI) database, it is possible to identify the contributions of Cai Changnian as one of the most relevant authors in the field, who is considered one of the "founders of the information theory in China."[17] Cai published a book titled *Information theory* (信息论) in 1962, and his research is considered one of the first contributions on the topic in China.[18] However, it is worth mentioning that Cai's academic background in mathematics and applied sciences benefited from his experience in the United States, where he was based at Cornell University between 1944 and 1947. After his return to China, he was appointed as head of the Department of Telecommunication Engineering at the Beijing University of Post and Telecommunications. Cai's major influence came from the studies of Claude Shannon with reference to the aforementioned *A Mathematical Theory of Communication*. Cai argued that "information theory is a basic applied science that studies the general laws of information transmission, storage and processing."[19] Cai also opened the first academic course on information theory in China at the Beijing University of Post and Telecommunications in 1956, which further contributed to the field's development within China.

The interest on information theory in China was not only driven by Chinese scholars who had an experience abroad, but was also supported by US scholars who visited China during its "Reform and Opening-up" period. One of the most significant contributions in this

sense came by the visit of Wilbur Schramm to China in 1982. The general media reform that started to take place during that period, as well as the necessity to reconfigure the role of political propaganda in support of a more liberal journalistic environment, facilitated the circulation of technical definitions of *information* and *feedback*. These were two key concepts that justified the idea of *news value*, a turning point in the history of the media system in contemporary China.[20]

According to Angela Xiao Wu, during his series of lectures at the Chinese Academy of Social Sciences, Schramm claimed that Claude Shannon and Warren Weaver established information theory to "study the feedback phenomenon in the communication on human society."[21] Schramm also stated that "information theory has migrated from natural sciences to social sciences" and that Shannon and Weaver's goal was to "scientifically measure the circulation of information among people."[22] Wu herself notes how Schramm's interpretation on Shannon and Weaver must be considered wrong and biased.[23] Indeed, compared to Schramm's vision that mainly focused on the social dimension, Shannon clearly highlighted the limitations of information theory on technical communication because of the lack of semiotic dimension. Likewise, Weaver never explicitly theorised on concrete impact of information theory on a social dimension; he only expressed a wish that information theory would be expanded also in the domain of human communication.[24]

The concrete attempt to develop a theory of human communications through information theory was launched by Schramm. Shannon's model, based on the prototype of a phone call, focused on the technical features of communication; it explains the transmission of the message from its source to the destination, it elaborates the role of the signal and the action of converting back the signal into the message upon reception. All in all, Shannon's mathematical theory of communication emphasises the channel capacity of a technical system. Whereas Schramm's approach focused on the *effects* of communication with an emphasis on audience's opinion. A further step that enriched Schramm's information theory in the field of communication studies as it was eventually introduced to China was the application of *feedback*, a concept which was originally developed by Norbert Wiener in his cybernetic theory.

Importing, adopting, and applying information theory in China were especially functional to Chinese journalistic norms. The reference to "information" in the sense of Wiener and Shannon supported the shift from a dimension almost uniquely dominated by propaganda to a new liberal environment in which the quality of journalism was defined by "news value" (新闻价值).[25] Indeed, during the Reform period the CCP's conservative wing expressed concerns on the possible spread and impact of Western liberal ideas on the centrality of the CCP. Specifically, communication and media studies were believed to "negate class struggle." The reference to "news value" inspired by the imported definitions of information and feedback were functional to leverage journalism from propaganda. At the same time, considering news as information supported the idea that news can, and should, be non-ideological. Furthermore, Chinese scholars, following Shannon's theory, developed a series of mathematical formulas to identify "news information content." The relevance of information theory in this period was made clear by the decision of the State Science and Technology commission in 1987 to list the media sector as "information industries."

Information theory and concepts such as information value and feedback were supported by a broader political vision, but they also had academic consequences. Indeed, according to Liu and Qin, one of the main characteristics of Chinese communication studies was the importance addressed to audience research and the consequences of research.[26]

The role played by audience research particularly has been and is still useful nowadays at least for two reasons. On the one hand, it contributed to support the economic turn of the Chinese media sector, after the "Reform and Opening up" was more subjected to market dynamics compared to the Mao period. On the other hand, audience research was considered a new tool from the Chinese government to monitor its own propaganda activities.

