Numbers and Journalism during the Covid-19 Pandemic

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Números e Jornalismo durante a Pandemia de Covid-19

Resumo: Este projeto pretende perceber como a pandemia foi coberta pela comunicação social, nomeadamente como a informação numérica serviu de base às notícias. Foram analisadas as notícias relacionadas com a pandemia de três jornais impressos: *Público*, *Diário de Notícias* e *Expresso*. Observou-se algumas diferenças entre os jornais e que a grande maioria das notícias tem um tom neutro. Apesar do número ter um poder mediático inquestionável, a informação numérica raramente foi usada na primeira página dos jornais ou nos títulos das notícias. Além disso, quando é usada geralmente está associada a notícias que transmitem sentimentos negativos ou positivos.

Palavras-chave: Jornalismo, números, tom das notícias, covid-19.

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Abstract: This project aims to understand how the pandemic was covered by the media, namely how numerical information served as the basis for the news and its contextualization. We analysed the news related to the pandemic of three printed newspapers: *Público*, *Diário de Notícias* and *Expresso*. There were some differences among newspapers and the vast majority of news has a neutral tone. Although the number has an unquestionable media power, numerical information has rarely been used on the newspaper covers or headlines. Moreover, when it is used, it is usually associated with news that conveys negative or positive feelings.

Keywords: Journalism, numbers, news tones, covid-19.

Introduction

Coronavirus disease have been identified in December 2019, since then it has rapidly spread all around the world (Park, 2021). Furthermore, "in times of uncertainty and stress, the media plays an important role in disseminating information" (RodríguezLopes, 2021, p. 67). This project aims to understand how the main Portuguese newspapers covered the covid-19 pandemic, namely how statistical information was communicated.

News about covid-19 could have a mixed effect: "On the one hand, information helps individuals develop adequate risk perceptions, empowers them with informed decision-making about preventive behaviors […] On the other hand, information triggers negative emotions and impairs psychological well-being" (Link, 2021, p. 1). Therefore, it is important to understand what has been communicated during the pandemic and how it has been communicated.

Although there is research on how journalists use statistics, namely graphics and infographics (e.g. Bauer & Schoon, 1993; Garcia, 2009, by Haan et al. 2017 and Pinto, 2018), in Portugal these studies are scarce (Pereira, 2015). In this sense, we intend to be a contribution to the reflection on an area that has been gaining space in the media and society in general. If, at first, numbers and graphics had a secondary and sometimes a decorative or instrumental role, today they are often the protagonists of the news (Sjafiie, Hastjarjo, Muktiyo & Pawito 2018), especially in a crisis like this, where the number of infected recoveries and deaths are in the daily news. The United Nations Secretary-General, António Guterres, stressed the importance of numerical information:

> Statistics are fundamental for evidence-based policymaking. Current, reliable, timely and trusted data help us to understand the changing world in which we live and to drive the transformations that are needed, leaving no one behind. The coronavirus pandemic has further elevated the importance of data to save lives and recover better […] is an opportunity to recognize the statisticians worldwide who work to provide reliable data, adhere to the Fundamental Principles of Official Statistics, and build more resilient and insightful data ecosystems (Guterres, 2020) .

In this study, we will analyse the expressive resources used on the covers of main Portuguese newspapers, trying to assess the place occupied in the construction of representations of that exceptional moment, by word or iconography, in its various expressions, whether photos, drawings, graphics and infographics. We will also evaluate the role of numbers in the covid-19 news. In addition to newspaper covers, we will look at news headlines as well. This analysis has two main objectives: analyse the tone of the

news (positive, negative or neutral) and the presence/absence of numerical information. For this purpose, we have chosen three Portuguese large-circulation newspapers: *Público*, *Diário de Notícias*, and *Expresso*.

1. The journalists and numerical data

UNESCO (United Nations Educational, Scientific and Cultural Organizations) proposed a complex concept -Media and information literacy (MIL) - which covers all terminology used around the world (see Table 1). It is focused on four main competencies: knowledge, skills, attitudes, and values. MIL has 19 broad learning outcomes and skills. One of them is to critically evaluate information, media and digital content (UNESCO, 2021). Underlying this, and other outcomes, is understanding statistical information - statistical literacy.

Table 1: Notions of Media and Information Literacy

Literacy fields used by various actors
Freedom of expression and information literacy
Information literacy
Media literacy
Library literacy
News literacy
Computer literacy
Internet literacy
Digital literacy
Cinema literacy
Games literacy
Television literacy, advertising literacy

Source: Adapted from UNESCO, 2021

If statistical literacy is important for all citizens, it is even more important for communication professionals, since they need to be able to handle numerical data: search, read, clean, interpret and critically analyse. Additionally, they also need to communicate statistical information accurately and clearly, which is a big challenge (Silvestre &

Meireles 2021). Although journalists' use of statistics is not new, most of communication students are not comfortable dealing with numbers (Bradshaw, 2018). However, an effort has been made to use statistics, both by higher education institutions and by journalists.

