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THEMATIC DOSSIER

SCIENCE IN THE PRESS, RADIO AND TV: FRANCO'S REGIME AND THE POPULARIZATION OF SCIENCE

Science Before Dinner: Science popularization in Francoist Spain through the *Los Progresos Científicos* Broadcast

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Abstract: Through the case study of Manuel Vidal España (1905-1984), a Spanish engineer and science popularizer, this paper addresses some features of science popularization in Franco's dictatorship (1939-1975), such as the apolitical and uncritical techno-optimism and the (dis)continuities with the previous political regime. Vidal España conducted science radio talks on Radio Barcelona from 1924 until the late 1960s, particularly in his show *Los Progresos Científicos* (the Scientific Advances), which broke the typical one-way radio communication, establishing a dynamic relationship with his audience. His techno-optimistic and uncritical stance toward science and technology was a strategic approach for navigating the Francoist regime, allowing him to express occasional dissent. In addition to analysing his adaptation to new political conditions, the article explores his connection with the public, illustrating how an effective exchange of knowledge emerged, revealing the working classes' understanding of science and technology during Francoism.

Keywords: Radio show; publics of science; Francoism; popularization; popular science

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Introduction

When Vidal Españaó began [his broadcasted talks], we were still living in the last days of romantic science, and the fast pace of scientific discoveries that followed is well known. However, nothing in electricity, illumination, physics, chemistry, astronomy, etc., escaped his attention, and everyone could understand the clear explanations in my friend's radio talks.¹

On the 2,000th broadcast of *Los Progresos Científicos*, Manuel Vidal Españaó (1905-84) was awarded the Medal of the City of Barcelona. In the celebration, Miquel Masriera, a prestigious theoretical and physical chemistry lecturer at the University of Barcelona before the Civil War who became a famous science writer because of the purge undertaken in Spanish universities after the contend,² synthesized in his laudatory text two of the main characteristics of Vidal Españaó's popularization task: persistence and simplification. Manuel Vidal Españaó, an engineer by profession, combined his entire work career with publishing science popularization books and broadcast talks.³ He delivered thousands of lectures for over almost fifty years, from the beginning of radio in Spain in 1924 to the end of the 1960s. Like other radio pioneers, he had a naive idea about listeners' interests and considered science and technology an ideal topic to fill the radio station's airtime.⁴

Vidal Españaó started his career as a popularizer on the radio by the hand of the Catalan astronomer and popularizer Josep Comas i Solà, a known anarchist.⁵ He gained recognition in

¹ Miguel Masriera, "Manuel Vidal Españaó," *La Vanguardia Española*, February 4, 1969, 11. This laudatory text was published following the award of the City of Barcelona's Gold Medal to his friend.

² When Masriera decided to return to Spain in the early 1940s, he was not allowed to take back his position at the university. He began conducting independent scholarly work and acted as a private consultant. He became an active science popularizer by publishing successful popular science books and articles in newspapers and translating foreign texts on nuclear physics, among other issues. See Agustí Nieto-Galan, "From Papers to Newspapers: Miguel Masriera (1901-1981) and the Role of Science Popularization under the Franco Regime," *Science in Context* 26 no. 3 (2013): 527-49.

³ He graduated as an Expert Electrician from the *Escuela Superior de Industrias* of Terrassa in 1922, obtained a degree as Electrical Engineer from the School of Civil Engineering in Paris in 1927, an Industrial Engineer degree from the Barcelona School of Industrial Engineering in the class of 1954-1955, and finally, a doctorate on May 30, 1960 (*Título de Doctor Ingeniero por la Junta General Calificadora del Ministerio de Educación*). He began his career in the electric supply company *Cooperativa de Fluido Eléctrico*, which was later incorporated into the *Hidroeléctrica de Cataluña, S.A.*, where he became the Deputy Director-General.

⁴ See Marcel C. LaFollette, *Science on the Air. Popularizers and Personalities on Radio and Early Television* (Chicago: The University of Chicago Press, 2008); and David A. Kirby, "Film, Radio and Television," in *A Companion to the History of Science*, ed. Bernard Lightman, 428-41 (Oxford: Wiley-Blackwell, 2016).

⁵ Comas i Solà achieved great popularity as an astronomer in Spanish society during the 1890s. From 1893, regular popular astronomy contributions appeared in the newspaper *La Vanguardia*. His astronomical work was also recognized abroad as one of Flammarion's protégés. See Antoni Roca-Rosell (ed.), *Josep Comas i Solà, Astrònom i Divulgador* (Barcelona: Ajuntament de Barcelona, 2004); and Pedro Ruiz-Castell, "Priority Claims and Public Disputes in Astronomy: E. M. Antoniadi, J. Comas i Solà and the Search for Authority and Social Prestige in the Early Twentieth Century," *The British Journal for the*

the Republican period and participated in projects connected with the Generalitat de Catalunya (the Catalan autonomous government). Though these activities could have led to his ostracism during the Francoist period, he found a way to keep his hobby going almost immediately after the Spanish Civil War. His explicit support of some of the regime's positions suggests an effort to restart his regular life and his staunch techno-optimism turned him into a valuable asset in the hands of the Franco regime to celebrate progress. Furthermore, his popularity among those with limited access to knowledge guaranteed the continuity of his radio program for almost fifty years in an unchanging formula.

Masriera was also condescending towards Vidal Españaó and his audiences. These "clear explanations" that "everyone could understand" moved Vidal Españaó's work far away from other proposals of popularization aimed at educated audiences. Loyal to the dominant view of popularization,⁶ Manuel Vidal Españaó often reaffirmed that scientific discourse should be simplified to reach the public properly.⁷ He considered that the best benefit of science popularization through the radio was bringing knowledge to every household.⁸ Various interviews granted during his extensive career supported this fact.⁹ He firmly believed that scientific popularization consisted of a process of simplifying scientific ideas so that non-scientists could understand them, and he remained faithful to his style despite the new trends that emerged throughout his long career.¹⁰

Vidal Españaó established a personal relationship with his listeners, who nourished his program with their questions and feedback. He effectively managed the transfer of knowledge between

History of Science, 44 no. 4 (2011): 509-531.

⁶ Stephen Hilgater, "The Dominant View of Popularization: Conceptual Problems, Political Uses," *Social Studies of Science* 20 (1990): 519-39; Greg Myers, "Discourse Studies on Scientific Popularization: Questioning the Boundaries," *Discourse Studies* 5, no. 2 (2003): 265-79.

⁷ For instance, in the introduction of the first volume of *Los Progresos Científicos* (Barcelona: Ed. Ars, 1949) and also on talks about scientific popularization such as "Nuestras Charlas de Divulgación," (*Guions de Ràdio Barcelona*, March 13, 1943, hereafter cited as GRB)) or "Trascendencia y Eficacia de la Radiodifusión Científica," GRB, January 30, 1948.

⁸ J.A. Irurozqui, "Una Entrevista con Este Hombre de Ciencia, Auténtico Benefactor de los Oyentes de Radio Barcelona," *Ondas* 61 (June 1955): 13. Interview with Manuel Vidal Españaó on the occasion of his 1,400 broadcasted conference.

⁹ F. Vázquez-Prada, "Manuel Vidal Españaó. El Hombre de las Mil Charlas," *Fotos*, 570 (January, 1948); J.A. Irurozqui, "Una Entrevista con este Hombre de Ciencia," 13; Records collection of *Radio Barcelona, Biblioteca Nacional de Catalunya*, "Interview with Manuel Vidal Españaó, Industrial Engineer" (January 25, 1969). The same idea also appears in the introductions to the editions of his lectures, *Maravillas de la Ciencia* (Barcelona: Editorial Montesó, 1937) and *Los Progresos Científicos*, Vol. 1.

