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Mathematics in 18th Century Spanish Daily Press. The Early Years of *Diario de Barcelona*

Matemáticas en la prensa diaria española del siglo XVIII. Los primeros años del Diario de Barcelona

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Abstract

During the 18th century, many newspapers were published in Spain. Many of them covered scientific topics, even if it was not their main goal. In fact, it was possible to find scientific contents in daily newspapers whose main goal was essentially informative. Mathematics was not an exception. In this paper, we focus on the early years of *Diario de Barcelona*. We have identified the relevant presence of Mathematics in 51 out of the 3013 initial issues of the daily paper. Then, we provide an overview of the mathematical contents presented in this newspaper, that can be classified into two main categories (isolated collaborations and interactions) and, furthermore, we have a closer look at some of these contents. In particular, we describe interactions between readers around arithmetic and algebraic problems proposed by some of them, as well as some isolated collaborations about different topics. In both cases it is possible to detect interesting questions and debates about several aspects of Mathematics.

Keywords: Mathematics. Newspapers. Spain. 18th century. Diario de Barcelona.

Resumen

Durante el siglo XVIII se publicaron, en España, multitud de periódicos. Mucho de ellos cubrían contenidos científicos, incluso si no era ese su principal propósito. De hecho, era posible encontrar contenidos de carácter científico en diarios cuyo objetivo era esencialmente informativo. Las matemáticas no eran una excepción. En este trabajo nos centramos en los primeros años del Diario de Barcelona. Hemos identificado la presencia relevante de las Matemáticas en 51 de los 3013 números iniciales del diario. A continuación, ofrecemos una visión general de los contenidos matemáticos presentados en este periódico, que pueden clasificarse en dos grandes categorías (colaboraciones aisladas e interacciones) y, además, profundizamos en algunos de estos contenidos. En concreto, describimos interacciones entre lectores en torno a problemas aritméticos y algebraicos propuestos por algunos de ellos, así como algunas colaboraciones aisladas sobre diferentes temas. En ambos casos, es posible detectar interesantes cuestiones y debates sobre diversos aspectos de las Matemáticas.

Palabras clave: Matemáticas. Periódicos. España. Siglo XVIII. Diario de Barcelona.

1 Introduction and objectives

The origins of what we call newspapers (dated and printed periodical publications) can be traced back to the 17th century. In fact, the *Relation aller Fürnemmen und Gedenckwürdigen*

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Historien, which is usually considered the first newspaper, began its publication in 1605 (WEBER, 2006).

In Spain, the first published newspaper was *Gazeta de Madrid*, which appeared in 1661 and that, in some sense, was the culmination of prior non-periodical publications that could be found in previous years not only in Madrid, but also in other Spanish cities, such as Barcelona or Sevilla (SÁIZ, 1983).

Throughout the 18th century, the number of newspapers published in Spain greatly increased. In his thorough catalogue, Aguilar Piñal (1978) provides a list of almost 200 different periodic publications that could be considered as newspapers under the above definition. However, it must be noted that many of them had a very short lifespan. Most of them were published in Madrid, but Guinard (1973, p. 523) identifies up two 12 cities in Spain in which newspapers were published (often with more than one publication in each city). The Spanish colonies at South America were no exception either (WINSHIP, 1908), and we find newspapers such as *Gazeta de Mexico* (1722), *Gaceta de Lima* (1744), or *Mercurio Peruano* (1791) just to name a few examples.

The notorious flourishing of the Spanish press during the second half of the 18th century led to the creation of the first daily newspaper. Up to this moment, Spanish newspapers had different periodicities (*Gazeta de Madrid* and *Gazeta de Mexico* appeared monthly, for example) but none of them were published on a daily basis. In fact, the first daily newspaper published in Spain appeared in Madrid in 1758, and soon the phenomenon extended to other major cities like Barcelona (1762), Valencia (1790), Murcia and Sevilla (1792), or Zaragoza (1797).

Aguilar Piñal (1978) points out that these periodic publications played a very important role during the Spanish Enlightenment by disseminating novel ideas and scientific advancements throughout the country. Accordingly, in his classification on 18th century Spanish periodic publications, one of the main categories is that of “scientific journals”. However, those journals that where more explicitly devoted to scientific topics “were perceived by the population as a mean of training, suitable only for cultured people” (AGUILAR PIÑAL, 1978, p. xii) and this fact possibly reduced their popularity.

