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Popularization through press advertisements: mobile telephony in Spain (1994–1999)

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Abstract

This paper explores the combined effects of everyday life technological devices and advertisements in constituting an efficient way to scientific popularization. We, therefore, analyze mobile telephony advertisements published in a high-circulation Spanish newspaper — La Vanguardia — between 1994 and 1999. We identify content that promoted knowledge about the devices, the service, or the uses of this groundbreaking technology. Advertisements also attach attributes to technology — modernity, freedom, or efficiency. We suggest that the analysis of advertisements that promote everyday life digital devices allows a better understanding of what (digital) technology means to publics.

Keywords

History of public communication of science, Popularization of science and technology

Introduction: popularization of everyday technologies

High-tech devices surround us. Mobile phones, plasma screens, microwave ovens, and vacuum cleaners, each gadget follows a particular popularization process that introduces users to scientific facts or technological concepts. By using them, individuals share technological knowledge with other users, both about the gadgets and their uses. However, scientific popularization literature[1] focuses either on well-developed controversial technologies or on new technologies with estimated great potential.[2] Domestic gadgets are not usually seen as subjects of interest in technology studies — including those about popularization — because they are ordinary objects of consumption [Gronow and Warde, 2001]. In contrast, we consider domestic devices targeted at end consumers as a relevant, unexplored source of technological popularization. In particular, advertisements produce a significant amount of scientific and technical content related to domestic devices that deserves an analysis from the perspective of popularization.

Advertisements constitute essential raw material for studying how a technological device is presented to publics, and how the device and its representation change

[1] According to Burns, O'Connor and Stocklmayer [2003], "in the context of science communication, science is deemed to include 'pure science' [...], mathematics, statistics, engineering, technology, medicine, and related fields" (p. 185).

[2] For instance, Bauer [1995] emphasizes that reticence about nuclear power, information technology, and biotechnology caught the attention of popularization studies at the end of the twentieth century.

over time [Lyth, 2009]. Advertisements share new knowledge with publics not only when a technology is introduced into the market but also when the technology evolves. They play a role as educators [Lubar, 1998], and introduce ideological messages about the technology they publicize [Cowan, 1985; Koski and Kretschmer, 2005]. Advertisements provide information about technical characteristics, illustrate the evolution of the device and suggest — or even prescribe — new trends, models to follow, or both [Ferran Boleda, 2013]. From this perspective, historical studies on everyday life technologies analyzed, among others, domestic electricity [Nye, 1990], lighting [Bijker, 1995; Bowers, 2001; Dillon, 2002], refrigerators [Nickles, 2002], automobiles [Laird, 1996], and aviation [Budd, 2011].

The historical study of the popularization of gadgets entails analyzing everyday life, as one of the results of popularization is the adoption of domestic devices by publics. The approach to technologies in use introduces new perspectives which suggest new chronologies, geographies and sociologies as claimed by Edgerton [1999]. Specifically, the research on everyday technologies from the point of view of popularization opens the door to a richer analysis. Such an analysis includes, among others, the identification of scientific and technological knowledge spread through the use of the new device [Pitrelli, Manzoli and Montolli, 2006], and the description of new uses invented or suggested by the end-users [Bar, Weber and Pisani, 2016; Pinch, 2003].

Advertisements constitute evidence of "knowledge in transit" [Secord, 2004], this is why the analysis of science and technology popularization benefits from focusing on communication processes created for marketing campaigns. Advertising helps provide an understanding of what happens to technology once it turns into a commodity [Wigelsworth, 2010]. It is easy to identify discourse modifications reflecting how the users' reception of the devices changes over time, for instance, by monitoring the presence, or absence, of specific technological concepts or uses. Therefore, advertisers would be the experts when knowledge circulation responds to the commercial goal of increasing sales of technological devices [Cowan, 1976].

Social and cultural creations have been evaluated through the "modernity" lens for more than a century; and "in common speech, 'modern' is often a synonym for the latest, and it is assumed inevitably the best, in a triumphant progression to the present" [Misa, Brey and Feenberg, 2003, p. 5]. This is the meaning of modernity we use here. In this sense we understand that contemporary advertisements build the legend of progress through a parade of technology [Misa, Brey and Feenberg, 2003], and the diversity of publicity campaigns gives ample leeway to introduce analysis about uses, perceptions or other characteristics of the new devices [Cowan, 1985].