> While the use of statistics by journalists is not new, exponential growth in available data and a desire for source material unmediated by political and public-relations framings have seen data journalism increasingly embraced—to varying degrees—by newsrooms, and editors increasingly seek reporters who can think in computational ways (Treadwell, Ross, Lee & Lowenstein, 2016, p.1).

This need has been pushing the development of disciplines in the field of quantitative content analysis that enrich communication, such as storytelling or data journalism.

Nowadays, and in particular with the news covering the covid-19 pandemic, it is easy to understand that numerical information has been considered an excellent element of communication. Infographics is one example. Infographics (information graphics) are visual representations of information or data combined with verbal language, in order to communicate information in an attractive, visually appealing, and easily understandable way. By using infographics, we can communicate complex data set in a simple way, since "visual stimuli in the form of infographics have the capacity to improve the public's compliance" (Egan et al., 2021).

2. Methodology

We restricted the analysis to only three Portuguese large-circulation newspapers. Two daily newspapers, *Diário de Notícias* and *Público*, and a weekly one, *Expresso*. In Portugal *Diário de Notícias, Público*, and *Expresso* are influential newspapers, since they have the characteristics highlighted by Zamin (2014). They have credibility in the journalistic area; value politics, the economy and international affairs; address social segments with greater purchasing power and social power with access to higher education; and show proximity to political, economic and social power circles. They also tend to serve as a reference for other media (Barros & Silvestre 2020).

In order to understand how the Portuguese written press covered the pandemic, we conducted two distinct phases. The first one, referring to the first wave, covers the period between March 1st (one day before the announcement of the first covid-19 case in Portugal) and May 31st, 2020 (one day before the end of the lockdown).

We have chosen to analyse the front page of newspapers, kowing that the journalistic activity is not limited to the collection and processing of information, it also involves the selection of journalistic pieces and, among them, those that deserve to be highlighted on the cover (Medina, 2001), hence the relevance of analysing the front page of newspapers. In this analysis, we have valued both the visual elements, whether graphics, tables, charts, illustrations, caricatures and photographs, as well as the captions, titles, leads, headlines, and numbers.

Taking into account the time available for this first phase of our project, we have restricted the analysis to just two newspapers: *Público* and *Diário de Notícias*.

During the second phase we mainly focused on news headlines, as to write a good headline is an important task. Headlines introduce, frame, and give an overall picture of the news. They also provide the information that readers need, in order to decide if they want to commit more time reading that story or not (Montejo & Adriano, 2018). Anabela Gradim (2000) also draws attention to the importance of titles. According to her research, headlines together with photographs are the first thing, and sometimes the only one, that the reader pays attention to, in all newspaper.

In this analysis, our main goals were to analyse the tone of the news (positive, negative or neutral) and the role that numbers played. In this phase, we have analysed the three newspapers (*Diário de Notícias, Público*, and *Expresso*), and the headlines of all the news related to the covid-19 pandemic were collected.

3. Newspaper Covers

The analysis of the *Público* and *Diário de Notícias* confirms the preponderance of the pandemic on the front pages of these newspapers. About 68% of the cover of *Diário de Notícias* is dedicated to articles that made reference to covid-19, a number very similar to *Público*, where 70% of the front pages have the same theme. It should be noted that 23% of the covers of *Diário de Notícias* and 12% of those of *Público* were fully occupied by the pandemic. The first pages devoted exclusively to the pandemic are mainly found in late March (state of emergency declaration), early April (extension of state of emergency) and early May (information on gradual deconfinement). Since in Portugal this first wave of the virus did not generate particularly critical moments, such as the rupture of the

national health system, political or social crises, these first pages appear mainly related to the announcement of government measures. As we can see in Figure 1, the editions that exclusively highlight this theme on the front page occur when the state of emergency is declared (end of March), the state of emergency is extended (beginning of April) or the different stages of deconfinement are announced (early May).

Figure 1: Percentage of the first page dedicated to covid-19.

Source: Original

3.1.   Newspaper: *Público*

Nonetheless, these two newspapers use different ways to represent and organize pandemic information. In particular, the choice of discursive practice based on iconographic material, photography and drawing. In *Público*, these representative resources are more abundant and appealing. They tend to occupy, on average, half of the newspaper's front page, and in 10% of the issues analysed, these representations occupied at least 80% of the cover.

The importance of iconography in this newspaper is confirmed by the 11 first covers totally dedicated to covid-19, with 8 of them presenting an image that occupies the entire page; in the remaining 3, the image maintains a remarkable space, occupying between 60 % to 70% of the newspaper spot. All these first had occurred between March, 19th and May 4th, as this editorial option was abandoned from then on.

Portuguese politicians have a small share in the newspaper's photos and drawings, appearing in only 1% of first pages. Governments, ministers, deputies, party leaders and other Portuguese from legislative, executive and judicial institutions almost disappeared

from the front pages of newspapers. Mário Centeno, finance minister, appears on April, 21st, occupying 61.3% of the page; António Costa, Portuguese prime minister, appears three times, starting on May 5th; the President of the Republic, Marcelo Rebelo de Sousa, appears only once, accompanied by Portuguese prime minister (May, 14th).