In any case, it was also possible to find scientific topics covered in journals and newspapers having a more informative, or generalist, orientation. Among the many themes and genres identified by Guinard (1973), he mentions the *didactic genre* in which the writer seeks to instruct and to communicate precise knowledge. In this regard, it is interesting to point out that the first properly educative Spanish journal, *El Regañón General*, was not published until

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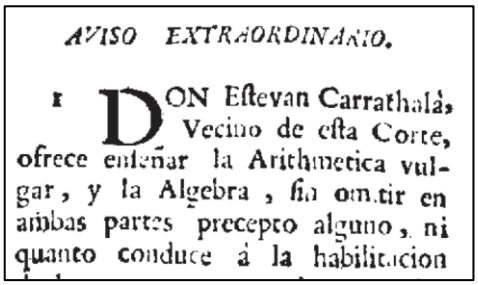
1803, and the existence of pedagogical journals in Spain did not consolidate until the second third of the 19th century, reaching its peak during the last third of the century once training schools and teachers' associations had already been well established (ESTEBAN; LÓPEZ; MARTÍN, 1992). In particular, this means that, in the context of periodical publications, the dissemination of scientific ideas and advancements mostly relied on journals with a generalist orientation, and addressed to the general population.

During the 18th century, Mathematics was perceived as an increasingly important prerequisite not only for Science, but also for daily life. Popular schools of Mathematics, devoted to the instruction of artisans and general population, were founded throughout the country (ARENZANA, 1987) and tutors published their "advertisements" in the newspapers (see Figure 1).


AVISO EXTRAORDINARIO.

DON Eſtevan Carrathalà, Vecino de eſta Corte, ofrece enſeñar la Arithmetica vulgar, y la Algebra, ſin omitir en ambas partes precepto alguno, ni quanto conduce á la habilitacion

Figure 1 – "Don Estevan Carrathalà […] offers himself to teach elementary Arithmetic and Algebra…"
Source: *Diario noticioso, curioso, erudito y comercial público y económico* (Madrid, Jan. 22, 1760. n. 18, p. 36).

Meanwhile, textbook authors often made the importance of Mathematics clear in their introductions. It is the case, for instance, of Ventura de Avila (OLLER-MARCÉN, 2018) who stated: "It is very convenient for all kinds of men to possess the Rules of Arithmetic. How many boys have lost their fortune by ignoring them! One of the circumstances of great recommendation for a young person to know how to count" (AVILA, 1786).

As a consequence, even if not on a regular basis, it was relatively common to find explicit mathematical contents in newspapers which were not specifically addressed to cultured readers, or that were not solely devoted to the dissemination of scientific topics. Consequently, some research questions might arise:

- Q1: How common was it to find mathematical contents in Spanish general information newspapers during the 18th century?
- Q2: What kind of mathematical contents could be found in those newspapers?
- Q3: What information about Spanish 18th-century Mathematics and Mathematics Education can be obtained by the analysis of those contents?

These questions are interesting, and they have not been previously addressed in the

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literature. However, they are rather general and they have a very wide scope. Hence, in a first attempt to approach them, we decide to carry out a case study which, according to Creswell (2014, p. 14), is defined as "an in-depth analysis of a case, often a program, event, activity, process, or one or more individuals".

Even if some authors consider that case studies must deal with "a contemporary phenomenon within its real-life context" (YIN, 1984, p. 13), it has also been pointed out that "the case study is a mode of inquiry well-suited to historical topics" (RURY, 2014, p. 244) and some efforts have been made in order to develop research strategies combining the features of history and case study (WIDDERSHEIM, 2018). In fact, taking into account Creswell's definition of case study, and considering that "a case connotes a spatially and temporally delimited phenomenon of theoretical significance" (GERRING, 2017, p. 27), it is possible to find multiple examples of case study research within the field of History of Mathematics Education. In particular, it is rather common to find works that use this case study approach in order to thoroughly analyze particularly interesting or relevant periodical publications (ZELBO, 2022) or books (DE BOCK; ROELENS; VANPAEMEL, 2019).

In this paper, we carry out an exploratory and descriptive single-case study in order to provide an initial approach to the questions above. The selection of the case under study is crucial in this type of research. Yin (1984) or Gerring (2017) give several rationale for single-case research designs. In our research, we will address the particular case of *Diario de Barcelona*. More particularly, we focus on the early years of this newspaper, starting from its foundation on October 1792, and until the end of the 18th century; i.e., until the end of the year 1800. Although this newspaper did not appear until the end of the century, in 1792, it was a "modern journal" (GUINARD, 1973, p. 215) which soon became an "important mode of transmission of literary and intellectual curiosity" (SÁIZ, 1983, p. 261), and it was one of the most important daily newspapers of that period (GÓMEZ-APARICIO, 1967).