Our approach

We are interested in analyzing the transit of knowledge from experts to lay people through advertisers that is facilitated by press advertisements. We selected an already popular technology, mobile telephony. Created in the 1970s [Agar, 2003], it became a market success at the end of the 1990s [International Telecommunication Union, 2006] that, since then, has followed a path of constant innovation. There is no question about the social and cultural importance of mobile telephony (i.e., Castells et al. [2006] and Goggin [2008]), with advertisements contributing to communication of the technological innovations attached to it [Aguado and

Martínez, 2007]. Of interest to us are the initial stages of popularization of mobile telephony, when advertisements would mostly be devoted to introducing new technical knowledge to publics.

By approaching knowledge construction as a communication process, we can understand that actions aimed at popularizing mobile phones constitute new shared knowledge among experts and lay people. Our aim is to analyze the technological content of advertisements and to contextualize the new knowledge that users incorporated into their everyday life. In doing so, we identify content that shaped particular forms of appropriation among publics.

When a radical innovation enters the market, product descriptions prevail over brand differentiation strategies [Kotler and Armstrong, 2010]. To create awareness, advertisements deploy the technological information that industry considers the public are likely to need. Changes in commercial discourses and strategies could reflect not only a successful awareness campaign but also different levels of knowledge in the audience. By identifying changes in the discourses concerning technology we can understand the underlying reasons for certain content. At the time new users incorporate mobile phones into their everyday life, we will infer what knowledge was apprehended by the public, and how sales arguments adapted to these changes. The analysis allows us to understand how different content in advertisements — technical descriptions, suggested uses, and stereotypes — contributed to the popularization of new knowledge about mobile telephony.

We focus on knowledge about technology mobilized in press advertisements during the first stages of mobile telephony popularization. Three research questions articulate our approach:

*RQ1: What was the **technological information** displayed/shown/demonstrated in advertisements in the press?*

*RQ2: Is it possible to identify **differences in technological information depending on the target audience** of advertisements? If so, what are the most relevant differences?*

*RQ3: What are the **underlying attributes** that advertisers wanted to **associate with mobile telephony**? How do they relate to technological knowledge?*

The case study

We discuss the research questions through a case study concerning mobile telephony advertisements published in a Spanish newspaper between 1994 and 1999. This six-year period corresponds to the initial market explosion of mobile telephony in Spain and worldwide [International Telecommunication Union, 2012]. Spain is one of the European countries where mobile telephony experienced the fastest growth: during the period mobile ownership rocketed, moving from 1 mobile telephone subscription per 100 inhabitants in 1994 to 38 in 1999 (that is, from 0.4 million to 15 million subscriptions) [International Telecommunication Union, 2012]. We therefore expect the case of mobile telephone technology in Spain to exhibit better evidence of knowledge circulation through advertisements than in other countries.

The period witnessed key changes in the telecommunications market. In 1994 there was one mobile telephone network operator in Spain, MoviLine, a subsidiary of the incumbent Telefónica, In operation since 1990, it deployed analog technology [Pérez Yuste, 2002]. The mobile market liberalization in 1994 entailed the allocation of two digital licenses under the European GSM (Global System for Mobile Communications) standard. New providers, launched in 1995, were Movistar — a Telefónica brand, and Airtel — operated by Airtel-Sistelcom-Reditel. The Spanish telecommunications market regulator, CNMT (Comisión Nacional del Mercado de las Telecomunicaciones), was created in 1996, while the incumbent Telefónica was privatized in 1997. The third GSM digital network operator to be licensed, in 1998, was Retevisión Móvil, which started its activity in January 1999 in 10 cities under the commercial brand Amena [Escribano and Zaballos, 2002].

To build the corpus of analysis we selected *La Vanguardia* (LV), a general-interest newspaper. Published in Barcelona and with a high audience at the Spanish level [AIMC, 2000], its online library allows for systematic, free-access searches. We looked for content in which the name of at least one operator appeared — Movistar, MoviLine, Airtel, or Amena — between 1994 and 1999. Mobile operators subsidized mobile handsets during the period, therefore we assumed that all the advertisements of mobile phone manufacturers were linked to at least one operator and already appeared in the search.