International news is also barely covered by photographs or drawings. The exceptions are an illustration of China and Europe, which is represented only three times in the analysed period. There is only the photograph of two international leaders, Viktor Orbán, Hungarian Prime Minister and Donald Trump, both of reduced size, occupying 4.6% and 4% of the first page, respectively.

Moreover, the social dimension of the pandemic is valued, 50% of the total number of photographs and drawings on the front page of the newspaper refer to the social impact of the pandemic. They highlight changes in everyday life, for example, pieces representing streets and other desert public spaces, telework environments or distance learning. The social effects of the pandemic crisis such as unemployment, hunger, the drama of the elderly are also chosen themes. The activities related to the health are the target of great iconographic representation, in particular anonymous professionals and the interior of hospitals and health centers.

3.2.   Newspaper: *Diário de Notícias*

The newspaper *Diário de Notícias* is very different in terms of the use of photographs and drawings on the front page. These tend to occupy a small part of the first page, 27% on average. The largest image used on the front page is a photograph of the covid-19 virus, which occupies 46% of the page, on March, 7th, even before measures related to lockdown were taken. This was an exception. In this newspaper the written word is predominant.

Diário de Notícias chooses to use portrait photographs of prominent political figures (Minister of Justice, Francisca Van Dunem; Graça de Freitas, Director of DGS; Adalberto Campos Fernandes, Minister of Health, between 2015 and 2018; Marçal Grilo and Nuno Crato, both former Ministers of Education; Manuel Alegre historical activist of the Socialist Party), in the business area (Luís Araujo, President of Portugal Tourism), and in the cultural area (the neurologist, António Damasio, the television comedians , Ricardo

Araújo Pereira and Herman José, and the pivot of the private SIC channel, Rodrigo Guedes de Carvalho). Yet, these portraits are, in most cases, small in size, taking up less than 3% of the first page.

Larger photographs are published in two editions, March 28th and April 11th, covering aspects of the lives of health professionals, which occupy 41.6% and 39.5% of the cover, respectively. Also on April 18th and May 2nd editions there are photos of two other activities that allow the maintenance of confinement, that of pickers and delivery people (the first occupying 26.5%, and the second 17.9% of the first page). On May 16th, there is a drawing, occupying 38.6% of the first page, representing the impact of CoVID-19 on everyday life (using masks in the streets, supermarkets and teleworking).

However, as it happened with *Público*, international themes are not relevant in terms of photographs and drawings. The stories chosen for the front pages of newspapers are centered on national issues.

3.3.   The role of numbers

Knowing that numbers have unquestionable media power (Garcia, Rosa & Barbosa, 2017), the question arises: what were journalists doing with the numbers that were made available daily? In this work, we consider a number as a broader concept referring to digits, numbers in full or numeric expressions, for example "half the cases".

More than half of the newspapers present numerical information on the front page. In *Público* this information occurs 52% headlines and in *Diário de Notícias* 69%. In order to understand the context in which numerical information was used, headlines were classified according to their impact: political, economic, social, on the pandemic situation, and on public and health services. Numerical information was mainly linked to the social impact (27% news), the health system (24%), the economy (24%) and the evolution of the pandemic situation (20%) (see Figure 2).

Figure 2: News with numerical information: their impact.
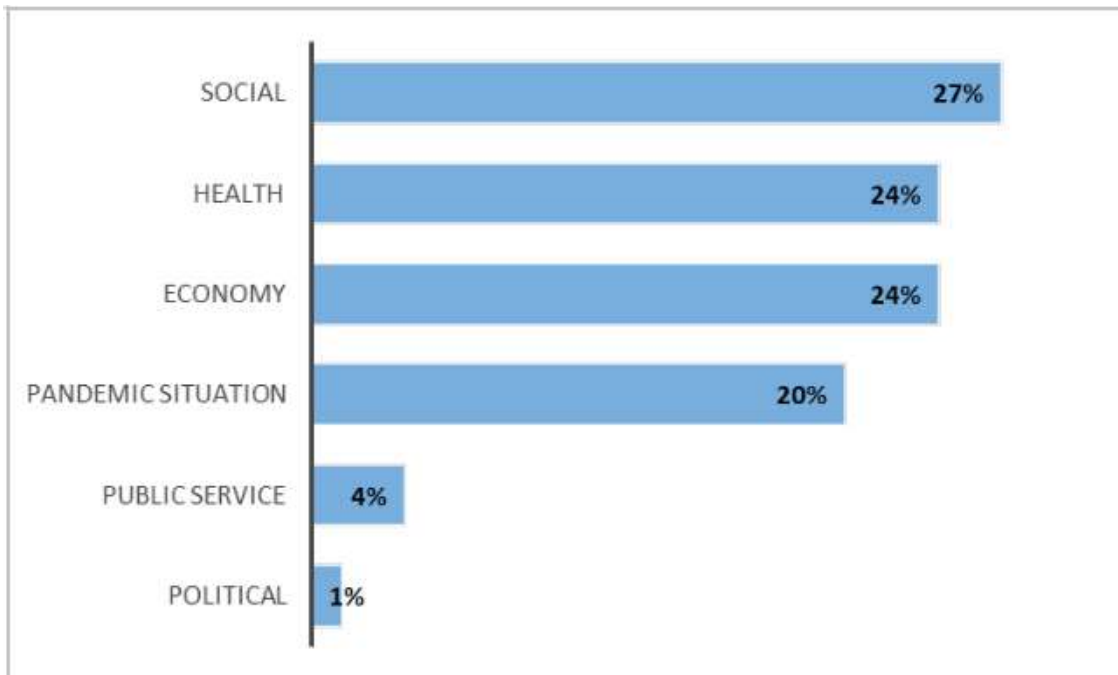
4. Headlines