It must be noted that it is not our goal to generalize our findings, since different newspapers probably had different editorial lines. However, we think that this newspaper can provide relevant information about the presence of mathematics during that time in similar publications (daily journals, published in a major city, with an erudite and modern orientation). This information might be useful in guiding forthcoming research.

After all these considerations, we can introduce the specific objectives of this paper, which are closely related to the previous research questions. They are the following.

1. Identifying the presence of Mathematics in the issues of *Diario de Barcelona* published between October 1792 and December 1800.

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2. Sorting and analyzing the identified mathematical contents.

In order to do so, we have analyzed the digital versions of all the issues of the newspaper that can be found at the *Arxiu de Revistes Catalanes Antigues* from the Library of Cataluña. Initially, we started checking the indexes, that were published every four months, but we found out that they were not completely reliable. Hence, we ended up checking the 3013 issues that were published between October 1, 1792 and December 31, 1800. However, we must point out that we have focused just on the first section of each issue, i.e., in this work we have not analyzed those sections of the newspaper devoted to news, advertisements etc.

2 Some remarks about the beginnings of *Diario de Barcelona*

The newspaper *Diario de Barcelona* was founded in 1792. Its first issue was published on Monday, October 1 (see Figure 2). Its founder was a Neapolitan, Pedro Pablo Hussón de Lapezarán, who obtained a Royal Privilege from King Carlos IV to do so. This is an important point, because on February 1791 all newspapers had been forbidden in Spain, with the sole exception of *Gazeta de Madrid*, *Diario de Madrid,* and *Mercurio histórico y politico* (all of which had official character), and most of the requests to publish a newspaper during the period 1791-1795 were rejected (SÁIZ, 1983).


Núm. 1
DIARIO DE BARCELONA.
Del Lunes 1 de Octubre de 1792.
SAN REMIGIO, OBISPO Y CONFESOR.

Figure 2 – Header of the first issue of *Diario de Barcelona*
Source: *Diario de Barcelona*. (Barcelona, Oct. 1, 1792. n. 1, p. 1).

Prior to the first issue, a short six pages pamphlet was published under the title of *Prospective of the curious, erudite, economic and commercial newspaper which, with the title of Diario de Barcelona will be published starting from October 1, 1792*. It was devoted to justifying the existence of the newspaper, and to providing an overview of its structure.

The first part, covering about three pages, explained the importance (both for instruction, and for common utility) of newspapers, giving examples from other countries such as Germany, Italy, France, or England. The existence of daily journals in Madrid, Valencia, and Sevilla was also used as an argument in order to justify the publication of this newspaper. Finally, the author also acknowledged the previous short existence of other newspapers in

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Barcelona, hoping that this was not going to be the case now (and in fact it was not, *since Diario de Barcelona* continued, almost without interruption, until 1994).

The second part of the pamphlet introduced the general structure of the newspaper. This structure was essentially the same for most of the daily newspapers published at that time. First, the title. Then, the saints of the day together with some astronomical and meteorological information. After that, the newspaper was to be divided into two sections (one corresponding to the adjectives curious and erudite, and the other to the adjectives economic and commercial). The *curious and erudite* section would be devoted to science, humanities, art, and craftsmanship, presenting excerpts from monographies or from other journals, but also contributions by the readers (either anonymous or not). The *economic and commercial* section would be devoted to *common utility*, and it would include a miscellanea of news, advertisements, book reviews, lost and found, etc.

This structure (quite common, as we say), and the underlying philosophy of the journal would remain the same until 1808-1809 when, due to the Spanish War of Independence, the newspaper was taken from its founder (under the accusation of being friendly to the French), and its control was given to Antonio Brusi. During the French invasion (1810-1813) the newspaper was controlled by the Napoleonic administration and it was published both in French and Spanish. After the war, edited again by the Brusi family, it acquired a more conservative ideology (MOLIST POL, 1964).

3 An overview of the mathematical topics in the early years of *Diario de Barcelona*

As we mentioned in the Introduction, we have checked the first section (the *curious and erudite* section) of the 3013 issues that were published between October 1, 1792 and December 31, 1800. The number of issues containing mathematical contents was not very large. In fact, we have just found 51, which represents less than 2% of the issues.

In Table 1, we provide the distribution of these issues in periods of four months. As we can see, the distribution was rather uneven, since the most part of the issues that contained some kind of mathematical content were concentrated on the years 1794 and 1798 and, in particular, from May to August.