The Latin American Tradition

In Latin America, the effects of information theory were felt across different disciplines. This part of the chapter focuses on the central role played by the concept of *information* in communication studies. Latin America and communication theory went through three stages, throughout which the modifications in the definition of *information* (and the tensions with the concept of *communication*) were constant. The first stage, which could be placed in the years 1950–1970, corresponds to the entry and diffusion of mass communication research as a key component of the development policies promoted by the United States, especially after the Cuban Revolution of 1953–1959. An institution like CIESPAL (Centro Internacional de Estudios Superiores de Comunicación para América Latina) in Quito, Ecuador, played a key role in that dissemination. The work of some authors were translated and adopted by the nascent Schools of communication.[27] The second phase, roughly 1960–1980, was characterised by the adoption of critical European models, halfway between French semiotics (such as Roland Barthes and Christian Metz) and the Frankfurt School (Max Horkheimer, Theodor Adorno, Herbert Marcuse). The theoretical contributions of Mattelart are quintessential examples of this theoretical approach.[28] Finally, starting in the 1980s, a Latin American-born culturalist paradigm took shape at the hands of researchers such as Martín-Barbero, García Canclini, or Reguillo.[29]

Shannon and Weaver's classic text *A Mathematical Theory of Communication* was only translated into Spanish in 1981, but the model had been in circulation since the early 1960s, such as in the texts of Wilbur Schramm, translated into Spanish by CIESPAL.[30] Unlike the cases of China and of France (see below), in Latin America the concept of *information* was radically opposed to *communication*. This theoretical exchange started in the early 1960s and went through the three research phases. In this context, the publication of *Comunicación y Cultura de Masas* by Antonio Pasquali in 1963 should be considered a milestone in the history of Latin American media and communication research.[31] Published before Eco's *Apocalittici e Integrati* (1964), Marcuse's *One-Dimensional Man* (1964), McLuhan's *Understanding Media* (1964), and Enzensberger's *Constituents of a Theory of the Media* (1970), Pasquali's ideas anticipated many of the philosophical discussions about mass media that dominated the 1960s and beyond.[32]

To understand *information*, it is first important to define *communication*. For Pasquali a "communicational relationship" is a dialogic liaison that "produces (and supposes at the same time) a biunivocal interaction of the type of knowing."[33] Communication is an activity exclusive and limited to human beings; they are the "only entities capable of provoking authentically communicational and social types of behavior."[34]

Pasquali proposes "reserving the term *information* both for the *process* of unilateral transmission of knowledge between an institutionalised transmitter and a mass receiver, as well as for its *contents*, and whatever the language or medium used."[35] For Pasquali, this predominance of "communicational unilateralism (information)" determines a "massification of receivers."[36] In this framework, the expression *mass communication* should be avoided:

it would be better to call them *broadcast media, mass media,* or *mass information channels* because the receiver "is in the impossibility of becoming directly or indirectly a transmitter of a dialogic replica, favouring in the transmitter the progressive sterilisation of his receptive potentiality."[37] In the unilateral information relationship, "the control, selection and use of the information media become absolute prerogatives of the transmitting agent."[38]

The opposition between *information* and *communication* is fundamental in Latin American media and communication studies. Pasquali's opposition was enhanced by another basic opposition between *extension* and *communication*, promoted by Paulo Freire. The concept of (rural) *extension* was broadly used in Latin America to define the informal educational strategies directed towards the rural population, including instructions to increase the production and the efficiency of farms. In extension processes there is a *unilateral transmission of information* from an active subject (the rural extensionist) to a passive one (the farmer). Freire's *extension* is therefore close to Pasquali's *information*. According to the Brazilian educator, "only through communication can human life hold meaning (…) Authentic thinking, thinking that is concerned about *reality*, does not take place in ivory tower isolation, but only in communication."[39]

The opposition between *information* (understood as a unilateral transmission of information) and *communication* (understood as a dialogic exchange) led in Latin America to a proliferation of experiences and theories of "alternative communication" (*comunicación alternativa*) inspired by Pasquali and Freire's semantic oppositions.[40] Those experiences—from local radios to video productions and theatre performances—differed from the traditional ones at the level of organisation, source of financing, management, content, or relationship with the audiences. The 1970s were the "golden age" of alternative communication in Latin America.

As can be seen, Pasquali's philosophical opposition between *information* and *communication* was also appropriated by Freire and applied to the lived reality of the popular classes, rendering it operational within the framework of a critical educational praxis. For Freire, traditional "banking education" consisted in filling the students "by making deposits of information."[41] On the other side, dialogic and liberating education "consists in acts of cognition, not transferals of information."[42] The experiences and theories of "alternative communication" of the 1970s were fed from the same sources.