In this analysis, the three newspapers were considered: *Diário de Notícias*, *Público*, and *Expresso*. All titles related to covid-19 pandemic were analysed, making a total of 2020 headlines.

The analysis of the titles took into account three aspects: (i) the tone of the news: positive, neutral or negative, (ii) the reference to numbers: yes or no, and (iii) the predominant words. As we have already seen, we considered that the numbers did not refer only to the use of digits or the number written in full, but also to the concept of quantity, such as half or the majority. About the tone of the news, we considered those that conveyed feelings of security, hope and confidence as positive. Those that raised doubts appealed to fear or conveyed insecurity as negative, and the others as neutral. To analyse the predominant words, we have eliminated all articles, prepositions, adverbs …

Before analysing news distribution, it is worth remembering that *Diário de Notícias* and *Público* are daily newspapers whereas *Expresso* is weekly. The amount of news produced by *Diário de Notícias* and *Público* throughout the period under analysis does not differ much, so it was decided to represent them together, to be easier to visualize. It can be

seen in the figure 3 that the coverage of the pandemic made by the *Expresso* differs from *Diário de Notícias* and *Público*.

Figure 3: Number of news
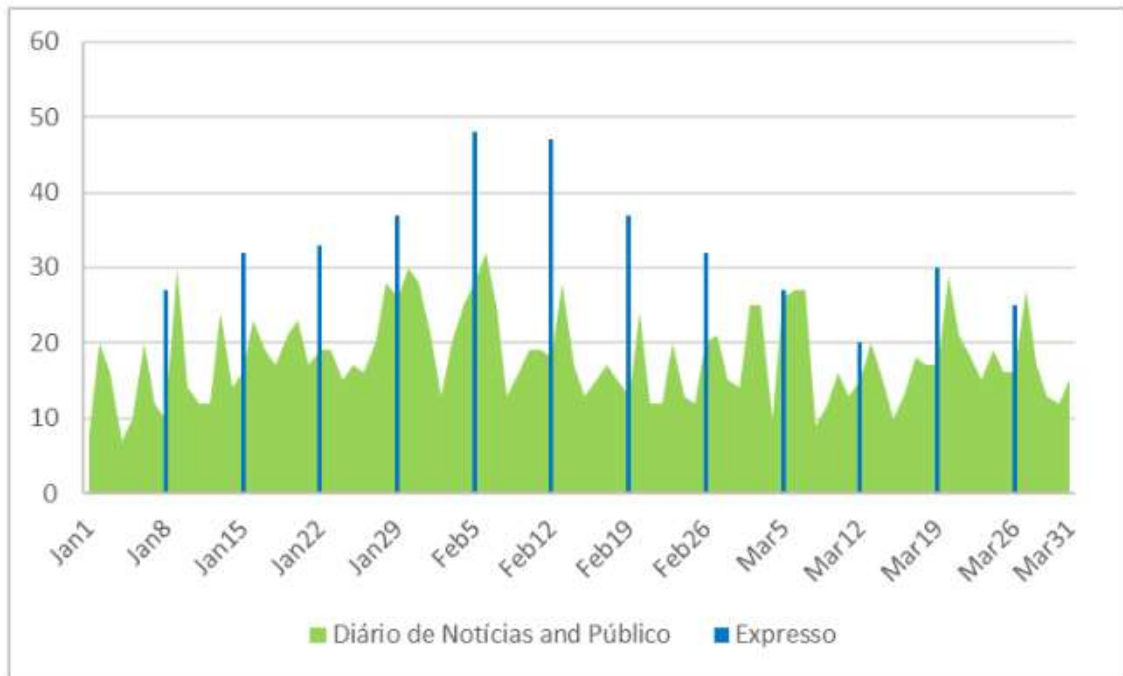
Source: Original

The peak of *Expresso* was reached in early February (more specifically February 5th and February 12th), while other newspapers had several news peaks. *Expresso* captures what is happening in society, fears, challenges, doubts about the present, but also about the future. As a result, in these two weeks, it does not focus on one theme, but addresses several social issues. We identified three main themes: health and vaccines, government policies and decisions, and economy.