Table 1 - Presence of Mathematics in the analyzed issues of *Diario de Barcelona*

	1792	**1793**	**1794**	**1795**	**1796**	**1797**	**1798**	**1799**	**1800**
January - April		2	4	-	-	-	2	-	-
May - August		-	14	-	-	-	18	-	-
September - December	-	-	7	-	-	2	2	-	-

Source: made by the author.

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We have identified two different ways in which Mathematics appeared in the analyzed issues. We will call them isolated collaborations, and interactions. Isolated collaborations consist in texts introducing a topic, or developing an idea in a merely expository way. They typically involve only one person, the author of the text. On the other hand, interactions consist in an exchange of questions, answers, comments etc. involving different readers of the newspaper. In addition, isolated collaborations usually involve only one or two issues of the newspaper throughout a short period of time, while interactions can take place over longer periods, sometimes even months (Frame 1).

Dates	Brief description
October 21 and 22, 1797	Anonymous text explaining the usefulness of the decimal system, and presenting a brief review of a memoire by Isidoro Bernareggi
March 30 and 31, 1798	Anonymous letter of a father that explains to his son the importance of Mathematics in the Army
May 20 and July 20, 1798	Andrés Dumont, Marquis of Montsemé, describes the benefits of a mathematical instrument of his own invention

Frame 1 - Isolated collaborations
Source: made by the author.

In our search, we have found three isolated collaborations, and six interactions. It must be noted that, in some cases, the same issue contained both a contribution to an ongoing interaction and an isolated collaboration.

In Frame 1, we present a brief description of the isolated collaborations, with the dates of its publication. As we can see, only one of the three detected collaborations was signed by its author.

In the same way, Frame 2 gives a brief description of the interactions. We provide the date of the beginning and of the end of the interaction, the number of different issues of the newspaper in which it appeared, and the number of people taking part in the debate. In the six cases, the interaction was triggered by the proposal of a problem or puzzle.

Dates	Number of issues	Number of participants	Theme
April 12, 1793 – April 7, 1794	4	5	Arithmetic puzzle
March 31, 1794 – June 13, 1794	4	2	Arithmetic problem
May 30, 1794 – September 14, 1794	7	4	Algebraic problem
July 30, 1794 – October 10, 1794	10	4	Problem about alloys
August 9, 1794 – August 14, 1794	2	2	Algebraic problem
May 27, 1798 – September 7, 1798	19	12	Problem about currency

Frame 2 - Interactions
Source: made by the author.

As we can see, three of the interactions were particularly long in terms of the number of involved issues. The last one was particularly polemic, as it spread over nineteen issues of the newspaper, involving up to twelve different people.

Regarding the participants, they often signed their contributions with some kind of

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pseudonym, or even with an acronym; in some cases the contribution was completely anonymous. Thus, we cannot always know exactly how many different participants were involved in the discussions. Among the pseudonyms, we find for example *El Paisano Catalán* (The Catalonian Countryman) or *Aritmético sin Reglas* (Reckoner without Rules).

However, six participants provided their full names in their contributions: Manuel Mestanza y Santiestevan, Josepha Molet y Antunez, Joseph Florit y Reventós, Pablo Franch, Antonio Ferrater and Manuel Poy y Comes. We remark the fact that one of them was a woman, which was unusual for that time. At least two of them, Mestanza and Poy, were known to be elementary education teachers in Barcelona at that time. We have not been able to find any information about the remaining names.

In the forthcoming sections, we will have a closer look at the two ways in which Mathematics found its way into the analyzed issues. First, we will introduce and briefly discuss the three isolated collaborations (recall Frame 1). Then, we focus on two different interactions. A short one (March 31, 1794 – June 13, 1794), involving four issues and only two participants, and a longer one (May 30, 1794 – September 14, 1794) that involved seven issues and four participants (Frame 2). These two cases are good examples of the type of questions, answers, and discussions that took place in the context on these so-called interactions.

4 The isolated collaborations

We are now going to provide a more detailed description of the contents of each of the three isolated collaborations with mathematical content that we have been able to find.

4.1 Decimal system and Bernareggi's memoire

This collaboration was published on October 21 and 22, 1797. Its full original title was *Uso de las fracciones decimales en la multiplicación de los números, por el Padre Bernareggi, en Venecia* (Use of decimal fractions in the multiplication of numbers, by Father Bernareggi, in Venice).