The search returned 4,242 hits, 79% of them being advertisements (3,353). In 1994, we found 101 advertisements. They multiplied almost by ten, coming to a head in 1999 with 945 published advertisements — giving an average of 2.6 advertisements per day that year. Even though there is repeated content, the figures capture the increasing importance of mobile telephony in the Spanish society. We classified advertisements into three categories: first, sponsorship — in sports or other areas; second, advertisements placed by manufacturers and shops — aimed at selling handsets, which often were associated with specific operators; and third, operators' advertisements — aimed at selling the service and promoted handsets sometimes. Our interest mostly centered on this last category, while we also considered advertisements from the second category when relevant. After a systematic review we selected the most illustrative examples of advertisements that contained (1) explicit technological descriptions, (2) novelties, and (3) demonstrations of use. These are discussed in the following section.

Results and discussion

Firstly, regarding **technological knowledge in advertisements in the press (RQ1)**, some specific technological concepts moved from technology forums to colloquial language, particularly at the beginning of the period. Handset manufacturers and electronics stores resorted to technological descriptions in their advertisements, focusing on specific characteristics of devices and detailing their functions. There was no need for explicit descriptions because publics already knew the meaning of, for instance, phonebook capacity, handset weight, and battery life.[3] As these are the most commonly discussed features, we could therefore infer that these, not others, are the features that would influence purchase decisions as far as these

[3] "L'oferta Miró en telefonia" (LV, 25/November/1995, p. 2, Economy supplement: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1995/11/25/ECO19951125-002.pdf). The links provide direct access to the advertisements (all accessed on January 30, 2017).

advertisers were concerned. In contrast, mobile operators publicized more sophisticated features which required a better understanding of the device and therefore came with detailed explanations, as in the case of dual band handsets — those able to operate in both GSM 900 and 1800 MHz frequency bands.[4]

The digital GSM network deployment constitutes an interesting example of the way advertisements introduced new technological concepts. This system was aimed at substituting the existing analog system. Airtel, the first digital-born brand, argued against its analog rival, MoviLine, in technical terms. Before its launch, from June to July 1995, Airtel published a collection of text-only, sober advertisements. They highlighted the disadvantages of analog and the advantages of digital. The first advertisement focused on the limited number of concurrent users due to the restriction in the analog bandwidth, which impoverished the quality of communications; and the heterogeneity of analog country systems, which precluded the use of mobile phones abroad.[5] A subsequent advertisement praised the benefits of the digital system, which overcame interruptions and noises and allowed secure conversations. It also introduced the "smart card" (not mentioning the term SIM card yet) explaining that it could operate with different mobile handsets around Europe.[6] A simple claim described the underlying technological arguments in favor of the digital system: it needed less bandwidth. Therefore, as far as the advertisers' were concerned, it was enough to appeal to the higher efficiency in using a scarce resource — radio spectrum bandwidth — to make clients move into the digital system. However, there is no detailed explanation of the technical concept of radio spectrum. Airtel's aggressive campaign qualified analog mobile telephony as "residual" at the end of 1996,[7] even though it accounted for 44% of total subscriptions that year in Spain [International Telecommunication Union, 2006] and remained in operation until the end of 2003.

The other operator, Telefónica, followed a significantly different strategy with its digital brand Movistar in 1995. As Telefónica also owned MoviLine, the only analog license in operation, its advertisements pointed out the benefits of both systems. A double page advertisement depicted MoviLine associated with a map of Spain and Movistar associated with a map of Europe.[8] Although it described the digital system as the one with the latest novelties and greater advantages, it also emphasized the competitiveness of the analog system — given the widespread deployment of the network at the time. When comparing analog and digital systems, coverage emerged as a key argument to support the former. At this time, MoviLine had reached about 90% of the territory and 98% of the population. In the advertisement, these figures were contrasted with digital coverage. The latter was introduced more vaguely and avoiding any exact number and anticipated that

[4] "Dual Band: El doble de don de gentes con el telemóvil" (LV, 12/July/1999, p. 72: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1999/07/12/LVG19990712-072.pdf).