On a theoretical level, the decline of the radical opposition between *information* and *communication* ran parallel to the emergence of a new culturalist theoretical paradigm in Latin America (although in some areas—like media activism—it is still very much in force). According to Martín-Barbero, alternative communication cannot be built outside of the tensions and hybridisations between traditional media and popular cultures:

> Communication will be alternative to the extent that it assumes the complexity of these processes, if the language of the medium is investigated alongside its perception and recognition codes and the enunciation devices of the popular, the codes and devices in which they materialize and express entangled with popular memory and mass imaginary.[43]

While it may have been useful at the time, for the new generation of Latin American researchers that emerged in the 1980s and 1990s a basic opposition such as *information* versus *communication* was not the best theoretical tool for understanding the complexities of contemporary cultural and media life. New concepts and oppositions, like Martín-Barbero's

displacement from *media* to *mediations,* set the course for theoretical discussion. Rather than perceiving media merely as a one-way conduit for disseminating information, he advocated for understanding it as a dynamic space of mediation, where diverse and sometimes conflicting cultural meanings are negotiated and exchanged.[44]

The French Tradition

The history of information and communication theories in France is complex, full of paradoxes, and in many ways unique. In France, the field that is commonly associated with media and communication research in the English-speaking world is labelled *Sciences de l'Information et de la Communication*. Colloquially known as "SIC" or "infocom" by French speaking researchers, it can be translated as "information and communication sciences." In this context, "information" loosely refers to library and information science and is associated with specific French or francophone research traditions such as "bibliologie," "documentologie," and "médiologie." In this respect, the field covers a very specific ground, quite different from the mainstream American tradition which has so often been imitated in other countries like China. This history is not well-known and yet to be written since only a handful of works have attempted to map the history of the field, or some aspects of it.[45] Through the lens of the twin concepts of information and communication, which were alternatively opposed and articulated and whose definitions shifted, the field reveals some of its distinctive features and singularities.

Among the first generation of researchers in *SIC*, the tendency was often to draw a theoretical framework encompassing both information and communication. Among these, the voices of Robert Escarpit and Jean Meyriat were possibly the most important. Escarpit and Meyriat are widely recognised as the twin founders of the field in France. In the mid-1970s, they were at the forefront of the campaign for the official administrative recognition of *SIC* by the French *Conseil Consultatif des Universités*, which was attained in 1975. In this context, institutional recognition and theoretical developments both supported and justified each other.

Escarpit began developing *infocom* at the Université de Bordeaux in the mid-1960s, securing the creation of a local *Unité Plurisdisciplinaire des Sciences de l'Information et de la Communication* in 1968. At the time, many similar professional training programmes revolving around "information"—an all-encompassing buzzword meaning journalism, organisational communication, and library science, among other things—were being developed in France. In parallel with his activities aimed at further institutionalising his home-cooked formula, Escarpit was ambitioning a general theory of information and communication. In his 1976 seminal *Théorie Générale de l'Information et de la Communication*, Escarpit drew heavily on the work of Claude Shannon and very broadly construed communication as the transmission of information.[46]

At the time, in the context of the official recognition of *infocom* by the French *Conseil Consultatif des Universités*, similar efforts at developing a general theory of information and communication were common. In November 1975, the first meeting of the newly formed French Society for Information and Communication Sciences (*Société Française des Sciences de l'Information et de la Communication*, or *SFSIC*) had as its theme the convergence of information and communication sciences. More than any other theoretical approaches—and there were plenty of them—it was cybernetics that provided the theoretical cornerstone needed to articulate information and communication.[47]

That information was the content of communication was then consensual among the founders of the field.[48] But information, in this context, was much more associated with arts and literature than mathematics and engineering. Escarpit was a literary scholar. Building on previous work by Abraham Moles and Umberto Eco, he was investigating readers and the various meanings they associated with literary material.[49] In a word, he approached literature as a problem of communication.[50] Meyriat was also a literary scholar whose intellectual trajectory also leans towards political science and history. As the head of the research library of the *Fondation Nationale des Sciences Politiques*, he developed an expertise in information science and wrote extensively about "information." "Information," Meyriat wrote, "is the cognitive content of an actual or possible communication."[51] In this respect, information implies active reception and the development of personal knowledge. It is radically different from data as objective, finite elements, or as information defined by cybernetics. Meyriat was much more explicit with regard to the heritage of cybernetics and its limits. In *SIC*, information has meaning, and in this respect, the concept differs from Shannon's. Despite this criticism, a cybernetic impetus remains: information is a content, and communication a process. Information was the key concept for Meyriat, who thought that communication was of second importance.[52] He later recognised that the union of information and communication was much more opportunistic and related to institutional and political realities than it was theoretically and epistemologically driven.[53]