The author of the text began by dating the use of decimal fractions back to 15th century, citing Regiomontanus as the *discoverer of this method, which he applied to the construction of tables of sines*. The author then proceeded to point out that some *learned people* had proposed that all magnitudes used in common life were divided and subdivided in tenths but that this had not been fulfilled. Consequently, he said, everyone wanting to use decimal fractions should

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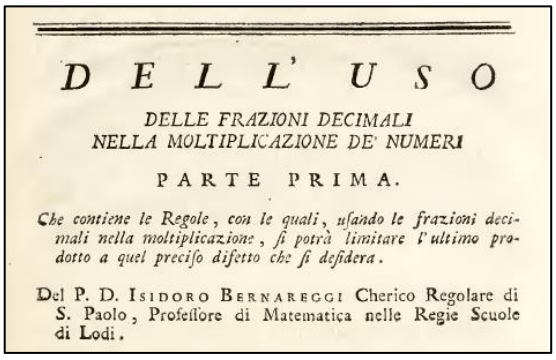
convert common fractions into decimals, and vice-versa; a transformation that is not always exact.

The remaining of the text was devoted to a discussion about the possibility of approximating any common fraction by decimals with arbitrary precision, as well as to commenting on the eventual propagation of the error when multiplying approximations. This was done by reviewing a work by some Father Bernareggi, that the author claimed could be found *in the Collection of the Italian Society printed in Verona in 6 volumes*.

Certainly, the author of this collaboration referred to the "Memorie di matematica e di fisica della Società Italiana delle Scienze", published on 1792. This society is one of the oldest academies in Italy. It was founded in 1782 in Verona by the engineer and mathematician Antonio Maria Lorgna, and still exists with some changes in the name (PENSO, 1978). In the sixth volume, we find a dissertation entitled *Dell' uso delle frazioni decimali nella moltiplicazione de' numeri. Parte prima che contiene le regole colle quali usando le frazioni decimali nella moltiplicazione si potrà limitare l' ultimo prodotto a quel preciso difetto che si desidera* written by the Father Isidoro Bernareggi, a teacher of mathematics at Lodi (see Figure 3).



D E L L' U S O

DELLE FRAZIONI DECIMALI
NELLA MOLTIPLICAZIONE DE' NUMERI

PARTE PRIMA.

Che contiene le Regole, con le quali, uſando le frazioni decimali nella moltiplicazione, ſi potrà limitare l' ultimo prodotto a quel preciſo difetto che ſi deſidera.

Del P. D. Isidoro Bernareggi Cherico Regolare di S. Paolo, Profeſſore di Matematica nelle Regie Scuole di Lodi.

Figure 3 – Header of Bernareggi's memoire
Source: Bernareggi (1797).

It is remarkable that someone decided to write this review about a rather unknown work by an also rather unknown Italian professor. In any case, Bernareggi's work might have had some impact, since in the same year of 1797 he published an extended version of his memoire under the title of *Aritmetica riformata* (BERNAREGGI, 1797), which was later reprinted in 1801.

It is also uncertain who could have been the author of this review because, by 1792, there was only one Spanish member of this Italian Society that might have had access to its Memoires. It was Pedro Rodríguez de Campomanes, a very important Spanish political figure at that time, but who lived in Madrid. However, the Library of Cataluña possesses exemplars

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of the Memoires of the Italian Society, in particular of those from 1792, whose origin is unknown.

The choice of the topic is also interesting. The use of a universal decimal system was very related to the ideas of the French Revolution, and we must not forget that the meridian used to define the meter was measured from Barcelona to Dunkerque, with the French astronomer Méchain arriving in Barcelona for the first time on June, 1792 to undertake the operations (DELAMBRE, 1827).

4.2 Mathematics in the Army

This collaboration was published on March 30 and 31, 1798. The text began with an explanation in which an unknown person explained that he had found a letter that his father had written to him fifteen years before, and that he wanted to share it in the newspaper so that *other fathers can read it to their sons*.

The letter began by enumerating different disciplines that must be known by anyone in the military: Foreign languages, History, and, of course, Mathematics. Then, the father gave a short list of situations in which Mathematics can be useful in the Army, paying special attention to fortification. He mentioned Vauban, claiming to have studied him.

The letter also contained an interesting section where the author advised his son not to believe those who claim that Mathematics are abstract or difficult. According to the author, only an average intelligence, good will, and a good master are required to learn Mathematics. He also told his son that 10-year-old children can understand Algebra and that even women can make progress in Mathematics (he cites Feijoo's "Defense of Women" discourse and he mentions the name of Juliana Morell).

The text ended with a concluding remark written by the son in which he wanted to complete his father's words pointing out that Mathematics is not only useful in the Army, but also for every kind of people. The remark was closed with some known anecdotes about Pythagoras (in fact the author might have meant Plato), and Aristippus.