[5] "La telefonía móvil hoy" (LV, 29/June/1995, p. 57: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1995/06/29/LVG19950629-057.pdf).

[6] "GSM, la revolución tecnológica de los teléfonos móviles" (LV, 30/June/1995, p. 57: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1995/06/30/LVG19950630-057.pdf).

[7] "¿Algún usuario de telefonía móvil analógica residual quiere un Airtel GSM totalmente gratis?" (LV, 26/November/1996, p. 39: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/11/26/LVG19961126-039.pdf).

[8] "MoviLine o Movistar. ¿Qué sistema de telefonía móvil prefiere?" (LV, 23/July/1995, p. 22–23: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1995/07/23/LVG19950723-022.pdf and http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1995/07/23/LVG19950723-023.pdf).

Movistar would have the best GSM coverage in Spain. Also, the advertisement linked digital telephony to roaming agreements within the European Union.

The Short Messaging System, or SMS, is another radical innovation brought by GSM –present in the market since at least 1995.[9] Even though it became common vocabulary shortly afterwards, operators almost never used the technical initials SMS during the period. Instead, Airtel talked about *TeleAviso* (TeleNotice),[10] and Telefónica about Movistar *Mensajería* (Movistar Messenger).[11] Handset manufacturers explained that devices could receive and send "text messages" or "SMS messages",[12] and operators gave detailed explanations about the service and its advantages.[13] Even in the 1999 Christmas campaign, a few months before the explosion of SMS in Spain [International Telecommunication Union, 2004]) Movistar kept talking about text messages — not SMS.[14]

In our search for technological knowledge in advertisements, we found some features merely described without comments on their technological background. However, the co-existence of the digital and the analog systems entailed the discussion of technical details to explain such differences. Other technical concepts appeared in advertisements related to the GSM network. Roaming,[15] coverage,[16] and SIM card[17] also needed detailed explanations because they were not yet part of the publics' general background knowledge.[18]

[9] "L'oferta Miró en telefonia" (LV, 5/November/1995, p. 72: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1995/11/05/LVG19951105-072.pdf).

[10] "Nuevo servicio TeleAviso Airtel" (LV, 8/October/1996, p. 37: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/10/08/LVG19961008-037.pdf).

[11] "Para las comunicaciones de mi empresa necesito algo más que un móvil" (LV, 15/October/1997, p. 21: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/10/15/LVG19971015-021.pdf).

[12] "Pryca — Nokia" (LV, 8/March/1997, p. 33: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/03/08/LVG19970308-033.pdf).

[13] Ibid. 10, 11.

[14] "Este año, como siempre, escribe unas líneas a los tuyos" (LV, 24/December/1999, p. 13: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1999/12/24/LVG19991224-013.pdf).

[15] Roaming was introduced with no extra explanations, which might point to a certain degree of maturity regarding everyday life vocabulary. For instance, a 1998 advertisement clarified that the promotion did not include "international calls, calls made and received in roaming, and SMS." (LV, 11/February/1998, p. 27: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1998/02/11/LVG19980211-027.pdf). Then, at the end of the period, the term appeared linked to connection among different networks ("Guanya en qualitat" LV, 14/July/1999, Technology Supplement, p. 13 http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1999/07/14/SU119990714-013.pdf).

[16] Advertisements featuring coverage were usually illustrated with maps: "Con nosotros puede hablar hoy" LV, 23/June/1996, p. 23. http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/06/23/LVG19960623-068.pdf.

[17] Regarding SIM cards, information focused mostly on new payment possibilities ("Ahora para hablar sólo necesita una tarjeta como esta" LV, 5/March/1997, p. 27: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/03/05/LVG19970305-027.pdf). and sometimes mixed this idea with technological features ("Libertad sin cargos" LV, 21/March/1997, p. 57: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/03/21/LVG19970321-057.pdf).

[18] We observed a similar evolution in other cases related to mobile services or handset features, as "mobile banking" or "hands-free" systems. An extended analysis of these cases goes beyond the objectives of this paper.

Secondly, **regarding differences in technological information targeted at different audiences (RQ2)**, we found specific discourses aimed at business and private customers published in parallel to other generic advertisements. Initially designed for businesspeople and professionals, private end-users started to be targeted in the second half of the 1990s.