Some examples of health and vaccines headlines: Pharmacists blame European governments for delays (*Farmacêuticas culpam Governos europeus pelos atrasos*); Vaccines, utopias, beliefs and the good Dr. Francisco Ramos (*Vacinas, utopias, crendices e o bom Dr. Francisco Ramos*); The vaccines (*As vacinas*); New vaccination plan coordinator ensures tighter rules (*Novo coordenador do plano de vacinação garante regras mais apertadas*); The month with the most deaths since 1918 (*O mês com mais mortes desde 1918*); Is the vaccination plan going well? (*O plano de vacinação está a correr bem?*)

Although news about government policies and decisions taken appear in fewer numbers, they are part of all editions. In these two weeks we can read these titles: They do not govern themselves nor let themselves be governed… (*Não se governam nem se deixam governar…*); Government stress test (*Stress test ao Governo*); Costa (*Portuguese Prime Minister*) asks for consensus to avoid 4th wave (*Costa pede consensos para evitar 4ª vaga*).

The economy is a constant concern, some examples of *Expresso* headlines from the February 5th and 12th editions are: A country adrift (*Um país à deriva*); Economy resists better to second lockdown (*Economia resiste melhor ao segundo confinamento*); Covid takes Portuguese tourism to its lowest values for 27 years (*Covid leva o turismo português aos valores mais baixos desde há 27 anos)*; 2021 the year of all uncertainty in exports (*2021 O ano de todas as incertezas nas exportações*)

4.1 The tone

When we think about this pandemic, it is natural to have some negative thoughts. However, there were also positive aspects during the pandemic. The reduction of pollution, measures to prevent the spread of covid-19 were quickly identified, or demonstrations of solidarity are some examples.

News headlines reflect the feelings that were felt during the pandemic. As mentioned before, the tone of the news was classified into: positive, negative or neutral. Some examples of each tone can be found in the table 2.

Table 2: News Tone – Examples

Tone	Headlines
Positive	• United Kingdom, Portugal and European Union. A moment of optimism and renewal (Reino Unido, Portugal e União Europeia. Um momento de otimismo e renovação) • A hundred years of wine that the pandemic has not stopped (Cem anos de vinho que a pandemia não travou) • Portugal responded well and pragmatically to the pandemic (Portugal respondeu bem e com pragmatismo à pandemia)
Neutral	• WHO recommends an interval of 21 to 28 days between the two doses of the covid-19 vaccine (OMS recomenda intervalo de 21 a 28 dias entre as duas doses da vacina da covid-19) • It is all at stake in health and politics (Está tudo em jogo na saúde e na política)

- The pandemic showed that knowledge must serve the community (A pandemia evidenciou que o conhecimento deve servir a comunidade)

Negative
- National Health Service near the red line (Serviço Nacional de Saúde perto da linha vermelha)
- Nine months later everything is... worse (Nove meses depois está tudo... pior)
- Hotels in agony call for urgent help to survive (Hotéis em agonia pedem ajuda urgente para sobreviver)

Source: Original

Much of the news is informative, so it is no wonder that 80% are classified as neutral sentiment. In the current crisis situation, there is no balance between positive and negative news. Fear, panic, uncertainty and mistrust, and despair are reflected in news headlines. As a consequence, news with negative feelings is approximately double the positive news. In the *Expresso* this discrepancy is greater, reaching almost triple. Although there is little positive news, neutral news which do not communicate any kind of feeling predominate (Figure 4).

Figure 4: The tone of the headlines
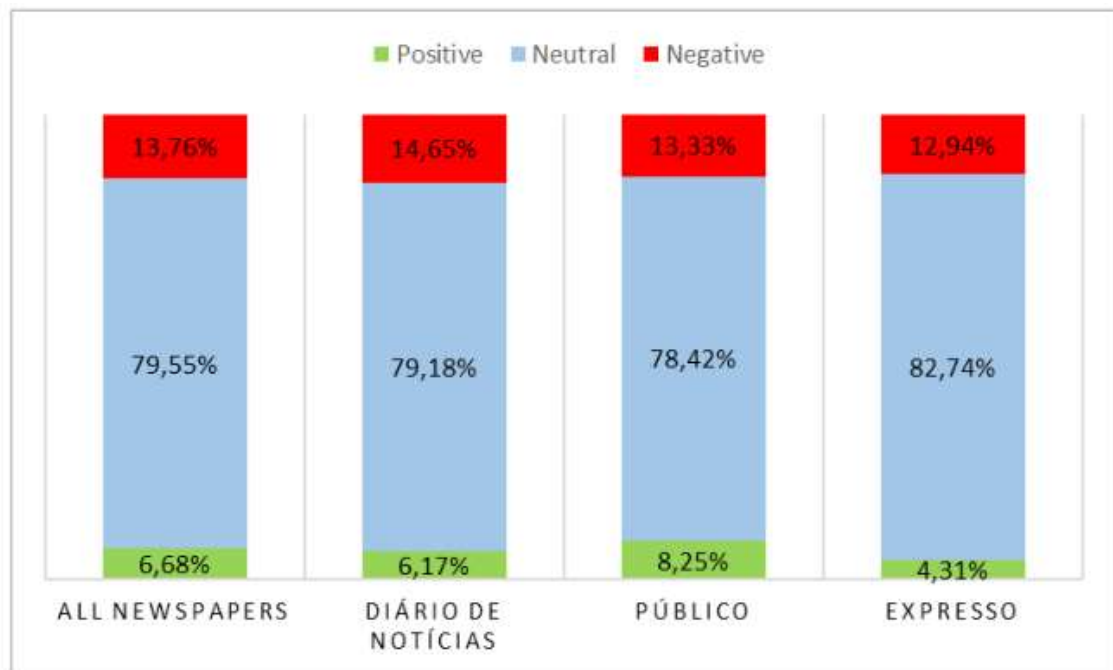
Source: Original