The content of the letter is rather common. During the 18th century many Mathematics textbooks were written by and for the military, and in most of them the author paid attention to the usefulness of Mathematics in that particular context. In Barcelona, the *Real Academia Militar de Matemáticas de Barcelona* was founded in 1720 (CAPEL; SÁNCHEZ; MONCADA, 1988) and it remained open until 1803, so the content of the letter must have made sense in the newspaper.

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However, the text contains two interesting features. First, we have the mention to Vauban. For sure, the author refers to Sébastien Le Prestre, who was an important military engineer of the 17th century (BLOOMFIELD, 1971), and whose work, if we are to believe the author of the letter, was studied in Spain at the time. On the other hand, we have the quite unusual explicit mention to women, and the citation of one of the most controversial discourses in Benito Feijoo's *Teatro Crítico Universal* (GARRIGA-ESPINO, 2012).

4.3 Dumont's mathematical instrument

This collaboration, which was the only signed one, appeared on May 20 and July 20, 1798. The author was the Brigadier Andrés Dumont, Marquis of Montsemé, and its main goal was to publicize a mathematical instrument of his own invention. Eyzaguirre (1966, p. 114-115) provides some brief biographical data of this Andrés Dumont, and López-Gómez (1993) gives a detailed account of his service record. We will not get into details, and we will just say that he was born in Barcelona in 1728, and that, after some successful campaigns, he ended up teaching fortification in the Academy of Ávila between 1774 and 1788. Later, he was dismissed (due to his deafness) and sent to Barcelona. He must have died between 1803 and 1804 because he was listed in the *Estado Militar de España* only until the 1803 issue.

In the text published on May 20, Dumont explained how, in his battlefield experience as a volunteer engineer, he had realized that sometimes some operations had to be undertaken in the absence of the required instruments. Then, he claimed to have invented a novel, light, portable, and universal mathematical instrument useful to carry out the operations required by military engineers, artillerymen, or miners. He also claimed that this instrument had been presented by Lalande in the Royal Academy of Sciences of Paris in 1768, deserving approval. Furthermore, the author included in the text a letter, dated 1776, from the Chief of Engineers of the Spanish Army (Silvestre Abarca) to the Ministry of War recommending that the inventor was awarded. Finally, he offered to provide with a prototype to any manufacturer willing to produce the instrument, and even to help in the construction and to teach how to use it.

Later, on July 20, Dumont made an additional comment pointing out that his instrument could be used to level, without appealing to any water, air, or lead level, only through the use of two visuals to the horizon.

Unfortunately, the text did not contain any precise description of the instrument, and we have not been able to find any mention to it, or to Andrés Dumont, in the *Memoires de la Académie Royale des Sciences* corresponding to 1768.

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5 A short interaction. A remainder problem

We now turn to interactions. Some of them were rather short and involved a small number of participants. In this case, the original person proposing a problem and a reader submitting an answer to it exchanged a few rather friendly letters.

On March 31, 1794 an unknown correspondent, who used the pseudonym R. del Vellocino, proposed the following problem:

> A woman went to the square to sell a basket full of eggs, but she run into a mule and all the eggs were broken. The woman went to court so the owner of the mule would pay for the broken eggs and the judge decided in her favor. The parties then decided to pay for each dozen, but the woman ignored the number of eggs she had. They appealed to a skillful reckoner to determine the number of eggs that were in the basket. The woman could only declare that when she counted the eggs two by two, three by three, four by four, five by five and six by six; there were no eggs left; while if counted seven by seven one egg remained. With only this information, the reckoner was able to determine the number of eggs that were in the basket (VELLOCINO, 1794, p. 357).

This problem is well-known, and very common throughout history (BULLYNCK, 2009). Furthermore, the proponent explicitly stated that the solution should not be obtained by trial and error, nor by the method of false position.

On April 7, the editor of the journal informed that he had received some answers to the problem, all of them claiming that the number of eggs could not be decided, and he reproduced the answer that he considered to be the most comprehensive. The author of the published answer signed M.L.

This respondent claimed that it was not possible to solve the problem because it had an infinite number of possible solutions, and he gave two of them: 120 and 5160. Moreover, he claimed that if there is an infinite number of solutions, it is useless to give any rule. He closed his answer by proposing back a new problem for which he demanded a general rule:

> Two robbers stole 91 *duros*, when they were to share the bounty, they had an argument, and each one got as much as they could. Later, after making peace, the first gave to the second one third of what he initially got, while the second gave to the first one fourth of what he initially got. Doing so, both had the same amount of money (M.L., 1794, p. 386).