¹⁰ Records collection of Radio Barcelona "Interview with Manuel Vidal Españaó." Luis Roca Ros, Secretary of the Organizing Committee of the tribute for his thousandth broadcast, defined Vidal Españaó task as that of a "scientific apostolate" ("Sobre el Homenaje a Dn. Manuel Vidal Españaó en su Milésima Emisión Radiada de Divulgación Científica, por Don Luis Roca Ros." GRB, November 26, 1947).

him and his public.¹¹ As a result, his proposal of scientific popularization was not as top-down as Vidal Españaó pretended it was, and he and his audience collaborated on building knowledge.¹² In this article, we will explore three facets of Manuel Vidal Españaó's trajectory: how he managed to perpetuate himself on air at the beginning of Francoism, despite rigid censorship policies; his model of scientific popularization; and his relationship with his followers. Thus, we will outline a model of successful scientific popularization on Spanish radio during a significant part of the twentieth century.

A Long Radio Career

Since the beginning of Radio Barcelona in November 1924, broadcast lectures had been on its agenda and had benefited from the support of scientists, composers, and literati.¹³ It was a copy of the Anglo-Saxon model, where broadcasters perceived science and technology content, usually provided by nonprofit organizations, as a low-cost way to fill airtime.¹⁴ The first scientific talks on Radio Barcelona, devoted to astronomy, were led by Josep Comas i Solà, a famous astronomer and science popularizer who was the head of the Sociedad Astronómica de España y América (Astronomical Society of Spain and America) at that time.¹⁵ Vidal Españaó was a member of this society and collaborated on these initial broadcasted lectures. He later described *Los Progresos Científicos* as the logical outcome of those talks, because of the significant number of questions unrelated to astronomy received from listeners.¹⁶ The program, led by Vidal Españaó, eventually became independent from the astronomy talks and appeared on the radio station programming as *Los Progresos Científicos* for the first time on December 28, 1933.¹⁷

¹¹ On the question of knowledge transfer, see James A. Secord, "Knowledge in Transit," *Isis* 95, 4 (2004): 654-72.

¹² Andreas W. Daum, "Varieties of Popular Science and the Transformation of Public Knowledge. Some Historical Reflections," *Isis* 100 (2009): 219-32.

¹³ Salvador Raurich, "Crítica de las Emisiones. Las Audiciones de Radio-Barcelona," *Radio Barcelona* 4 November 23, 1924: 7. See also Meritxell Guzman, *La Ciencia a la Ràdio en la Revista de Ràdio Barcelona* (MA thesis, Universitat Autònoma de Barcelona, 2013) and Meritxell Guzman and Carlos Tabernero, "The City in Waves. Radio Barcelona and Urban Everyday Life," in *Barcelona: An Urban History of Science and Modernity*, ed. Oliver Hochadel and Agustí Nieto-Galán, 200-22 (London: Routledge, 2016).

¹⁴ Marcel C. LaFollette, "A Survey of Science Content in U.S. Radio Broadcasting, 1920s through 1940s: Scientists Speak in Their Own Voices," *Science Communication*, 24 (2002): 4-33, on 7.

¹⁵ Roca-Rosell, *Josep Comas i Solà*.

¹⁶ F. Vázquez-Prada, "Manuel Vidal Españaó." We do not know Vidal Españaó's role in Comas i Solà's talks. However, a few years later, he had a good reputation as a radio technician: "La Labor Cultural de Radio-Sabadell," *Radio Barcelona* 199 June 9, 1928: 17.

¹⁷ Script of the day December 28, 1933 (January 15, 2017).

Vidal Españaó was not alone in popularizing science on Spanish radio—Pigmalió, on Radio Valencia, and Emilio Herrera, on Radio Paris, are contemporary examples.¹⁸ What makes Vidal Españaó's case unique is his ability to survive on air for five decades—under two dictatorships, the Second Spanish Republic, and even during the first few months of the Spanish Civil War.¹⁹ Vidal Españaó's radio talks were short radio segments, typically running for five to ten minutes, with a style that did not vary significantly during his long career.²⁰ His approach was marked by using plain, straightforward language. Whenever necessary, he clarified the meaning of words, incorporated many examples and comparisons, and occasionally employed unconventional statements to captivate audiences less familiar with scientific fields. Moreover, this style was just the kind of content the radio producers were looking for, distanced from academic conferences that made listeners switch between stations.²¹ Over the years, competition with radio soap operas, other entertainment programs and formats that included scientific content,²² suggests an inevitable marginalization of his program from the (mid-1850s),²³ as it frequently faced schedule changes, often being moved to later time slots.

His radio beginnings coincided with Primo de Rivera's dictatorship (1923-30).²⁴ In this period, he also organized activities to promote electricity in the home, both for lighting and appliances, at the 1929 Barcelona International Exhibition. In the later Bourbon restoration period and during the Second Republic years, he increased his activity as a scientific communicator, even though it was always a complementary activity to his main occupation in the electrical industry.²⁵ He consolidated his radio program, participated in numerous conferences on lighting topics and wrote many articles on the various electrical devices that emerged in the domestic

¹⁸ See for instance: Pedro Ruiz-Castell, "José M. Meliá Bernabéu «Pigmalió» y la Divulgación de la Astronomía en la Valencia de la Primera Mitad del siglo XX," *Dynamis*, 37 no. 2 (2017): 435-57; and Emilio Atienza, *Ciencia en las Ondas. Crónicas Científicas de Emilio Herrera en Radio París (1950-1951)* (Madrid: Fundación Aena, 2010).

¹⁹ The last conference in 1936 was on October 1.

²⁰ Talks before the Spanish Civil War appeared in his book *Maravillas de la Ciencia*.

²¹ Allan Jones, "Mary Adams and the Producer's Role on Early BBC Science Broadcast," *Public Understanding of Science* 21 no. 8 (2011): 968-83; LaFollette, *Science Communication*.

²² Contests included on shows sponsored by the OSRAM lighting company (1945-1946), informal talks ("Descubrimientos Científicos a Porrillo," GRB, December 3, 1945), and talks about health ("La Hora del Médico," from 1947).

²³ It was rescheduled from 8.25 pm to 10.25 pm in 1954 and eventually settled into a near-midnight slot in 1956.

²⁴ The coup d'état by Primo de Rivera, with the acquiescence of King Alfonso XIII, began shortly before the start of radio broadcasts in Spain. Among its main objectives was to control the increasing social conflicts. See: Eduardo González Calleja, *La España de Primo de Rivera: la Modernización Autoritaria (1923-1930)* (Madrid: Alianza, 2005).

²⁵ Jordi Ferran y Agustí Nieto-Galán, "The City of Electric Light: Experts and Users at the 1929 International Exhibition and Beyond" in *Barcelona: An Urban History of Science and Modernity*, ed. Oliver Hochadel and Agustí Nieto-Galán, 223-44.

environment. While we have no information on his previous political leanings, we know of his collaboration with the Republican City Councils and his participation in some Generalitat projects,²⁶ in both cases through his membership of the Catalan Lighting Committee. During the Civil War, he furthermore collaborated with a newspaper linked to Esquerra Republicana de Catalunya, the Catalan left-wing party that governed the Generalitat during the conflict.²⁷ Despite this, *Los Progresos Científicos* was cancelled on October 1, 1936, two and a half months into the Spanish Civil War.²⁸

After the war, the new regime implemented a widespread social and historical de-contextualization program to erase all signs of continuity with the Republican period.²⁹ From then on, all content had to pass through the censorship of the Servicio Nacional de Propaganda del Ministerio de Gobernación (National Propaganda Service of the Ministry of Government).³⁰ Despite this strict control, *Los Progresos Científicos* restarted only forty days after the end of the war, on May 11, 1939, and there is no record of changes in discourse caused by censorship in any of the surviving scripts, a sign that either Vidal Españaó was perfectly aligned with the regime or that he knew perfectly well what limits he should not cross.³¹ As we will see in the next sections, his discourse posed no threat to authority, lacking a critical mindset and, consequently, lacked the capacity to generate a critical discourse in his audience. In this period, we find Vidal Españaó more politically involved and strongly aligned with the arguments of the new regime that emerged after the conflict, whether driven by his necessity to position himself in the new context or adhering to propaganda directives. These initial post-Civil War appearances included a tribute to the inventor Guillermo Marconi, a scientific celebrity of Fascist Italy; patriotic praise of Spanish accomplishments in science in a special broadcast for Latin America on the occasion of the Día de la Raza (Day of the Race)

²⁶ Manuel Vidal Españaó, *Aspectes de l'Enllumenat Públic. Comunicació Presentada pel Comitè Català de Luminotècnia al Primer Congrés Municipalista Català* (Barcelona: Tallers Gràfics, Edicions Bosch, 1933). He also participated in school lighting studies, working with the Psychotechnical Institute of the Generalitat. Some years later, in a talk on this topic, he explained German works as a novelty, eluding that he had participated in experiences of the same kind during the Spanish Republic.