4.2 The numbers

While numbers are a relevant communication element, they only appear in less than 11% of the headlines related to the pandemic, which corresponds to 211 news. Making a

comparative analysis of newspapers, *Expresso* is the one with the lowest headlines with numbers (Figure 5).

Figure 5: Percentage of headlines with numbers.
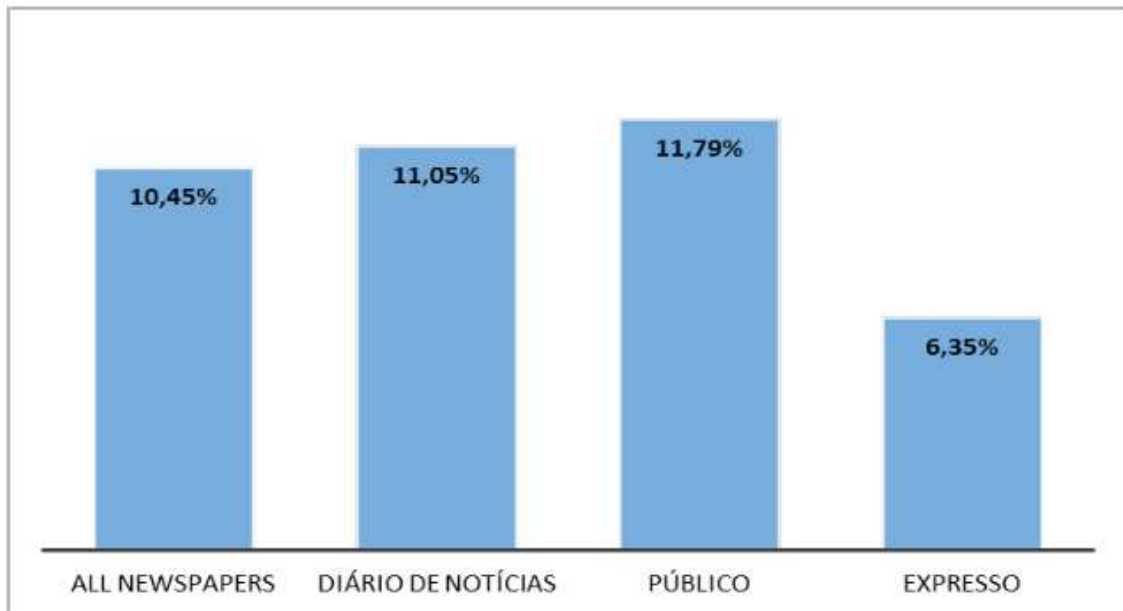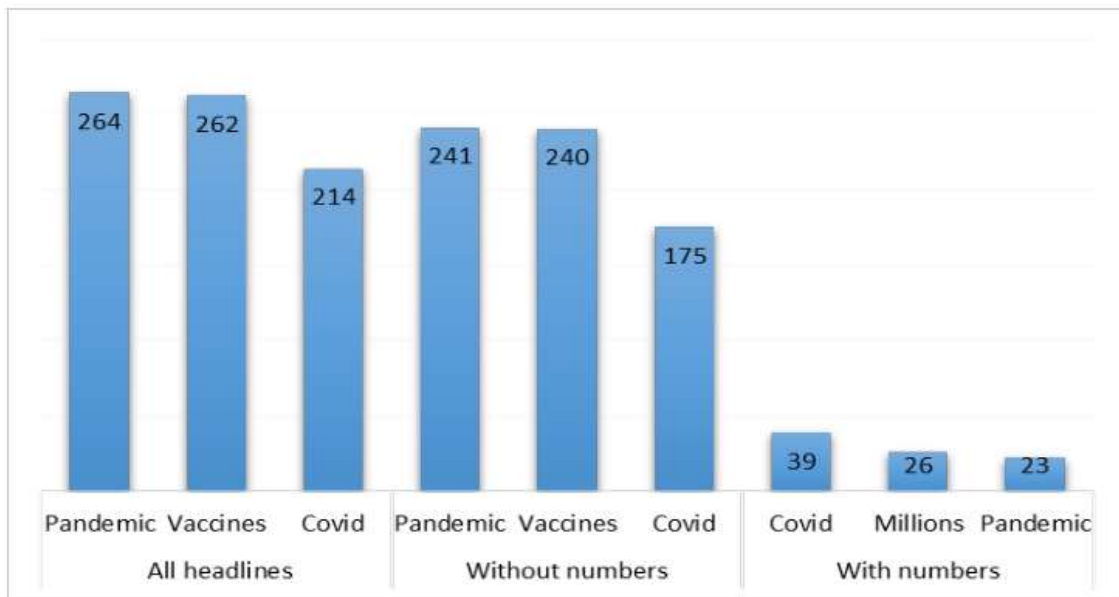