On the one hand, it was common to find messages aimed at professionals during the period studied. Operators focused on the mobile office, a combination of a mobile phone and a laptop computer.[19] Compatibility with previous systems was as important as incorporating the latest technological advances. In this sense, the insistence on showing the fax function of the new handsets — in close proximity to the possibility of sending emails — transmitted confidence. The underlying idea seemed to be that the incorporation of trendy novelties would not harm their communication with ICT-wary clients. Therefore, advertisements showed innovations aimed at bridging gaps with colleagues, clients, or suppliers.

On the other hand, voicemail is an example of a technical feature aimed at private customers. MoviLine promoted a free voicemail service by explaining that being unavailable — represented by a young man fishing on a river — had no extra cost for the user when they later accessed their voicemail messages.[20] The underlying idea emphasized the ability to manage the users' availability on the phone. A common strategy was illustrating uses in everyday situations: a boy on a sofa,[21] a woman in the rain,[22] or a young student on a bike and a retired couple in a garden.[23] So we can infer that, for the operators, it was important to combine means of appropriation with technological content — but usually in different advertisements.

Among private customers we identified specific target groups, for instance physically challenged individuals. Airtel featured voice dialing — together with hands-free features, as a significant improvement in removing keypad usability barriers.[24] In contrast, Movistar appealed to emotions, selling autonomy instead of usability, when addressing this group with descriptions of similar features.[25] Voice

[19] "Bienvenido a la oficina más pequeña del mundo" (LV, 2/June/1996, p. 12: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/06/02/LVG19960602-012.pdf) and "Su oficina móvil" (LV, 21/November/1999, p. 86: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1999/11/21/LVG19991121-086.pdf) by Movistar. Or "Vamos a cambiar la definición del diccionario…con la OFIMOVIL AIRTEL-COMPAQ" (LV, 9/June/1996, p. 41: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/06/09/LVG19960609-041.pdf) and "Lo que puede hacer Airtel por su empresa se resume en un par de líneas" (LV, 14/March/1997, p. 72: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/03/14/LVG19970314-072.pdf) by Airtel.

[20] "Desconectar no me cuesta nada" (LV, 12/November/1998, p. 27: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1998/11/12/LVG19981112-027.pdf).

[21] "Nuevo plan Airtel provincial" (LV, 6/February/1998, p. 15: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1998/02/06/LVG19980206-015.pdf).

[22] "Cada segundo es importante" (LV, 31/October/1998, p. 17: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1998/10/31/LVG19981031-017.pdf).

[23] "Movistar, líder en calidad y cobertura, también lo es en precio" (LV, 7/April/1996, p. 28: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/04/07/LVG19960407-028.pdf).

[24] "Hemos eliminado 10 barreras que limitaban a muchas personas discapacitadas" (LV, 17/January/1998, p. 11: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1998/01/17/LVG19980117-011.pdf).

[25] "Para llegar a cualquier parte" (LV, 22/May/1996, p. 9:

dialing features were also targeted at the general public arguing that users just need to remember their loved one's name.[26]

Despite the significant number of advertisements speaking to a non-segmented market, we are able to identify differences in the technological concepts aimed at specific target groups. In particular, the professional audience received more technical details.

Lastly, **regarding the underlying attributes associated with mobile telephony (RQ3)**, we found that advertisements stand out, mostly at the beginning of the period, in creating an association with modernity. In mobile communication, modernity was linked to new devices, new services, and new handset-embedded features. For instance, in the business context Airtel emphasized the modernity of mobile services by depicting a mobile handset next to an old typewriter in which the paper displayed a picture of an MS Word screen.[27] The illustration equated the use of mobile phones just for calling to the use of computers just for word processing. Similarly, in the context of private users modernity was represented by using a mobile phone for texting Christmas greetings instead of sending the customary cards.[28] The use of advertising for the introduction of new technologies for everyday uses has promoted the underlying idea of modernity ever since the first electrical appliances were sold as modern in the early twentieth century [Nye, 1985]. Every new device was (is) associated with modernity because progress and modernity were (are) presented as indivisible concepts [Misa, Brey and Feenberg, 2003].