²⁷ “Raigs Misteriosos. Il·lusió o Realitat,” *L'Autonomista* (September, 1937).

²⁸ Some years later, he used a term linked to the iconography of the Francoist regime, *Dominio rojo* (Red domain), to refer to the period when his program was suspended during the Civil War (Vázquez-Prada “Manuel Vidal Españaó”).

²⁹ Carlos Tabernero, Isabel Jiménez-Lucena, Jorge Molero-Mesa, “Scientific–medical Knowledge Management Through Media Communication Practices: a Review of Two Opposite Models in Early 20th Century Spain,” *Journal of History of Science and Technology* 6 (Fall, 2012): 64–84.

³⁰ Rosa Franquet, *Ràdio Barcelona. Setanta anys d'Història (1924-1994)* (Barcelona: Col·legi de periodistes de Catalunya, 1994), 22. Because of the censorship, many scripts are conserved on the *Universitat Autònoma de Barcelona* Archives (GRB). If we add to these scripts those published in various volumes throughout his career, more than 900 lectures are preserved between 1933 and 1958.

³¹ Clara Florensa and Agustí Nieto-Galán, “Introduction: Science Popularization, Dictatorships, and Democracies,” *History of Science* 60, no. 3 (2022): 329–347.

on October 12, 1939; and a series about railroad electrification introduced by José María Cornet, Provincial Delegate of Technical Services of the *Falange Española Tradicionalista y de las J.O.N.S.*, the Francoist single-party.³² The talks about railway electrification were filled with a sentiment of national pride. Electrification was considered a crucial step in supporting the nation's resurgence while delivering significant benefits to the Spanish economy.³³ The first talk on this topic also included an enthusiastic defence of autarky, which was part of the Francoists' initial political and economic project. Luis Alarcon de Lastra, Minister of Industry and Trade between 1939 and 1940, defined autarky as "the most important means in peacetime to maintain the independence of the Homeland."³⁴ Vidal Españaó sided with this idea, arguing that autarky "ensures economic balance and maintains the independence of the country, both during the war period and in peace during times of limited imports."³⁵ While discussing railway electrification, Vidal Españaó also praised hydroelectric power because it allowed energy independence from abroad. On those lines, dam construction was also identified as a critical policy of the regime.³⁶ The highly political nature of these talks was an exception rather than a constant in Vidal Españaó's science popularization show.

A few years after initially aligning closely with the regime, and once firmly settled in his position, some ideas that deviated from the official stance began to emerge. For instance, his public view on autarky changed after severe supply cuts provoked by an energy crisis in 1945:³⁷

The term "autarky" is a dialectical equilibrium through which an attempt has been made to disguise . . . the lack of raw materials. Moreover, we cannot stop feeling sceptical about the full achievement of autarky in the broad sense and scope that the term has been attempted to convey in recent years³⁸

³² Manuel Vidal Españaó "A Propósito de Marconi," in *Los Progresos Científicos*. Vol. 2 (Barcelona: Ed. Ars, 1949), 13-16; Manuel Vidal Españaó, "La Ciencia Española" in *Los Progresos Científicos*. Vol. 4 (Barcelona: Ed. Ars, 1950), pp.30-35. Talks on railroad electrification were published in Manuel Vidal Españaó, *Electrificación de Ferrocarriles: sus Ventajas, sus Fundamentos, su Necesidad* (Barcelona: Ed. José Montesó, 1941)

³³ Vidal Españaó, *Electrificación de Ferrocarriles*, 7.

³⁴ Borja De Riquer, *La Dictadura de Franco. Historia de España*, Vol. 9 (Barcelona: Crítica/Marcial Pons, 2010), 247.

³⁵ Manuel Vidal Españaó "Ventajas de la Tracción Eléctrica," in Vidal Españaó, *Electrificación de Ferrocarriles*, 11. (Translated by the author).

³⁶ Lino Camprubí, "'Paco el Rana': la Sistematización del Noguera Ribagorzana y los Límites del Totalitarismo," in *Los Ingenieros de Franco: Ciencia, Catolicismo y Guerra Fría en el Estado Franquista* (Madrid: Crítica, 2017), 111-30. Lino Camprubí, *Engineers and the Making of the Francoist Regime* (Cambridge, MA: The MIT Press, 2014).

³⁷ His conference broadcast on November 8, 1944, already mentioned the cuts, but he argued that "it is not the moment to explain the causes" (Manuel Vidal Españaó, "Una Pérdida para Nuestra Industria: Don Manuel Loyola," GRB, November 8, 1944, http://ddd.uab.cat/pub/guiradbcn/1933/guiradbcn_a1944m11d8.pdf).

³⁸ Manuel Vidal Españaó "La Batalla por las Materias Primas," GRB, February 21, 1945, translated by the author. http://ddd.uab.cat/pub/guiradbcn/1945/guiradbcn_a1945m2d21.pdf (January 15, 2017).

Occasionally, he condemned specific situations that affected the entire nation. When he did so, he adopted a more paternalistic tone, aligned with the image that, from the dictator to the different arms supporting the Regime (the Falange, the Catholic Church, and the Army), offered to the largely depoliticized population. For instance, he criticised the high number of workplace accidents, which he considered a “social plague” of his time.³⁹ The talk suggested the implementation of a few actions in factories and workshops linked to working conditions and workers’ behaviour but sidestepped the question of who should implement them. Importantly, he was a member of the Instituto Nacional de Racionalización del Trabajo (National Institute for the Rationalization of Work), an Institute linked with the Consejo Superior de Investigaciones Científicas (Superior Council of Scientific Research), but it is difficult to discern whether this was his opinion or whether he made public the regime’s concern about the issue.⁴⁰

Vidal España’s involvement in various institutions indicates that, at this point, he was aligned with the regime. The regime recognized his work with many awards because of his task of popularization. The foremost honour he received was the *Encomienda* (knighthood) of the Civil Order of Alfonso X The Wise, awarded by the Spanish Government in 1948. He also received the Medal of the City of Barcelona in 1969 and two *Ondas Awards* that acknowledged his communicative merits.⁴¹ He was proud to collaborate with the power structures and enthusiastic about the idea of a union between scientists and technicians and the benefits this should represent for the whole country.⁴²

Feeling confident as a man of the regime, he vindicated those of his friends that Francoism had concealed for political reasons, namely Comas i Solà, whom he proclaimed as “his reference on science popularization” during the session organised on the occasion of his 1,000th talk held at the City Hall of Barcelona in January 1948.⁴³ He made this statement in the presence of the same Francoist authorities who ostracized Comas i Solà’s memory due to his anarchist position, and would praise him again in other talks and interviews.⁴⁴ Miguel Masriera, as we

³⁹ Manuel Vidal España, “Accidentes de Trabajo,” GRB, October 24, 1945 http://ddd.uab.cat/pub/guiradbcn/1945/guiradbcn_a1945m10d24.pdf (January 15, 2017).