Source: Original

In what context are numbers chosen to be part of headlines? What message do numbers communicate? When analysing the presence of the numbers and the tones of news, it is observed that the choice to use numbers is related to the tone of the news. *Expresso* is once again the exception. In this newspaper, numbers are used to draw attention to negative as well as positive messages, whereas in other newspapers, the numbers are more associated with negative feelings than positive ones.

4.3 The predominant words

In the 2020 headlines analysed, which were related to the pandemic, the most common words are: pandemic (*pandemia*), vaccines (*vacinas*) and covid (Figure 6). There are differences when analysing news with and without numbers. In titles with numbers or numerical information, the most frequent words are covid, millions (*milhões*) and pandemic (*pandemia*). The number of infected, dead and recovered is usually news, so the words covid and pandemic are associated with news with numbers. But often the words covid and millions are in the same title. For example, Santander patronage has adapted, innovated and dedicated millions to the fight against covid-19 (*O mecenato*

Santander adaptou-se, inovou e dedicou milhões ao combate à covid-19 -Diário de Notícias 02/01/2021); 1.8 million deleted the StayAway Covid app (*1,8 milhões apagaram a StayAway Covid – Público 15/01/2021*); Local authorities spent more than 166 million on covid in seven months (*Autarquias gastaram mais de 166 milhões com a covid em sete meses – Diário de Notícias 13/01/2021*); or National Health Service expects 37 million needles and syringes covid-19 (*SNS espera 37 milhões de agulhas e seringas covid-19 – Expresso - 12/02/2021*)

Figure 6: The three most frequent words in headlines.

Source: Original

Conclusion

Our analysis highlights the exceptional character of this pandemic situation in which the scientific lack of knowledge of the infectious characteristics of the virus has placed readers heavily dependent on the constantly updated narratives of different professionals: journalists, politicians and specialists.

In this first approach, to understand how the pandemic was covered in Portugal by leading newspapers, we first analyse the covers of newspapers *Diário de Notícias* and *Público*. In a second moment, we look at the headlines of Diário de Notícias, *Público* and *Expresso*.

We highlight how the pandemic has imposed itself on the front pages, sometimes becoming the only subject to highlight on the day. Pages 100% dedicated to this topic tend to be more frequent during the state of emergency, until early May.

There is consensus on measures taken by the government, at least at an early stage. This is why most news has a neutral tone, it is neither positive nor negative. The varied iconography, photographs, drawings and infographics, as well as the use of numbers, contributed to that consensus around the government measures adopted. Though as the pandemic progresses, some divergent voices began to emerge. The national issues are valued, expelling the international theme from its highlights. Isolation, confinement and the new daily life of the Portuguese confined to their homes are the subject of the news. Politicians, in particular members of government, parliament and other institutions, were no longer the protagonists. They were replaced by social issues.

As the months went by, the economic theme began to gain prominence, since it began to be a matter of concern. Economic and social issues are closely related, and both appear frequently in newspaper headlines. Vaccines were also a hot topic, being one of the most used words in headlines.

Graphs to represent the evolution of the pandemic are a constant presence. These graphics are usually small in size. However, sometimes, when a summary was made, or a milestone was reached the graphic representations became news.

The little use of the numerical or statistical element allows us to understand that it is not a distinctive element on the front page or in the headlines of the written press. Although numerical information is rarely used, when it is used it often highlighted positive or negative information. It's not often that numbers appear in headlines classified as neutral.

REFERENCES

Alexandre, I. (2020, 28 de Abril). A covid-19 e o jornalismo guiado por dados. *Público* https://www.publico.pt/2020/04/28/opiniao/opiniao/covid19-jornalismo-guiado-dados-1914216.

Barros, J. L. e Silvestre, C (2020). Estatísticas e Jornalismo em Tempo de Pandemia. In R. Paulino & C. Rodrigues-Hidalgo (eds.), *Jornalismo Sociedade e pandemia* (pp. 107-134). Ria Editorial.

Bauer, M. & Schoon, I. (1993). Mapping variety in public understanding of science. *Public Understanding of Science*, *2*(2), 141–155.