Soon enough, cybernetics and information theory associated with the work of Claude Shannon became much less important. In 1978, the second meeting of the *SFSIC* made clear that a generational shift was already in place among information and communication researchers.[54] Institutionally robust, the field was not in need of a unified general theory of information and communication, and theorisation efforts similar to those of Escarpit and Meyriat seemed to belong to another era. Most scholars who contributed to the institutionalisation of the field in the early 1970s did not attend the second SFSIC meeting, but their former PhD students did. Bernard Miège, who eventually succeeded Meyriat as the President of the *SFSIC*, was among those who thought that a general theory was impossible.[55] In other words, the idea was no longer to articulate information and communication in a coherent theory, but as Dominique Wolton puts it, "to clearly distinguish the logic of information from that of communication."[56] Nevertheless, the question of the relationship between information and communication remains a sensitive one, and is regularly the subject of debate.[57]

This distancing from cybernetics and the mathematical theory of communication certainly echoes other factors. In France, the frenzy around cybernetics was intense and much longer lasting than in the United States.[58] Writing in the mid-1970s, Escarpit was still in the long tail of the cybernetic mania. Google Books NGram Viewer shows that in the mid-1970s, *cybernétique* was as often used than in the mid-1950s.[59] By the early 1980s, the frenzy was over and cybernetics was mostly the object of a radical political criticism by some of the heavyweight of French intellectual life, including, among others, Gilles Deleuze and Cornelius Castoriadis.[60]

The Soviet and Russian Tradition

In Russian, the word "media" has been widely adopted only in the last couple of decades. Throughout the Soviet era, and up until today, a more prevalent expression to describe media is "средства массовой информации" (abbreviated to СМИ), or the means of mass information. In Russian, media do not mediate communication – they are the means, tools,

instruments to spread information to the masses. Dubin and Reitblat suggest that the difference in "media" and "means of mass information" is also linked to the different historical trajectories of their formation.[61] The European press developed as one of the mechanisms to express opinions of social groups, institutions, organisations, and parties—so, as an element of the nascent public sphere.[62] In Russia, however, the publication of newspapers (and the Soviet radio and television development later) was primarily a state affair for a long time. Thus, in Russian media, asymmetrical power relation is in their name, and information is in the essence of their asymmetry.

The concept of information has been covered in some depth in Russian scholarship, although not within media and communications studies. The media and communication field in Russia began to emerge only in recent decades. In 2021, Benjamin Peters drew attention to the absence of a Russian media theory despite the broad Slavic intellectual tradition.[63] Yet some Russian theoretical insights into media and communications developed sporadically in the realms of other disciplines, and consequently now contribute to Russia's media and communication scholarship. Having a regional advantage of learning from the best practices and schools in media and communication, simultaneously paired with the solid intellectual legacy of philosophy, semiotics, and linguistics, Russian scholars are now focused more on communication and media than before. New areas of scholarship are developing and trying to define their borders: journalism theory, media theory, and even *communicativistics*, meaning communication theories as a separate field.[64]

As in other countries, the distinction between the concepts of information and communication is as paramount as it is complicated to define. Media scholars Ilya Kiria and Anna Novikova define information as "the content we exchange in the process of communication."[65] They point out that the concept of information differs from discipline to discipline, so we should differentiate between the terms according to different schools of thought. It is thus essential to consider how scholarship progressed in the fields, adjacent to Russian media studies, such as computer science, mathematics, informatics, philosophy, journalism, and linguistics. These differ in understanding information as something more objective and neutral, to being more subjective and socially constructed.

Mathematics and computer sciences are fundamental to understanding the concept of information. Scientific articles before the 1980s mainly concerned themselves with information theory and its application to the mathematical and applied sciences. In addition to American scientists Ralph Hartley and Claude Shannon, Russian mathematician Andrei Kolmogorov is considered one of the founders of information theory.[66] In the 1990s, he developed the *Algorithmic Theory of Information* (which was later elaborated by Gregory John Chaitin, an Argentine-American mathematician), where the concept of information can be seen as similar to data; the information is a signal encoded in a certain way for transmission by electronic media. In this sense, information for such sciences is unambiguous and differs only in coding. Machine systems thus see information as unambiguous data—decoding the message makes it possible to obtain identical information encoded. Therefore, information as such is not a problematic concept for machine systems. To this end, the development of scientific thought has mainly focused on systems for collecting, processing, and accumulating information.