After some time, the original proponent answered back with a long text that was published on May 31 and July 1.

In the first part of the answer (May 31) the proponent argued that a problem can have an infinite number of solutions and yet being solvable. He provided the two smallest solutions (120 and 540) to the original problem thus giving a hint of the general solution, and at the end he pointed out that “in spite of the uselessness that M.L. want to attribute to it, many people

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devoted to Arithmetic have spent their time in solving this and other similar problems" (VELLOCINO, 1794, p. 610).

The second part of the answer (July 1) was used to solve the second problem. It was solved using a system of equations (two or three, he says correctly) that were verbally described. Then, the correct answer was given: one of the robbers got 54 and 3/5, while the other got 36 and 2/5. But, even more, in a very subtle way he deduced that the amounts of each robber must be in the ratio 2:3, thus providing a general approach to this family of problems. He then concluded with a reflection on the meaning of *general rule*, comparing both problems. He explained that, in the first one, it means to describe a way to provide all the possible answers to the problem, while in the second one, it means to find a method to solve the problem independently of the particular data.

6 A longer interaction around an algebraic problem

In other cases, interactions developed over a longer period of time and involved a bigger number of participants. The general setting was usually the same: a problem was proposed, one or more answers were received, and these answers triggered reactions from the original proponent or from other readers. In these longer interactions not all the interventions were equally friendly, and more or less explicit mockery was not uncommon.

On May 30, 1794 an unknown correspondent who signed with the acronym D.M.C. proposed the following question:

> Anton invested 8 doubloons obtaining a certain number of pounds as a profit. In the same business, Juan invested a certain number of doubloons obtaining 10 pounds as profit. The pounds won by Anton and the doubloons invested by Juan are two numbers such that their sum is equal to the difference of their squares. It is asked how many pounds Anton won and how many doubloons Juan invested (D.M.C., 1794, p. 606).

The problem was introduced by a short letter where the author stated that the problem had been proposed during an evening of conversation and entertainment with some friends, and it was accompanied by a short poem of four lines in which the author offered to pay a cash prize consisting in as many reals as the answer to the problem.

About a week later, on June 7, a first answer was published. It was signed by Joseph Florit y Reventós, who claimed that Anton won twelve pounds while Juan invested thirteen and 1/3 doubloons. This answer was clearly wrong, but despite that, the respondent proceeded to check it, thus showing us a mistake he did not seem to notice. When carrying out the computations, Florit claimed that the square of thirteen and 1/3 is 169 and 1/3. Of course, had

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it been the case, his solution would have been correct. His answer was closed with another short poem of four lines asking for the prize.

Two days later, on June 9, a second answer, in this case anonymous (signed *F.R.*) was published. This second answer completely ignored the previous one, and provided a correct solution to the problem. Namely, that Anton won $\sqrt{160\frac{1}{4}}$ pounds plus 10 sueldos, while Juan invested $\sqrt{160\frac{1}{4}}-\frac{1}{2}$ doubloons. Since both these quantities are irrational (and an irrational amount of money does not make sense), the respondent then provided the most accurate rational approximation in each case for those who do not understand irrational computations.

On June 10, two reactions to the first wrong answer were published. The first reaction was by the proponent of the problem. He just limited himself to point out that the answer was wrong, and ended with yet another four lines poem claiming that he would be happy to pay as far as the answer was correct. The second reaction was again anonymous (signed K.F.), and it was not so benevolent. This second respondent pointed out that the answer was wrong, but he also pointed out the mistake by saying that the square of thirteen and 1/3 is in fact 177 and 7/9 and not 169 and 1/3. He then mocked the author of the wrong answer stating that he must be more a poet than a mathematician, since he ignores square numbers, and he finally addressed the editor of the journal telling him that it was regretful that such a wrong answer made its way to the pages of a journal that was read in so many places.

Three days later, on June 13, the proponent, D.M.C., reacted again; but in this case to the correct answer. In his reaction, the proponent responded to F.R. that, even if his solution was right, there were other additional correct solutions if one accepts both the positive and the negative square roots. To conclude, he asked F.R. to specify to which solution he refers if he wanted to win the prize.

Two months later, on August 11, the author of the correct answer reacted to the previous response, and he seemed annoyed. First, he (correctly) pointed out that, in fact, the original problem did not only have negative solutions, but also complex ones. Then, he said that the context of the problem implied that the answers had to be positive numbers (because the problem included the terms invest and profit, it is not possible to invest a negative amount of money, and if the profit had been negative, it would have been a loss). Furthermore, he claimed that even if there were a thousand satisfactory solutions, it is enough to exhibit one of them to consider the problem solved, and, finally, he somehow accused the proponent of using an equation ($x + y = x^2 - y^2$) which was needlessly complicated.