Bradshaw, P. (2018). Data Journalism Teaching, Fast and Slow. *Asia Pacific Media Educator*, *28*(1), 55-66.

de Haan, Y., Kruikemeier, S., Lecheler, S. & van der Nat, R. (2017). When Does an Infographic Say More Than a Thousand Words? *Journalism Studies*, *19*(9), 1293-1312.

DGS - Direcção Geral de Saúde (2020). *Ponto de Situação Atual em Portugal*. https://covid19.min-saude.pt/ponto-de-situacao-atual-em-portugal/.

Dur, B. (2014). Data visualization and infographics in visual communication design education at the age of information. *Journal of Arts and Humanities*, *3*(5), 39–50.

Egan, M., Acharya, A., Sounderajah, V., Xu, Y., Mottershaw, A., Philips, R. Ashrafian, H. & Darzi A. (2021). Evaluating the effect of infographics on public recall, sentiment and willingness to use face masks during the COVID-19 pandemic: a randomised internet-based questionnaire study. *BMC Public Health*, *21*, 367. https://doi.org/10.1186/s12889-021-10356-0.

Fidalgo, A. (2015). *A relevância atual da infografia nos jornais Público e The Times* [Tese de Mestrado não publicada]. Instituto Politécnico de Tomar.

Garcia, J. L. (2009). *Tecnoimagem, iconografia e cultura visual. Estudos Sobre os Jornalistas Portugueses, Metamorfoses e encruzilhadas no limiar do século XXI.* Imprensa de Ciências Sociais.

Garcia, R., Rosa M. J., & Barbosa L. (2017). *Que número é este? Um guia sobre estatísticas para jornalistas*. Fundação Francisco Manuel dos Santos.

Gradim, A. (2000). *Manual de Jornalismo Livro de Estilo do Urbi et Orbi.* http://www.bocc.ubi.pt.

Guterres, A. (2020). *Secretary-General's message 2020.* United Nations. https://www.un.org/en/observances/statistics-day/messages.

Hyejin, P., Biddix, P., & Park, H. (2021). Discussion, news information, and research sharing on social media at the onset of Covid-19. *Profesional de la información, 30*(4), 67-77.

Jacques, E. (2014). *Propagandas uma análise estrutural*. Antígona.

Lima, R. C. (2015). O que é a infografia jornalística? *Revista Brasileira de Design da Informação*, *12*(1), 111-127.

Link, H. (2021). Information avoidance during health crisis: Predictors of avoiding information about the COVID-19 pandemic among german news consumers. *Information Processing & Management*, *58*, 1-13. https://doi.org/10.1016/j.ipm.2021.102714.

Lopes, R. (2021). News consumption and risk perception of Covid-19 in Spain - Seguimiento informativo y percepción del riesgo ante la Covid-19 en España. *Comunicar*, *66*, 71-8.

Medina, J. L.B. (2020). Géneros jornalísticos: uma questão de género. *VIII Simpósio da Pesquisa em Comunicação, Intercom, Sociedade Brasileira de Estudos Interdisciplinares em Comunicação.* http://intercom.org.br/papers /viii-sipec/gt05/40-%20Jorge%20Lellis%20-%20trabalho%20completo.htm.

Medina, C. (2020). Apontamentos do Espanto na crise Covid 19. *Revista Longeviver II*(7), 4-8.

Montejo, G. M., & Adriano, T. Q. (2018). A critical discourse analysis of headlines in online news portals. *Journal of Advances in Humanities and Social Sciences*, *4*(2), 70-83.

Pereira, S. (2015). *A Matemática na Imprensa Portuguesa.* [Tese de Doutoramento não publicada]. Universidade do Porto.

Pinto, S. (2018). *Da impressão interatividade: Usabilidade de infografias impressas e interativas.* [Tese de Mestrado não publicada]. IPL - Escola Superior de Comunicação Social.

Serrano, E. (2006). *Jornalismo Político em Portugal- A Cobertura de eleições presidenciais na imprensa e na televisão (1976-2001)*. Edições Colibri/ Instituto Politécnico de Lisboa.

Sjafiie, S. S. L., Hastjarjo, S., Muktiyo, W., & Pawito. (2018). Graphic visualization in printed media: How does the use of technology influence journalism culture. *Jurnal Komunikasi: Malaysian Journal of Communication*, *34*(4), 373-385.

Silvestre C. & Meireles, A. (2021) Learning statistics using infographics: A powerful tool to engage communication students in learning activities. In INTED2021 (ed), *15th International Technology, Education and Development Conference Proceedings* (pp. 7074-7081). INTED. https://doi.org/10.21125/inted.2021.

Treadwell G., Ross T., Lee A., & Lowenstein J.K. (2016). A numbers game: Two case studies in teaching data journalism. *Journalism and Mass Communication Educator*, *71*(3), 297-308.

UNESCO 2021 *Media and information literate citizens: think critically, click wisely!* https://unesdoc.unesco.org/ark:/48223/pf0000377068.

Zamin, A. (2014), Jornalismo de Referência: o conceito por trás da expressão. *Revista Famecos: Mídia, Cultura e Tecnologia*, *2*(3), 918-943.