This brings us to the further development of the information as a concept. Since the 1960s, scholars have tried to understand the value of "information." In management and sociology, the role of information was explicitly seen through its value for achieving of goals.[67] Thus, with this practical oriented approach, *measuring* the value of information

was important and Aleksandr Kharkevich was one of the first to draw attention to the possibility of measuring it in terms of the incremental probability of achieving a goal before, and after, the cybernetic system obtains information. In 1960, he founded an *Institute for Information Transmission Problems* of the Russian Academy of Sciences (also known as Kharkevich Institute). He also postulated a theory: "The amount of information is growing at least in proportion to the square of the country's industrial capacity."[68] With Kharkevich's method, the concept of information is again seen as objective and neutral, and only the quantity of information is an important variable for effective communication. Only later, scholars such as Michail Bongard, Ruslan Stratonovich, and Boris Grishanin, using game theory, algorithm theory, and optimal control theory, developed further the study of the information value, where it could be negative and dependent on the subject (recipient of the information) and the goals of communication.[69]

From the 1970s, information as a concept was put into a new critical perspective. Arkady Ursul critically reflected on the concept of information and its impact on society.[70] At first, his understanding of information was influenced by Marxism-Leninism: for example, whether information is a property of matter. Then, the reflection acquired a broader social scope, which gave rise to a new scientific discipline—informatics.[71] Informatics, in this case, is understood as a broad meta-reflection on the meaning and notion of information. Informatics is distinct from the computer sciences because it is not specifically concerned with the storage and transmission of information in the computer systems. Instead, informatics focuses on the information at large within a broader social scope. An even narrower branch within this field is social informatics, which focuses on the importance of information in the development of society and within the computer revolution.[72]

Journalism is probably the academic field which has been the most critical towards information in Russia. In journalism, one of the stumbling blocks is the problem of objectivity and subjectivity. Information is, therefore, a central concept for this problem. The theories of journalism emphasise that information is objective and, in contrast to information, communication is a product of social processes and can thus become propaganda.[73] Overall, Soviet thought on information confronted and problematised the ideas of propaganda and ideological confrontation.[74] Russian theory of journalism, being normative in its essence, asserted that the spread of information, as objective and neutral as it is, is the goal of any mass media. This tendency to refer to the concept of information as purely accurate, neutral, and reliable data, details, or facts is evident in many publications, even in other fields. Information, again, appears as objective data. Scholars in journalism questioned information only through the lens of the lack or excess of information, overload or scarcity. This is mainly associated with the development of communication technologies as they multiply the amount of the surrounding information and allow access to the previously unreachable information.[75]

Russian philosophers and sociologists elaborated more on media and communications from the late 1980s, influenced heavily by the linguistic school of semiotics and Western media and cultural studies, such as the Birmingham and Frankfurt Schools. One of the key aspects was the intensification of the information flow. Instead of just measuring value of information, the philosophers enquired *why* information has value. Kurennoj suggested two mechanisms of the information function of media: first, semantically, media stories set up a way of giving a subject or fact; the second notion of meaning we can use in relation to news media is the hermeneutic notion of giving meaningfulness.[76] In this sense, the philosophy of information was also an object of interest for Russian scholars. There are even some

claims that the philosophy of information was developed by Russian scholars before the works of Luciano Floridi in the 1990s; for instance, Konstantin Kolin attributes the birth of philosophy of information to Ursul's works of the 1960s–1970s.[77] The philosophy of information challenges notions of artificial intelligence, navigates the computational turn, and raises issues of computational ethics. More scholarly works on information technology are being published now that concern how information is processed, biased, and can also be problematic for technology.[78]

Overall, these scientific branches have continued to develop at their own pace in parallel, so that significant names, concepts, and theoretical frameworks can be found in each area. Despite many points of overlap, these sectors remain distinct branches of scientific knowledge. For example, between 2010 and 2015, the work of Kolin and Ursul in the field of social informatics led to the formation of a new scientific trend in the field of cultural studies—called informational cultural studies.[79] Cultural studies in Russia, which grew from philosophy and followed Western schools of thought, have done similar work.[80] However, despite the apparent similarities, the two fields' conceptual apparatus and theoretical foundations remain different, affecting different ideas about information. Overall, this brief overview of Russian scholarship on information and its reflection in the various scientific fields demonstrated that while the concept of information is entangled in a constellation of different notions, such as communications, media, and data, it is heavily loaded with the idea of objectivity, as opposed to communication as subjective and potentially biased.