⁴⁰ He also complained about municipal issues, for instance, about the lack of investment in a planetarium instead of “the money wasted on absurd and mediocre things” (Manuel Vidal España “El Planetario,” (GRB, February 5, 1947)).

⁴¹ He received the first one in 1955 for the best local radio broadcast and the second in 1961 for the best science show. He also received minor prizes for technical contests.

⁴² Manuel Vidal España, “El Instituto de Investigaciones Técnicas,” GRB, 15 January 1947.

⁴³ Manuel Vidal España, “Transcendencia y Eficacia de la Radiodivulgación Científica,” GRB, 30 January 1948.

⁴⁴ Comas i Solà (died 1937) had been a member of the anarchist union CNT (Julio Samsó, “José Comas Solà (1866-1937),” *Boletín Informativo. Fundación Joan March* 175 (1987): 3-20; Roca-Rosell, “Josep Comas i Solà.”

will see in the following section, and Francisco Bastos Ansart (a military Francoist who had been demoted), were also acknowledged in his radio section.



Figure 1 - Homage to Manuel Vidal España on the occasion of his 1,000th talk. Barcelona City Council (January 30, 1948). Arxiu Fotogràfic Municipal de Barcelona.

An Unconventional Connection with Audiences

Vidal España revealed in some interviews that he had fluid communication with his listeners through letters, telephone, or even in person.⁴⁵ He explained the birth of the *Los Progresos Científicos* radio show, and the two publications that compiled his talks—the book *Maravillas de la Ciencia* (Wonders of Science) in 1937 and the eight-volume series *Los Progresos Científicos* published between 1949 and 1951—as a response to popular demand.

Vidal España described his audiences as working class.⁴⁶ He believed they were workers, “fervent devotees of science and technology who were willing sacrifice their rest for the sake of

⁴⁵ Many of the talks begin by referencing one of these letters. Unfortunately, they have not been preserved.

⁴⁶ Letter from Manuel Vidal España to Ramon Barbat Miracle, Director of Radio Barcelona, July 28, 1949. Private Collection. No audience studies from the time corroborate this statement by Vidal España. However, as we will see in the following sections, the socio-economic and cultural level we can assign

learning.”⁴⁷ Although it is impossible to fully characterize the program’s audience to analyse if the profile corresponds to Vidal España’s thoughts, the popular tribute he received alongside the Encomienda award in 1948 gives us a better understanding of who were his audiences. The Organizing Committee gathered a good number of the regime’s prominent figures in the city of Barcelona under the presidency of the Viscount of Güell, Eusebio Güell, and the deputy presidency of the Procurador en Cortes (member of parliament), Juan Masó Llorens.⁴⁸ The Secretary of the Commission was Luis Roca Ros, representing the Delegación Nacional de Ciegos (National Delegation of Blind People). The presence of this organization was not a coincidence because people with visual impairment were among Vidal España’s most loyal followers.⁴⁹

The Organizing Committee launched a popular fundraising program to award Vidal España with a silver microphone. The minimum contribution was set at a modest 0.50 pesetas (roughly the price of a daily newspaper), and to make contributions easier, people could also donate stamps. In contrast, the cost for the event celebration dinner was of 100 pesetas per person. The significant difference between both quantities illustrates the broad spectrum of Vidal España’s audience.⁵⁰ According to the Organizing Committee, two days before the award 35,923 people had already contributed 25,851.90 pesetas.⁵¹ The list of contributors and contributions allows a first approximation of the public that switched on their radios to listen to Vidal España: a 14-year-old boy who gifted a miniature he made himself and 0.50 pesetas; a disabled and visually impaired man from Teruel, who gave 100 pesetas; the well-known tenor Hipólito Lázaro, who contributed 100 pesetas; an anonymous citizen from Barcelona, who gave 1,000 pesetas; twenty-five boys and twenty-five girls from a school, who gave 0.50 pesetas each.⁵² In other cases, the list just mentioned the listeners who contributed to the homage, such as

to the audience according to other available sources would be consistent with a working-class audience.

⁴⁷ “Homenaje a Don Manuel Vidal España,” *La Vanguardia Española*, January 31, 1948, 9.

⁴⁸ The other members of the Commission were Antonio Navarro Sedó and Arturo Martorell, the culture delegates of the Provincial Deputation and the City Council of Barcelona respectively; the Director of *Radio Barcelona*, Ramón Barbat Miracle, and the President of *Radio España*, José Fernández Ramírez; Santiago Gotor, Artillery Commander and President of Electrotechnique Association; Luis González Abella, engineering lieutenant colonel and member of the Parlament; Rafael Delclós, Director of the Spanish news agency EFE; and the engineers Carlos Buigas and José M^a Guillén García; the photographer Pedro Catalá Pic and the journalist Fernando Barangó Solís (Luis Roca Ros, “Sobre el Homenaje a Dn. Manuel Vidal España en su Milésima Emisión Radiada de Divulgación Científica, por Don Luis Roca Ros, Secretario de la Comisión Organizadora,” GRB, December 3, 1947.

⁴⁹ Vázquez-Prada, “Manuel Vidal España.” Vidal España also published some articles in the journal *Relieves* (Reliefs) edited in the Braille alphabet.

⁵⁰ “Comisión Homenaje al Ilmo. Sr. D. Manuel Vidal España. Actos que tendrán lugar el 30 de enero de 1948.” *Fundación Gas Natural Archives*.

⁵¹ “Homenaje a D. Manuel Vidal España en su Milésima Emisión de Divulgación Científica” GRB, January 29, 1948. The press increased the figure of contributors to 45,000.

⁵² Vázquez-Prada, “Manuel Vidal España.”

the football player José Samitier, a family of seven members, or companies and factories that registered all their staff.⁵³

Pedro Catalá Pic, a photographer and member of the Commission, explained the reasons for the contribution of a young mechanic's apprentice, who met him to give his donation in person: the boy considered Vidal Españaó his "maestro" (teacher) because his lessons "inspired projects he will do in the future."⁵⁴ Vidal Españaó was proud of the scientific vocations his work appeared to generate, and some laudatory words about his talks emphasized this dimension of his work,⁵⁵ although he and his program did not participate from an official, established agenda to promote scientific and technical vocations, as had happened in other dictatorial contexts.⁵⁶

Vidal Españaó introduced some of his talks with sentences such as "Answering a question of one of our listeners..." These talks give us an idea of the kinds of questions his audience believed should be addressed by a science popularizer. The public wanted to know about the technology behind new media, for instance, how discs were recorded, how films were dubbed, and how pencils were made. They also wanted to know more practical things, such as how to use a photo camera.⁵⁷ Vidal Españaó used these kinds of questions to introduce scientific principles, such as in the talk entitled "Drinking Ducklings."⁵⁸ In this conference, he answered a question from a listener about a popular toy: a duckling swinging in front of a glass of water. To explain that this popular toy on the radio proved complicated, especially "without having graphic help," as he noted in the introduction of the talk. The explanation involved pressure differences caused by differences in temperature, the movement of the fluid inside the toy, and finally, the change of the centre of masses that facilitates the rotation of the toy around its axis. Aware of the difficulty listeners might have in understanding this process, he published the explanation almost immediately, with an illustration, in the fifth volume of *Los Progresos Científicos*.⁵⁹

⁵³ Luis Roca Ros, "Sobre el Homenaje a Don Manuel Vidal Españaó." Beyond the specific examples shown by the organizing committee, the overall figures indicate that most of the donations must have been modest, which would be consistent with the fact that many of the people making contributions for the tribute belonged to the most disadvantaged classes.