Once the basic technological knowledge associated with mobile communication became common background knowledge in society, advertisements changed their arguments. Modernity mostly vanished, opening the door to other attributes not always necessarily linked to new knowledge. Freedom, for instance, appeared in some of the advertisements of the corpus, equating cost control to freedom of choice — thanks to prepaid subscriptions.[29] But the freedom attribute exploded in 1998, when the third GSM operator, Amena, entered the market. Amena's initial advertising campaign did not focus on technical arguments, but relied heavily on the popular 1972 song *Libre* (Free) which constituted the soundtrack of an aggressive TV campaign mainly aimed at a young audience that has associated freedom with mobile phones ever since in the Spanish cultural context.[30]

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http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/05/22/LVG19960522-009.pdf).

[26] "Siempre tengo su nombre en la cabeza, no necesito más" (LV, 13/February/1999, p. 21: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1999/02/13/LVG19990213-021.pdf).

[27] "¿Su empresa utiliza sus ordenadores sólo para escribir a máquina? Entonces ¿por qué utilizar sus teléfonos móviles sólo para hacer llamadas?" (LV, 10/February/1997, p. 16, Sports Supplement: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/02/10/DEP19970210-016.pdf).

[28] Ibid. 14.

[29] "Habla con libertad. Sin contratos, sin cuotas mensuales" (LV, 26/April/1998, p. 21: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1998/04/26/LVG19980426-021.pdf).

[30] TV commercial "Libre" 1998: https://www.youtube.com/watch?v=xwiccQrDYVQ, accessed 20/January/2017.

This transformation, with less technological information in the ads, reflects the change of mobile telephony into an everyday life service. Advertisements not only linked it to attributes such as fashion,[31] but introduced mobile telephony as a gift for loved ones on occasions such as Mother's Day [32] or Saint Valentine's Day. [33]

We also identified safety/security, self-confidence and reliability as key attributes during the period. First, advertisements described situations in which a mobile phone appeared as "the" effective solution for safety/security reasons. For instance, they turned mobile phones into an essential car accessory by depicting a car with an empty petrol tank on an isolated road.[34] Also, a mobile phone replacing the barrel of a St Bernard rescue dog delivered a similar idea.[35] The possibility of staying in touch when away from home ("You've arrived. Let them know"[36]) was also included in the combined dimension of safety and reliability of the system. Second, regarding self-confidence, mobile phones gave users absolute control of their communications, as claimed by an advertisement by Ericsson/Movistar that associated self-confidence (be yourself) with full control of mobile phone expenditure (thanks to pre-paid subscriptions).[37]

Finally, in terms of reliability, mobile operators wanted to transmit confidence in their services. They, therefore, repeatedly published data on coverage and subscribers, linking their number of customers with the strength of their service. For their part, Telefónica featured its first 300,000 subscribers in 1994,[38] and the first million in 1995.[39] After that, figures became fuzzier "more than one million [subscribers]" or "more than two million".[40] Airtel, similarly, reported its first million on its second anniversary.[41] The strategy of drawing upon the number of subscribers for creating confidence is not new, but is described for domestic devices

[31] "Un color para cada llamada" (LV, 19/July/1997, p. 5: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/07/19/LVG19970719-005.pdf), or "Una elección muy personal" (LV, 24/July/1997, p. 49: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/07/24/LVG19970724-049.pdf).

[32] "Porque es una buena madre, el más pequeño. Porque eres un buen hijo, el más completo, gratis" (LV, 3/May/1997; p. 19: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/05/03/LVG19970503-019.pdf); or "El 100% de las madres sólo tienen oídos para sus hijos" (LV, 2/May/1997, p. 5: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/05/02/LVG19970502-005.pdf).

[33] "El día 14 díselo 2 veces. Dile 2 veces lo que le quieres y te costará la mitad" (LV, 11/February/1998, p. 27: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1998/02/11/LVG19980211-027.pdf).

[34] "Carretera local L-451. A varios kilómetros de ninguna parte. Sin gasolina. Con cobertura" (LV, 20/March/1997, p. 21: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/03/20/LVG19970320-021.pdf).

[35] "Tranquilo, puedes contar con Airtel hasta en las estaciones de esquí" (LV, 3/January/1997, p. 56: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/01/03/LVG19970103-056.pdf).