Conclusions

The four case studies analysed above demonstrate how information and communication are, and have been, conceptualised and interpreted in various ways in different geographic regions. Consequently, the first, and most interesting finding, is the fact that a history of information and communication theory (or theories) is mostly impossible to tell. We should instead talk about histories and different periods inside the same region, as we can clearly see from the evolutions in the Latin America and French traditions, for example. What counts as "information" and "communication" differs as each of the national and transnational communities of researchers domesticated information and communication theories in specific ways.

Second, all the histories of information and communication theories in the four different regions are linked to American scholarship. By linked, it means that they were often inspired by the US model and, even if we are trying to recount a non-US history, the starting point and the founding fathers are nevertheless Shannon and Wiener in most of the cases. That being said, they were a starting point only for further evolution of ideas. There are of course heralds of the American development of information theory, establishing a clear lineage: for example, the communication scholar Wilbur Schramm acted as an information and communication theory evangelist both in China and in Latin America. Where the American champions were not directly imported or referred, other national scholars seemed to play a key role in importing or translating their theories, as Escarpit did in France for Shannon. But there are also cases where the American legacy was rejected or limited, and we have seen some attempts to build "autochthonous" information and communication theories which are explicitly or implicitly original compared to American ones. The cases of Pasquali in Latin America and Cai in China are quite symbolic of non-Western founding fathers of contemporary information/communication/media theory, not yet acknowledged historically.

A third useful insight towards a new history of information and communication theory(ies) deals with the variety of fields where these theories can be placed in the different regions. In the French tradition, information (and communication) theory has emerged in the field of literary studies. In the Latin American and Chinese ones, it has emerged mainly in conjunction with communication and media theory. Whereas in the Soviet and Russian arena, there is a wide spectrum of fields reflecting on similar issues but not interacting or collaborating: from mathematics to computer science, from (social) informatics to social sciences. Where is the place, or better, the field of "information theory"? The answer perhaps is both everywhere and nowhere. The place changes in the same region according to the time period and time frame: think about the French case, where the project of a general theory of information and communication has been slowly abandoned over time. Apparently, information and communication theories (together or separate and despite the disapproval of Shannon himself) have been broadly applied in the twentieth and twenty-first centuries; their success can be explained in part due to this flexibility. This is one of the cases when the uncertainty of names, definitions, and disciplines contribute to the popularity of concepts and ideas.

Finally, focusing on the key aspect of this chapter, how have the relationships between information and communication theories developed in the four regions? The *con-fusion* of the two fields, already discussed in the introduction, clearly emerges in the French case, where the labels "*Sciences de l'Information et de la Communication*," "SIC," and "infocom" all underline the fact that information and communication are profoundly intertwined and occupy a common ground. But, as already mentioned, this combination changed over time. In other traditions and regions, several unquestioned differences among the two fields are discussed, but drawing a clear line between the two is mostly impossible, and its value questionable. In some places and traditions, information theory seems to deal more with hard sciences and communication theory than with the social sciences. Information theory seems to operate more with the quantity of information, while communication theory with its quality. And in the Russian case, this also brings up related issues such as understanding information as objective, and communication as subjective and potentially biased. Information theory seems to be more concerned with the mechanical and technical aspects of information transmission, while communication theory with the social effects of this transfer, with a specific interest on the receiver/the audience. Similarly, information theory deals more with one flow, while communication theory looks more dialogic. This is clear in the Latin American tradition, where communication is seen as the exchange of messages, the interactivity between the actors, while information has a "low coefficient of communicability," of interactivity. This idea has also become popular in Brazil thanks to the work of Freire. According to him, information is an extension, meaning passive, one-to-many, asymmetrical, and with negative connotation; communication is the opposite and therefore has a positive connotation. But these are not fixed categories. In the Russian case, information is considered as "the content we exchange in the process of communication" or, reversely, communication is the act of transmitting pieces of information; in this sense, information looks like as something static and given and communication something more processual. At the opposite side, in French, according to Meyriat, information is the cognitive content of an actual or possible communication. So, information in this case implies active reception and the development of personal knowledge, in a sense which is radically different from data as objective, finite elements, or as information defined by cybernetics. Of course, information and communication theories deal with power, even political power: governments have often defined them and, through definitions, classified them with related consequences.[81] If the Chinese State

Science and Technology Commission list the media sector as "information industries," this has consequences on the media themselves. If powerful French academics decide to create a unique sector collecting all the studies in information and communication theory, this has an impact on the academia, on other disciplines, but also at political level.