⁵⁴ An electromechanical toy and a project that pretended to use the sea movement. Vázquez-Prada, "Manuel Vidal Españaó."

⁵⁵ J.C.R. "'Los Progresos Científicos'. Un programa semanal de Radio Barcelona que ha llegado al número dos mil," *Ondas* 389 February 1969: 26.

⁵⁶ For instance, in East Germany. See Dolores L. Augustine, "Technological Fantasies in Popular Culture and Propaganda," in *Red Prometheus. Engineering and Dictatorship in East Germany, 1945-1990*, 201-60 (Cambridge: The MIT Press, 2007).

⁵⁷ Manuel Vidal Españaó, "Fabricación de Discos," GRB, February 20, 1953; Manuel Vidal Españaó, "Películas Dobladas," GRB, November 19, 1947; Manuel Vidal Españaó, "Fotografías de Nubes," GRB, September 24, 1947; Manuel Vidal Españaó, "¿Cómo se Fabrican los Lápices?" GRB, September 8, 1948.

⁵⁸ Manuel Vidal Españaó, "Los Patitos Bebedores," GRB, June 10, 1949.

⁵⁹ Manuel Vidal Españaó, "Los Patitos Bebedores," in *Los Progresos Científicos*, Vol. 5. (Barcelona: Ed. Arts, 1950), 90-93.

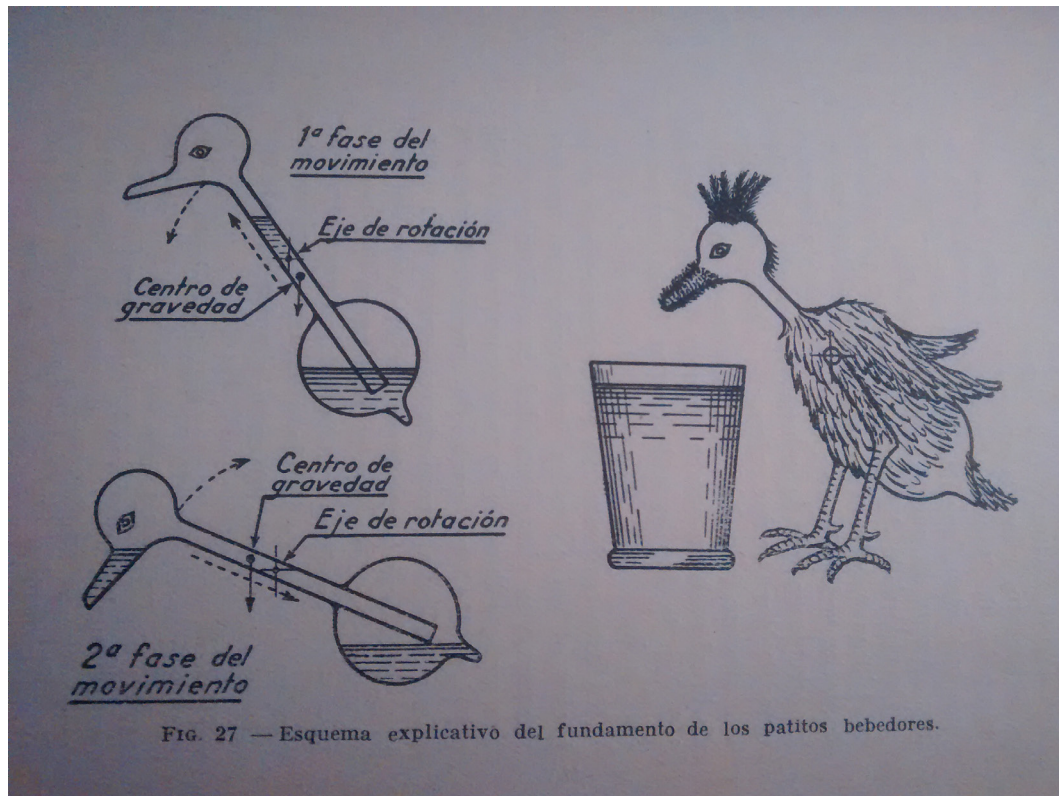


Figure 2 - Manuel Vidal España, “Los patitos bebedores” in *Los Progresos Científicos*, Vol. 5. Barcelona: Ed. Arts, 92.

Vidal España built a reputation among his audience as a trustworthy person, the teacher of those who had no other resources to clarify the questions that science and new technological devices raised. Some listeners even preferred asking him rather than their teachers, such as a young science student interested in knowing if one of Barcelona’s mountains, Montjuïc, was moving while another, Tibidabo, remained still.⁶⁰ Listeners also made Vidal España move beyond his field of expertise, introducing health-related themes and inquiring about questions that were more appropriate for a medical doctor than an engineer, for instance on hormones, homeopathy, blood pressure, or heart surgical techniques.⁶¹

⁶⁰ Vázquez-Prada, “Manuel Vidal España.”

⁶¹ Manuel Vidal España, “Hormonas,” GRB, June 26, 1943; Manuel Vidal España, “Homeopatía,” GRB, June 2, 1950; Manuel Vidal España, “Tensión Arterial,” GRB, December 19, 1952; Manuel Vidal España, “Cirugía Cardíaca,” GRB, July 27, 1954; and Manuel Vidal España, “Posibilidades de las Operaciones de Corazón,” GRB, August 3, 1954.

The interactions were not limited to asking questions or proposing topics. Some talks provoked unexpected reactions from the audience. A conference on microscopy highlighted the vast number of microorganisms that the microscope allowed us to observe in a drop of water.⁶² In response, a girl sent a concerned letter about the effect of such microorganisms on water quality, to which Vidal Españaó replied by talking about the benefits of some microbes.⁶³ When he talked about the psychological effects of colour, listeners flooded him with questions,⁶⁴ forcing him to broadcast a second talk on the theme. He explained a few concepts he used in the previous conference and settled the issue by advising on the most appropriate wall colours for house rooms according to their function.⁶⁵

Whether or not he was aware of it, his management of the audience's concerns directly impacted his top-down approach to science popularization. Listeners became part of the popularization process by moving Vidal Españaó to prepare and broadcast contents he hardly considered a scientific topic. His relationship with audiences shaped his understanding of science and technology, making the broadcast's scientific content the result of a collaborative process.⁶⁶

An Unconventional Selection of Themes and Approaches

Vidal Españaó's ability to connect with the working classes made him a valuable tool for reproducing the scientific discourse of the ruling class. By expressing deep admiration for the authors he reviewed on his program, he kept alive a network of friends, acquaintances, and Francoist figures who could provide content, contacts, or information for his program.⁶⁷ He also

⁶² Manuel Vidal Españaó, "Microscopía," GRB, May 23, 1952.

⁶³ Manuel Vidal Españaó, "Microbios Útiles," GRB, June 27, 1952.

⁶⁴ Manuel Vidal Españaó, "Efectos Psicológicos del Color," GRB, July 9, 1957.

⁶⁵ Manuel Vidal Españaó, "Influencia de la Pintura," GRB, July 23, 1957.

⁶⁶ It would be a new example that would question Habermas's theory about the public sphere (Geert Somsen, "Afterword: Science Popularization, Dictatorships, and Democracies," *History of Science* 60, no. 3, 2022, 430-435).