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Finally, the interaction concluded on September 14 with a last reaction by the original proponent of the problem. On it, he argued that a negative profit made sense to him, and that the use of the term *profit* was not arbitrary because if the problem had been stated differently as *Anton invested 8 doubloons losing a certain number of pounds. In the same business, Juan invested a certain number of doubloons obtaining 10 pounds as a profit…* then it would not have made sense.

7 Some final remarks

In this work, we have analyzed about 3000 issues of *Diario de Barcelona*, and we have been able to find 51 issues including some kind of mathematical content in their main sections. Even if we cannot generalize our findings since it is not possible to assume that *Diario de Barcelona* was a particularly representative example, our findings provide an initial answer to the Q1 question that we raised in the introduction. This amount of mathematical content that we identified may not seem very impressive, but it shows that Mathematics was considered important enough to be included on a newspaper addressed to the general public, and not necessarily to intellectuals or cultured people. Moreover, some of the contents that we found suggest the existence of an active and lively community of people interested in Mathematics in the journal's geographical area of influence (Barcelona and its vicinities). This opens the door to future research along the same lines for similar Spanish publications of that period such as *Diario de Madrid* or *Correo de los Ciegos de Madrid*. In fact, an informal and unsystematic approach shows some presence of mathematics in these journals sharing similarities with the case under study in this work.

With respect to question Q2 and Q3, we have been able to classify the presence of Mathematics in *Diario de Barcelona* into two clearly different categories: collaborations and interactions. Each of them has its own defining features and provides a different type of information.

Collaborations may provide interesting information from the point of view of History of Mathematics that could eventually lead to further research. In our case, we have identified three such situations.

First, we have seen that Bernareggi's memoire about decimal numbers was considered to be worth publishing. This fact suggests different questions. The first one, of course, is related to finding out who could have written the collaboration and how he had access to Memoires of the Italian Society, but we can also wonder if this memoire, or Bernareggi's book, had any

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impact on Spanish textbook authors.

Second, we have found textual evidence that suggests that Vauban was being studied by military engineers. Again, this opens the question of searching for this author's influence over Spanish fortification textbook authors.

Finally, the author of the only signed collaboration, Andrés Dumont, is rather obscure and nothing is known about the mathematical instrument he claims to have invented. However, he even mentions being presented on the Royal Academy of Sciences in Paris by Lalande. Maybe it would be interesting to search for more information about this fact.

These three examples, as particular as they might be, illustrate the potential of newspapers as a source for the History of Mathematics and of Mathematics Education. In this regard, Karp and Furinghetti (2018, p. xi) point out that researchers in these fields must study "not only the traditional objects of the history of mathematics education […] but also a far broader sphere of sources, including, for example, […] newspaper articles". We believe that our work contributes in this direction.

On the other hand, we think that interactions are particularly interesting from the point of view of History of Mathematics Education. If we focus on the two examples that we have discussed above, we can identify some interesting questions and debates, which relate to cognitive and epistemological aspects of Mathematics. For instance: What does the expression *general rule* mean? What does it mean to solve a problem? If a problem has more than one solution, is it enough to provide one of them? Is a loss the same as a negative benefit? Do negative numbers make sense in real life contexts?

All these questions are old, and they have been extensively addressed in the field of Mathematics Education, but the interactions that we have presented show not only that these topics date long ago in time, but they also exemplify paradigmatic beliefs, conceptions, mistakes, etc. that might be useful in the approach to these questions. It is also noteworthy that these somewhat specialized discussions were present in daily journals, showing that mathematical knowledge was, at least in part, present on the public debate of Barcelona at that time. Also, the different opinions and points of view about the previous, and other, questions can give us valuable information about the, sometimes difficult to grasp, bidirectional interactions between mathematics and society (BOS; MERTENS, 1977) during the Spanish Enlightenment.

If we focus on the list of non-anonymous participants in the interactions provides us with a set of names that might be interesting for research purposes. It is possible that some of these people might be only of local interest, but even in that case they could deserve further

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attention (SCHUBRING, 2009).

Finally, we have just focused on a relatively short period and on just a newspaper. Consequently, our findings are conclusion are necessarily limited, both geographically, and in time. However, we think that we have been able to provide some insight regarding the questions that were posed in the introduction. Moreover, we think that our results show that this is an interesting line of research, which would be worth exploring in greater depth.

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