[36] "Ya has llegado. Díselo a los tuyos" (LV, 6/September/1999, p. 11: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1999/09/06/LVG19990906-011.pdf).

[37] "Sé tú mismo. Piénsate bien lo que vas a pagar por ser tú mismo" (LV, 2/August/1999, p. 15: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1999/08/02/LVG19990802-015.pdf).

[38] "Los primeros 300.000" (LV, 30/May/1994, p. 23: http://hemeroteca-paginas.lavanguardia.com/LVE02/PUB/1994/05/30/LVG19940530-023.pdf).

[39] "Un millón de móviles con Telefónica" (LV, 9/July/1995, p. 63: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1995/07/09/LVG19950709-063.pdf).

[40] "Con nosotros se puede hablar" (LV, 25/February/1996, p. 53: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1996/02/25/LVG19960225-053.pdf); "La vida es un poco más fácil si tienes en quien confiar" (LV, 23/November/1997, p. 33: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/11/23/LVG19971123-033.pdf).

[41] "Airtel, en su segundo aniversario alcanza el 95% de cobertura y el millón de clientes" (LV,

as early as the first part of the twentieth century [Marchand, 1985]. It reflected the public's preference for widely adopted technologies and has the indirect effect of sharing key data on the market structure with the general audience.

Conclusions

For most publics, technology is more closely related to (digital) everyday life devices than to big science. The analysis of mass-media advertisements allows an understanding not of what technologies are, but what publics might think technologies are. This is because advertisements constitute an essential channel through which publics receive information about such devices, and because marketing campaigns rely on studies of end consumers. Popularization of mobile phones is a complex process that includes technological knowledge, on the one hand, and appropriation of the device, on the other. Advertising spreads technological information and, at the same time, promotes feelings and attitudes that shape mobile telephony use and appropriation. To analyze this we defined a case study that focuses on advertisements in a Spanish newspaper from 1994 to 1999.

We identified three kinds of technological knowledge in advertisements that contributed to popularizing mobile telephony. The most relevant is knowledge about the service. As mobile telephony constituted a disruptive innovation, a number of new concepts — such as GSM system or SMS — were introduced for the first time. Colloquial language incorporated these terms during the period, or shortly afterwards, and advertisements constitute a useful tool for describing how and when the process occurred. Technological explanations tended to focus solely on the essential concept needed to understand the discourse delivered in the advertisement. However, once these concepts became popular with the audience, advertisements shifted their focus either to new technical features or to social or emotional aspects. In addition, advertisements included information on everyday uses of mobile technology linked — or not — to technological information. The other two types of knowledge are less relevant for our objectives — as they do not constitute new scientific or technological knowledge. On the one hand, technical specifications that users already knew from other contexts (i.e., battery life, or handset weight), and on the other hand, information about the industry and market structure (i.e., coverage and penetration rates).

When compared to advertisements targeted at the business world, advertisements aimed at end consumers included less technical contents; they focused more on emotional and social aspects, and introduced technological knowledge whenever needed. Regardless of the target, we identified a set of attributes attached to mobile telephony: modernity, freedom, safety/security, self-confidence, and reliability. We suggest that modernity and freedom reflect the existing general knowledge among publics. At the beginning of the period, modernity seems to have been a compelling argument; but when advertisements detached themselves from technological explanations, commercial arguments emphasized emotions and, especially, freedom.

3/October/1997, p. 20–21: http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/10/03/LVG19971003-020.pdf and http://hemeroteca-paginas.lavanguardia.com/LVE01/PUB/1997/10/03/LVG19971003-021.pdf).

By identifying press advertisements as a channel in the knowledge circulation process, we have described how new technological knowledge about mobile telephony was transmitted in an accumulative way, closely linked to the innovations introduced into the market. Press advertisements are only part of the knowledge circulation process concerning mobile telephony. Therefore, it would be of most interest to make a comparison with the technological content in advertisements broadcasted through radio, TV or digital media. Perhaps this research strategy, applied to a more complete set of everyday life digital devices during a wider period, could help create an understanding of why digital technologies seem to narrow the popular meaning of the word "technology", a term that nowadays seems to have excluded well-established technologies — as often, "technology" is used as a synonym for "digital technology".

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