⁶⁷ The talks allow us to trace his network of relationships. It included friendships made during his collaboration with the Barcelona International Exhibition of 1929, such as the engineer Carles Buigas (Manuel Vidal Españaó, "El Hombre entre Enigmas y Prodigios," GRB, March 23, 1949) or the advocate Francisco Vidal Burdills (Manuel Vidal Españaó, "Política Agraria y Electrificación Rural," GRB, July 6, 1951); science popularizers such as Ignacio Puig, the Director of *Ibérica*—the science and technology high popularization magazine published by the *Observatorio Astronómico del Ebro* (Manuel Vidal Españaó, "Electricidad Atómica," GRB, April 18, 1955); the Director of the Nautical School, Francisco Condeminas (Manuel Vidal Españaó, "Elogio del Velero," GRB, November 20, 1956); a professor of the engineering school, Daniel Blanxart i Pedrals (Manuel Vidal Españaó, "Física y Música," GRB, November 12, 1947); or personalities of the regime, such as Juan Claudio Güell, *Conde de Ruiseñada*, President of the shipping company Transatlántica (Manuel Vidal Españaó, "El Centenario de la Transatlántica," GRB October 27, 1950); Alfonso Peña Boeuf, Minister of Public Works from 1938 to 1945 and then President of the national railway company *RENFE* (Manuel Vidal Españaó, "Memorias de un Ingeniero Político," GRB, July 11, 1955); or Juan Masó Llorens, *Procurador en Cortes* (Manuel Vidal Españaó, "La

reported scientific events held in the city of Barcelona,⁶⁸ and took advantage of his position in the electric industry to introduce novelties regarding domestic electronic appliances, review the state of a particular industry, or discuss new kinds of electrical components.⁶⁹ This professional activity also gave him access to information about scientific events occurring in other countries, mainly in Great Britain and the United States, when Spain faced international isolation.⁷⁰

Occasionally, his top-down approach to popularization made him feel entitled to reproach his listeners. After a talk on the possibility of life on other planets, Vidal Españaó received a letter from a listener criticising him. More than a year later, he returned to the subject and blamed the listener's attitude, broadcasting his name and his address.⁷¹ The listener had misunderstood his words, he argued, because he "never claimed principles that were not strongly established." Declaring this before speculating about life forms on Mars seems contradictory. Nevertheless, Vidal Españaó had absolute confidence in the scientific quality of his source, the book *The Inhabited Worlds* by Desiderius Papp, and he reproduced its contents uncritically.⁷² In fact, he usually avoided criticizing any of his sources, referring to scientists as savants and placing them on a higher status than himself and his public.

The contents of *Los Progresos Científicos* were very heterogeneous, partly due to requests from listeners and partly due to Vidal Españaó's desire to deal with every novelty in all scientific and technological fields. Because of his professional relationship with the electrical industry, it is not surprising that electricity was one of his favourite subjects.⁷³ He was particularly interested in

Hostelería Española ha Perdido a su Gran Capitán," GRB, September 22, 1948).

⁶⁸ "Electricidad e Ilusionismo" about the conference organized by the Spanish Society of Ilusionism (GRB, November 7, 1945); "Prehistoria Contemporánea" about a course on archeology and prehistory taught in Barcelona (GRB, October 20, 1950); or "Condiciones de la Vida Moderna" about a conference on the *Ateneu Barcelonès* ("Los Progresos Científicos," Vol. 3: 19-21).

⁶⁹ Among others: Manuel Vidal Españaó, "Maravillas de la Electrónica" (GRB, October 31, 1945); Manuel Vidal Españaó, "Prodigioso Desarrollo de la Industria Telefónica," (GRB, October 10, 1942); and Manuel Vidal Españaó, "Los Cables Telefónicos del Porvenir," (GRB, March 11, 1949).

⁷⁰ For instance, he explained a hypnotism experiment conducted at the BBC (Manuel Vidal Españaó, "Hipnotismo por Televisión," (GRB, June 25, 1947)) or a garden developed at the Argonne National Laboratory in the United States (Manuel Vidal Españaó, "Radio-horticultura," (GRB, April 4, 1952)).

⁷¹ Manuel Vidal Españaó, "Los Mundos Habitados," (GRB, June 3, 1949). The talk that provoked the letter was Manuel Vidal Españaó, "¿Existen otros Mundos Habitados?" (GRB, April 7, 1948).

⁷² Vidal Españaó translated into Spanish the Papp's book (Desiderio Papp, *Los Mundos Habitados* (Barcelona: Editorial Iberia, 1949)).

⁷³ Some talks reproduced the discourse that linked electricity with modernity (Manuel Vidal Españaó, "La Electricidad Fuente de Progreso," (GRB, March 12, 1947); Manuel Vidal Españaó, "La Era de la Electricidad," (GRB, September 9, 1947)); there were also talks about specific domestic appliances (Manuel Vidal Españaó, "Historia de la Plancha Eléctrica," (GRB, July 24, 1946); Manuel Vidal Españaó, "El Horno Eléctrico de Cocina," (GRB, July 14, 1950)) and talks describing specific technical elements (Manuel Vidal Españaó, "Aislantes Eléctricos," (GRB, December 20, 1944); Manuel Vidal Españaó, "Soldadura Eléctrica por Resistencia," (GRB, May 8, 1946)), among many others.

the different ways of generating it.⁷⁴ Using electricity would, in his view, answer the increasingly difficult task of obtaining fossil fuels, and the resources needed to generate it, such as those used to build dams, were unquestionable long-term investments.⁷⁵ At the same time, he made an effort to present electricity and, above all, the work carried out by electrical companies as a superhuman task that consisted of taking energy from the remote dam to factories or homes.⁷⁶ In this way, he praised the merits of the employees of these companies while justifying the need to compensate the companies adequately for that monumental task.⁷⁷

The emergence of nuclear science had an impact on his ideas about future sources of energy. On August 15, 1945, Vidal Españaó broadcasted a talk entitled “The Disintegration of Matter, the Basis of the Atomic Bomb,” just nine days after the Hiroshima bombing and six days after Nagasaki’s.⁷⁸ At this conference and the following two, “The disintegration as a source of energy” on August 22 and “Utopias that the atomic bomb turns into realities” on August 29, he defended the future benefits to humanity stemming from the scientific and technical developments related to atomic bombs.⁷⁹ In the first of these talks, he explained the exception for discussing World War II-related topics because they were relevant at the time, but without making any reference to the attacked cities and the consequences of the bombings. After this brief introduction, he did not mention the bombs again and focused on the physics behind them.⁸⁰ The scientific ideas of the three talks were vague, only discussing the basis of

⁷⁴ His concerns about this topic date back to before the Civil War. The opening text of *Maravillas de la Ciencia* was devoted to the possibility of obtaining thermal energy from the oceans (Manuel Vidal Españaó, “La Energía Térmica del Mar,” 1-8), and in the same volume, we find his first reference to the possibility of using in some way the energy of the atomic nucleus (Manuel Vidal Españaó, “La Transmutación de la Materia, Viejo Sueño que se Convierte en Realidad,” 49-61), as well as the problems that could be caused by the scarcity of energy (Manuel Vidal Españaó, “Las Reservas de Energía en el Mundo” 265-70).

⁷⁵ Manuel Vidal Españaó, “¿Cómo se Acumula la Energía?” (GRB, April 13, 1951). Although his opinion was in line with the official propaganda, he also introduced other sources of electricity generation that should be considered in the future, such as the eolic or the solar (Manuel Vidal Españaó, “La Energía del Viento,” (GRB, February 16, 1944); Manuel Vidal Españaó, “Centrales Eólicas,” (GRB, June 22, 1951); Manuel Vidal Españaó, “Energía Eólica,” (GRB, December 20, 1954); Manuel Vidal Españaó, “Energía Solar,” (GRB, May 11, 1951); Manuel Vidal Españaó, “Captación de Rayos Solares,” (GRB, July 27, 1951); Manuel Vidal Españaó, “Utilización de la Energía solar,” (GRB, May 29, 1956); Manuel Vidal Españaó, “Captación de la Energía Solar,” (GRB, September 4, 1956).

⁷⁶ Manuel Vidal Españaó, “Misterios y Futuro de la Electricidad,” (GRB, February 2, 1951).

⁷⁷ Manuel Vidal Españaó, “El Servicio Eléctrico” (GRB, June 15, 1951) and Manuel Vidal Españaó, “La Distribución de la Energía Eléctrica,” (GRB, September 14, 1951).