The history of information and communication theory has been stabilised over time, and with the impact of digitalisation and of convergence between traditional media and information and communication technologies, the two fields and the two theories are merging more and more. Digital media as a research object in a broad sense seems to dissolve and challenge traditional disciplinary boundaries between information studies and communication studies. For example, many media and communication publications cover topics such as search, archiving and the management of information and data by platforms and media, topics that historically have been seen as the core of information studies. And vice versa, information studies can no longer avoid discussion about media, content, audiences, and other media-related topics. In this process of stabilisation, the classic vulgate of American scholarship, trying to draw a line between the fields and often quoting the same Western scholars, has gained more visibility. We hope this chapter can help contest the one-dimensional history of information and communication theory, while it may also add to its complexities, reciprocal connections, and tensions.

Notes

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2 Quoted in Flo Conway and Jim Siegelman, *Dark Hero of the Information Age: In Search of Norbert Wiener, the Father of Cybernetics* (New York: Basic Books, 2005), 189–190. Italics added by the authors.
3 Norbert Wiener, *Cybernetics, or Control and Communication in the Animal and the Machine* (Cambridge, MA: MIT Press, 1948).
4 Colin Koopman, "Information Before Information Theory: The Politics of Data Beyond the Perspective of Communication," *New Media and Society* 21, no. 6 (2019): 1326–1343, quote at 1329–1330. Italics added by the authors.
5 See https://www.britannica.com/science/information-theory. Italics added by the authors.
6 See, for example, Stefan Host, *Information and Communication Theory* (Newark, NJ: Wiley, 2019).
7 Robert T. Craig, "Communication Theory as a Field," *Communication Theory* 9, no. 2 (1999): 119–161, quote at 141. Italics added by the authors.
8 Alistair Black and Bonnie Mak, "Period, Theme, Event. Locating Information History in History," In *Information and Power in History. Towards a Global Approach*, ed. Ida Nijenhuis, Marijke van Faassen, Ronald Sluijter, Joris Gijsenbergh, and Wim de Jong (Abingdon, Oxon; New York: Routledge, 2020), 18–36.
9 See, for example, David W. Park and Jefferson Pooley, *The History of Media and Communication Research: Contested Memories* (New York: Peter Lang, 2008).
10 For the exceptions, see, for example, Peter Simonson and David W. Park, *The International History of Communication Study* (New York: Routledge, 2016), with several case studies building national histories of communication studies; Ronald R. Kline, *The Cybernetics Moment, or, Why We Call Our Age the Information Age* (Baltimore, MD: Johns Hopkins University Press, 2015), where the American theorists of information are confronted with the British ones.
11 Wang Wenjuan (王文娟), 改革开放第一个十年信息论在我国新闻界的引入——对中国期刊全文数据库 1979 年-1989 年相关文献的考察), 新闻传播, 3 (2012): 202–204. ["The Introduction of Information Theory in China Journalism in the First Decade of Reform and Opening Up——A Survey of Related Documents in China Periodicals Full-text Database from 1979 to 1989"].