⁷⁸ Manuel Vidal Españaó, “La Desintegración de la Materia, Fundamento de la Bomba Atómica.” (GRB, August 15, 1945, <http://ddd.uab.cat/pub/guiadbcn/1945/guiadbcn_a1945m8d15.pdf> (January 16, 2017).

⁷⁹ Manuel Vidal Españaó, “La Desintegración Fuente de Energía.” (GRB, August 22, 1945, <http://ddd.uab.cat/pub/guiadbcn/1945/guiadbcn_a1945m8d22.pdf> (January 16, 2017); and Manuel Vidal Españaó, “Utopías que la Bomba Atómica Convierte en Realidades.” (GRB, August 29, 1945, <http://ddd.uab.cat/pub/guiadbcn/1945/guiadbcn_a1945m8d29.pdf> (January 16, 2017).

⁸⁰ The fact that Vidal Españaó did not have precise information was not an anomaly among the Spanish

the disintegration of matter (“Einstein’s works, [which] show us that matter and energy are equivalent things”) and some arguments related to Rutherford’s experiments. His only goal was to point out nuclear power possibilities compared to other energy sources.

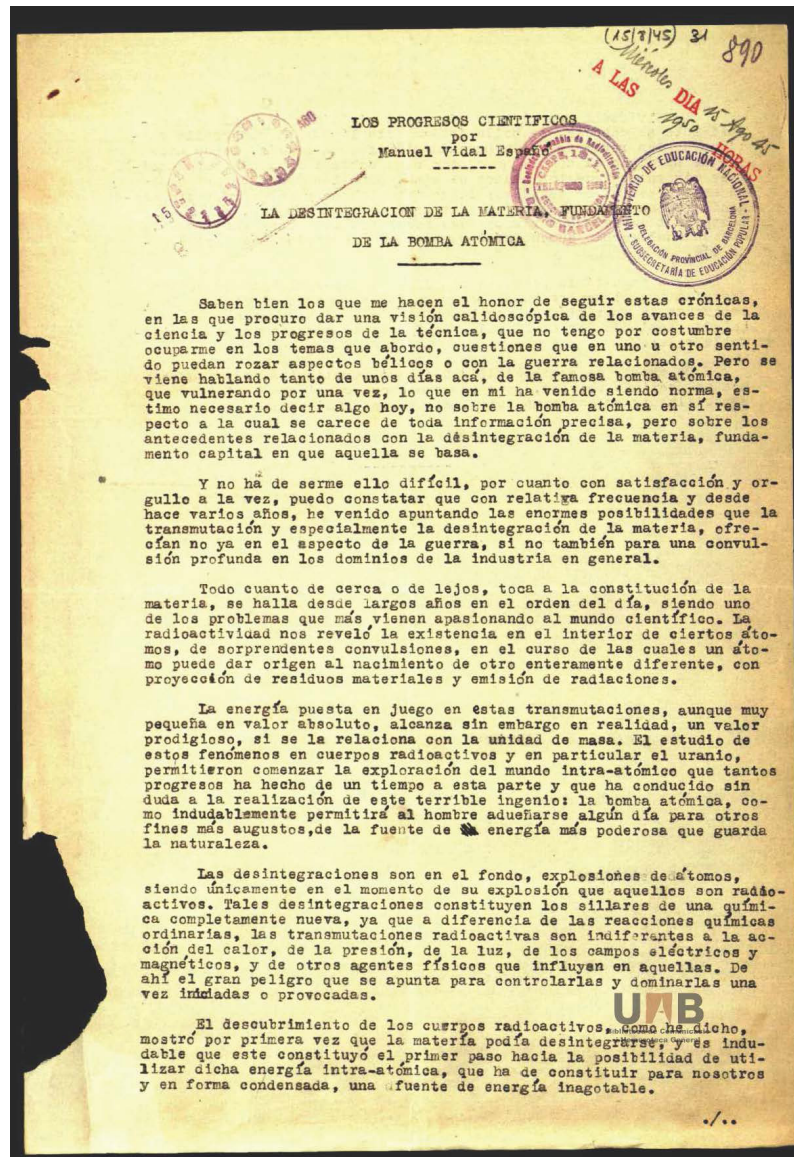


Figure 3 - Script of “La desintegración de la bomba atómica,” August 15, 1945. Radio Barcelona’s Script Collection, Biblioteca de Ciències de la Comunicació, UAB.

scientific circles of the time (Javier Ordoñez and José M. Sánchez-Ron, J.M. “Nuclear Energy in Spain: from Hiroshima to the Sixties,” in *National Military Establishments and the Advancement of Science and Technology*, ed. Paul Forman and José M. Sánchez-Ron, 189 (Dordrecht: Kluwer Academic Publishers 1996).

In later talks, Vidal Españaó kept referring to atomic bombs optimistically because of the possibilities they offered, a position that led to a public disagreement with Miquel Masriera. On August 8, 1948, Masriera published an article in the *La Vanguardia Española* (The Spanish Vanguard) newspaper titled “La Triste Actualidad de la Física” (The Sad State of Contemporary Physics).⁸¹ The article argued that the development of atomic energy for war purposes would be capable of destroying civilization all over the planet within a few years. For this reason, Masriera argued that “physicists like him felt ashamed of themselves.” While recognising the destructive capacity his friend described, Vidal Españaó considered that this fact had increased the popularity and admiration for physics among audiences. He argued that the state of physics at that time could not be considered sad because 200 kg of Uranium 235 was sufficient to generate the energy that Spain spent in a year.⁸² He would not adopt a critical discourse on nuclear weapons until 1955.⁸³

The relationship between Vidal Españaó and Masriera is worth exploring further. Vidal Españaó recognized Masriera as a strong influence in his science popularization efforts, alongside Comas i Solà and the Nobel Prize winner José Echegaray. The admiration was mutual, and Masriera recognized himself as one of Españaó’s most devoted listeners. They usually shared science books,⁸⁴ and their relationship went beyond the professional realm.⁸⁵ Vidal Españaó commented on air about Masriera’s adaptations of *New Pathways in science* by Sir Arthur Stanley Eddington and of *Das Atom – Endlich Verständlich* (The atom – finally explained) by Fritz Kahn,⁸⁶ and Masriera’s original works, such as *Ideas Básicas Sobre el Átomo y la Energía Nuclear* (Basic Ideas about the Atom and Nuclear Power).⁸⁷ In this last case, besides summarizing the volume index, Vidal Españaó praised his friend’s teaching experience when Masriera was still fighting for the academic position he had been removed from by the regime’s purge.⁸⁸

⁸¹ *La Vanguardia Española*, August 8, 1948, 4.

⁸² Manuel Vidal Españaó, “Brumas y Auroras de la Física,” (GRB, September 15, 1948).

⁸³ Manuel Vidal Españaó, “Kilovatios Atómicos,” (GRB, August 29, 1955) and Manuel Vidal Españaó, “Reactores Atómicos,” (GRB, February 28, 1956).

⁸⁴ Letter from M. Vidal Españaó to Miguel Masriera, March 11, 1953 (*Fons Masriera, Arxiu de l’Institut d’Estudis Catalans*).

⁸⁵ Masriera cited anecdotes of this relationship in his articles in *La Vanguardia Española*, such as when he wrote about an excursion of theirs to the Pyrenees (Miquel Masriera “Montlouis y Odeillo,” *La Vanguardia Española*, (August 22, 1967), 11).

⁸⁶ Manuel Vidal Españaó, “El Universo y la Física Moderna,” (GRB, February 20, 1946), about Arthur S. Eddington, *Nuevos Senderos de la Ciencia. Prólogo, Traducción y Notas de Adaptación de M. Masriera* (Barcelona: Montaner y Simon, 1945)) and Manuel Vidal Españaó, “Para Comprender el Átomo,” (GRB, February 27, 1953), about Fritz Kahn, *Para Comprender el Átomo. Prólogo, Traducción y Tabla de Isótopos por M. Masriera* (Barcelona: Ed. Destino, 1952)).

⁸⁷ Manuel Vidal Españaó, “Atomística,” (GRB, June 13, 1955), about the book Miguel Masriera, *Ideas Básicas sobre el Átomo y la Energía Nuclear* (Barcelona: Ed. Labor, 1955)).

⁸⁸ About this case, see Nieto-Galan, “From Papers to Newspapers.”

Regardless of this disagreement, it is not unreasonable to think that Masriera was the primary source of España's frequent lectures on this topic because of his profound knowledge of nuclear power and because of their friendship.⁸⁹ Vidal España used to limit his analysis to comparing the possibilities of the energy enclosed in an atom with magnitudes known to his listeners, a distinctive feature of his style. For instance, in a talk about scientific utopias, broadcasted on January 13, 1943, he compared the energy emitted by the disintegration of radium with the hydroelectric power of Niagara Falls, claiming that if it were possible to modify the half-life of radium from 1,700 years to 10, the provision of energy would no longer be a problem.⁹⁰ In the early 1950s, the talks on this subject became more precise than those of the previous years. Without reaching the sophistication Masriera showed in his *La Vanguardia Española* texts, undoubtedly dedicated to a more enlightened public, Vidal España began to include selected information on atomic power stations and the construction of nuclear reactors.⁹¹ He was merely expressing his admiration for the opportunities opened by the new energy and trying to transmit his optimism to his audience. In some cases, he only introduced details he considered attractive enough to catch his listeners' attention.⁹²

As nuclear power increased its importance in the public sphere of the regime, it started to disappear from the Vidal España talks. He did not refer to the Atoms for Peace program in his broadcasts and only briefly referenced the Geneva Scientific Conference of 1955, though both events had a significant impact not only on the press but also on cinema through the NO-DO.⁹³ His reaction to an official popularization program was to stop discussing the topic.⁹⁴ The abundance of information made his naive talks irrelevant.

⁸⁹ It was recognized even by the most visible leaders of the regime in the field of nuclear power (Ana Romero de Pablos, "Prensa y tecnología en la España de Franco: del secreto a la política atómica pública," *Dynamis* 38, no 1 (2018): 189-218).

⁹⁰ Manuel Vidal España, "Utopías Científicas," (GRB, January 13, 1943, <http://ddd.uab.cat/pub/guiradbcn/1943/guiradbcn_a1943m1d13.pdf> (January 16, 2017)).

⁹¹ Manuel Vidal España, "Centrales Atómicas," (GRB, June 13, 1952); Manuel Vidal España, "Construcción de Reactores," (GRB, April 10, 1956).

⁹² For instance, introducing the first atomic submarine, USS Nautilus (launched in January 1954), he debated the differences between the Westinghouse slow-speed-neutrons reactor and the General Electric medium-speed-neutrons reactor (Manuel Vidal España, "Submarinos Atómicos," (GRB, October 11, 1954)).

⁹³ Manuel Vidal España, "Electricidad Atómica," (GRB, August 28, 1956). Romero de Pablos, "Prensa y Tecnología en la España de Franco." NO-DO was the colloquial name for *Noticiario y Documentales* (News and Documentaries), a state-controlled cinema newsreels produced in Spain and closely associated with Franco's Regime.

⁹⁴ Nuclear power disappeared from the content of Vidal España broadcasting talks in 1957 and 1958. Unfortunately, the preserved script collection ends with the December 23, 1958 script. We do not know if he took up the subject later when the first nuclear reactors were launched in Spain.

Conclusion

In the aftermath of the Spanish Civil War, Franco's fascist regime had to consolidate a different socio-political situation and definitively break with any remnants of the Republican period. In this context, the fact that a public figure could continue doing the same public activity in the same place and precisely the same way as during the Republic is indeed exceptional. The transformation of a popularization broadcast, conceived initially from the deficit model, into a vehicle for the collective construction of knowledge is also an exceptional fact in the history of the popularization of science. Manuel Vidal España's *Los Progresos Científicos*, the science radio program this paper analyses, is a rare and illustrative historical example of such exceptional processes.

This case study shows how a top-down popularization initiative incorporated audience participation. Successful interactions through diverse channels (letters, phone calls, or face-to-face encounters) appeared to be an efficient method of sharing knowledge among the popularizer and the audience. Although this exchange did not lead to a critical discourse about science or the regime, it successfully pushed the boundaries of science and technology. The interaction with radio audiences incorporated into scientific outreach topics that formal science might not readily embrace but that audiences with less cultural capital would see as belonging to it.

Manuel Vidal España was an amateur popularizer who recognized himself as a science evangelizer. Moving away from the figure of the savant or expert, which he acknowledged in other figures he mentioned in his talks, he became a paternalistic figure, a teacher who aimed to feed his students knowledge that he did not even question himself. He successfully transferred his admiration for science and scientists to his audiences but chose not to facilitate the development of a minimal critical capacity in them, a quality not shown in his talks. His style of disseminating indisputable truths found the perfect place for perpetuation in the Franco regime.

Vidal España's narrative hardly changed during the Francoist period compared to earlier periods. Beyond accepting the regime's positions regarding related matters, he returned to his laudatory discourse about science and technology. Although his talks sometimes overflowed the official doctrine, we can infer that he was inoffensive and instrumental for the regime, just as he was at the time of the Republic. He became a helpful instrument for the regime, which nourished him with awards and distinctions. However, he never succeeded in going any further. His acceptance of the regime helped him stay on the air, although becoming increasingly irrelevant as time passed. Also, he could never move to TV, a media he devoted

many talks to and considered perfect for science popularization as it allowed the inclusion of images to facilitate an understanding of the most challenging topics.⁹⁵

He maintained relations with political power without belonging to it and was close to the scientific establishment, to which he had never belonged. He never considered himself a scientist. By referring to scientists as savants, he voluntarily positioned himself on a lower plane, always showing respect and admiration for them and their achievements. A person who admires them and does not criticize them is, no doubt, very convenient for the elites. By doing so, he succeeded, consciously or not, in empathizing with less-educated audiences. However, at the same time, he positioned himself as the teacher of these citizens who had limited access to information.

The main success of Vidal España's career as a popularizer was his ability to break the distance that is supposed to exist between the broadcaster and the public in a medium like radio. The interests of his target audience constitute a testimony of what the working classes understood to be the field of science and technology. Thus, this case helps us to draw the popular boundaries of science and technology in Franco's dictatorship. The characteristics of everyday technology fit better in the popular science category than tales of great scientific discoveries. The Franco regime does not seem to have prevented Vidal España's ability to manage the circulation of knowledge through his radio show. However, the limited access to education for most of his audience, which the regime perpetuated, seems significant in constraining what popular science was.

Josep Comas i Solà wrote a preface for the book *Maravillas de la Ciencia*, introducing Vidal España in similar terms used by Masriera thirty years later: a person who had the conditions to share elementary scientific knowledge with everyone.⁹⁶ Comas i Solà was widely recognized for his science popularization task before the Civil War. Miguel Masriera had a high-level scientific discourse targeted at the educated middle classes. Far from his two references regarding the quality of his scientific discourse, Manuel Vidal España's skills consolidated a public space for scientific dissemination in which the popular classes felt comfortable, providing them hope for a better technological future while building a mirage of shared knowledge.

⁹⁵ He disclosed his aspiration to broadcast on television in the future. Irurozqui, "Una entrevista con este hombre de ciencia."

⁹⁶ José Comas Solà, "Prólogo" (Vidal España, *Maravillas de la Ciencia*), I-VII.

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