12 Angela Xiao Wu, "Journalism via Systems Cybernetics: The Birth of the Chinese Communication Discipline and Post-Mao Press Reforms," *History in Media Studies* 2 (2022): 1–31. The reform period began between the end of the 1970s and the beginning of the 1980s and is characterised by the economic reforms of Deng Xiaoping which contributed to the restoration of international business and international relations extremely limited during the Mao era.
13 Wu, "Journalism via Systems Cybernetics."
14 Wu, "Journalism via Systems Cybernetics."
15 Yuezhi Zhao, *Communication in China: Political Economy, Power, and Conflict* (Plymouth: Rowman & Littlefield Publishers, 2008).
16 Zhao, *Communication in China*.
17 Bei You (北邮), 中国信息论研究的先行者——记全国劳模、北京邮电大学教授蔡长年), ["The Forerunner of China's Information Theory Research——Cai Changnian, a National Model Worker and Professor of Beijing University of Posts and Telecommunications,"] 工会博览 9 (2020): 43–45. According to the results of the database, Cai Changnian was the first Chinese author to publish in Chinese and in PRC on "information theory."
18 Cai Changnian (蔡长年) "Information Theory" (信息论) (Beijing, Post and Telecom Press 人民邮电出版社, 1962).
19 Bei, "The Forerunner of China's Information Theory Research," 44.
20 Zhengrong Hu and Deqiang Ji, "Retrospection, Prospection and the Pursuit of an Integrated Approach for China's Communication and Journalism Studies," *Javnost - The Public* 20, no. 4 (2013): 5–16.
21 Wu, "Journalism via Systems Cybernetics," 8.
22 Wilmer Schramm, 传学与新闻及其它,["Communication Study and Journalism, and Other Issues"] 新闻学会通讯 14 (1982): 19–22.
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25 Wu, "Journalism via Systems Cybernetics."
26 Hailong Liu and Yidan Qin, "Toward a New Media Study in China: History and Approach," *History in Media Studies* 1 (2021): 1–8.
27 Wilbur Schramm, *Media and National Development: The Role of Information in the Developing Countries* (Redwood, CA: Stanford University Press, 1964); Daniel Lerner, *The Passing of Traditional Society: Modernizing the Middle East* (New York: Free Press, 1958); Everett M. Rogers, *Diffusion of Innovations* (New York: Free Press, 1962).
28 See Armand Mattelart, *Agresión Desde el Espacio. Cultura y Napalm en la Era de los Satélites* (Mexico: Siglo xxi, 1972); Armand Mattelart, *La Comunicación Masiva en el Proceso de Liberación* (Buenos Aires: Siglo xxi, 1973).
29 The most known books of these authors are Jesús Martín-Barbero, *De los Medios a las Mediaciones* (Barcelona: Gustavo Gili, 1987); Néstor García Canclini, *Culturas Híbridas: Estrategias Para Entrar y Salir de la Modernidad* (México: Grijalbo, 1989); Rossana Reguillo, *En la Calle Otra Vez. Las Bandas Juveniles. Identidad Urbana y Usos de la Comunicación* (Guadalajara: ITESO, 1991); Rossana Reguillo, *La Construcción Simbólica de la Ciudad. Sociedad, Desastre, Comunicación* (Guadalajara: Universidad Iberoamericana/ITESO, 1996).
30 Claude Shannon and Warren Weaver, *Teoría Matemática de la Comunicación* (Madrid: Forja, 1981).
31 Antonio Pasquali, *Comunicación y Cultura de Masas* (Caracas: Colección Bicentenario Carabobo, 2021). First edition published in 1963.
32 Umberto Eco, *Apocalittici e integrati* (Milan: Bompiani, 1964); Herbert Marcuse, *One-Dimensional Man* (Boston, MA: Beacon Press, 1964); Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw Hill, 1964); Hans M. Enzensberger, "Constituents of a Theory of the Media," *New Left Review* 64 (1970): 13–36.
33 Pasquali, *Comunicación*, 61.
34 Pasquali, *Comunicación*, 62.
35 Pasquali, *Comunicación*, 75.
36 Pasquali, *Comunicación*, 90.

37 Pasquali, *Comunicación*, 78.
38 Pasquali, *Comunicación*,75. Pasquali also anticipated information overload: because through the "quantitative explosion" of information, the consumer "is forced to believe that the apparent information surplus automatically equals good 'information', and that this 'knowledge', ingested in elephantine doses, can only improve it automatically. The current use of the information media by the cultural industry must be denied, therefore, as a matter of priority" (Pasquali, *Comunicación*, 40).
39 Paulo Freire, *¿Extensión o Comunicación? La Concientización en el Medio Rural* (Mexico: Siglo xxi, 1973), 70.
40 See Fernando Reyes Matta, *Comunicación Alternativa y Búsquedas Democráticas* (Mexico: ILET, 1983); Alejandro Barranquero and Emiliano Treré, "Comunicación Alternativa y Comunitaria. La Conformación del Campo en Europa y el Diálogo con América Latina," *Chasqui* 146 (2021): 159–182.
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42 Freire, *Pedagogy*, 79.
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44 Martín-Barbero, *De los Medios a las Mediaciones*.
45 See Robert Boure, ed., *Les Origines des Sciences de l'Information et de la Communication. Regards Croisés* (Villeneuve d'Ascq: Presses Universitaires du Septentrion, 2002); Dominique Trudel, Olivier Le Deuff and Stefanie Averbeck-Lietz, "L'Histoire Digitale et la Recherche en Communication," *Communication* 40, no. 1 (2023), https://doi.org/10.4000/communication.17010.
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53 Renucci and Pélissier, "L'Esprit d'Aventure," 116.
54 Têtu, "Les Origines Littéraires."
55 See Robert Estivals, *Théorie Générale de la Schématisation 3* (Paris: L'Harmattan, 2003), 22–23.
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58 Dominique Trudel, "L'Abandon du Projet de Construction de la Tour Lumière Cybernétique de La Défense," *Le Temps des Médias* 1, no. 28 (2017): 235–250.
59 Google Books NGram Viewer is a tool for exploring the usage of words over time, based on their occurrence in the Google Books digitised collection. According to the tool, the occurrence of "cybernétique" in French books, which peaked in 1966–1967, was the same in 1956 and 1977.

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