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Compositional representation (CoDa) of the Agenda-setting of the political opinion makers in the main Spanish media groups in the 2015 general election

Abstract

This article presents an innovative proposal to represent the agenda-setting of the main Spanish media groups (RTVE, Prisa, Vocento, Unidad Editorial, COPE, Atresmedia, Planeta, Godó, Mediaset España and Libertad Digital) in the context of the 2015 Spanish general election. The study uses a quantitative method based on a content analysis of the main Spanish radio and TV programmes with political opinion spaces and the main newspapers linked to these media groups. Furthermore, the compositional methodological approach the CoDa-biplot is used to visualise and emphasise the relative salience of the components under study. The article not only provides a mapping of the agenda of the main media groups in the electoral context, but it also reaches the representation of the effects of priming and the spiral of silence in the proportional study of the issues and senders of the agenda.

Keywords

Agenda-setting, biplot, compositional data, media groups, priming, spiral of silence.

1. Introduction¹

Measuring agenda-setting, developed from the media system of the different issues that occupy spaces of debate on the media stage, has traditionally been approached by statistical methods of absolute values at the service of correlating the pairing sender-issues. With over 400 empirical works on the AS theory published worldwide (McCombs, 2006), it has become one of the main tools used by communication science to study the media universe and its interaction with the different social actors that shape public opinion.

The traditional postulates of agenda-setting are based on the study of the hierarchisation of the issues the mass media addresses to determine the relative importance of the topics exposed to public opinion through reiteration and content positioning. This research applies compositional analysis (CoDa), as proposed by Blasco-Duatis et al. in the area of communication (2018), with the aim of surpassing Spearman's correlations and focusing interest on the relative salience of the parts of a whole (Aitchison, 1986). The study particularly focuses on the compositional biplot as a data visualisation tool that tells us which issues are prioritised, who their senders are and the relations between them, bearing in mind that the salient information is the relative volume of each issue for each sender.

The case study in this work is the AS proposed by the opinion makers² that participate in political debates on the main Spanish TV channels and radio stations and that write opinion articles in the main general information newspapers. The data is amalgamated into a global study to visualise the AS of the political opinion makers of the main Spanish media groups during the period of the Spanish general election held on 20th December 2015. With the media groups RTVE, Mediaset España, Atresmedia, Prisa, Unidad Editorial, Vocento, Godó, Libertad Digital, Planeta and COPE we approach a content analysis of the issues that aroused public opinion in the two-week period prior to the election (the electoral campaign) and the two-weeks after the election (the post-campaign), and these data are then visualised by means of the CoDa-biplot. This method also allows us to approach the representation of the effects of priming (based on associative-activation among a group of issues that end up being more influential than others) and the spiral of silence (the issues that are omitted and/or replaced by the logic derived from the hierarchy process of agenda-setting).

2. Media groups, agenda-setting and the effects of prioritisation/alienation

The current Spanish media system is structured on a small number of large media groups, which are subject to exhaustive control both in terms of the press and the audiovisual industry in a similar way to what has happened in neighbouring countries over the last decade, and which according to the academic Pascual Serrano (2010) can largely be explained by the following four precepts: i) a concentration typical of the media universe, which is based on a very limited range of large groups that dominate communication and culture; ii) a business logic structured by the processes of *financialisation* (massive debt

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² Opinion makers are understood to be the group of actors that are invited by the mass media in the context of media debate to participate by manifesting an idea or opinion (in particular on current affairs talk shows on TV or the radio or as columnists in the press).

backed by the capital markets) which calls for the homogeneity of these groups in their strategies and ideological view of the world; iii) a hegemonic disposition about the logics of mass social communication stemming from the financial internationalisation of the large groups and their associated investment funds; and last, iv) legislation that has looked for ease of application rather than to exercise real control.

At the beginning of the 1980s, the Dutch professor Cees Hamelink (1984) developed a seminal work on funding and international communication. The conclusion of this pioneering research was that the transnational information industry and the transnational banking system are highly oligopolistic, the first out of huge financial necessity and the second driven by big interests and informative needs (see Almirón, 2007). The first point that must be made regarding this scenario is that the sustained growth of the power of the markets over economic dynamics - fed by a neoliberal ideology of the financial elites' growing economic and political power - has brought about what Santamaría (2012) considers as the impasse of a business management model based on the 'stakeholder' - where control of the company is exercised internally by a Board of Directors and their managerial mandate - to one based on a type of 'shareholder' - where control is exercised externally by liberalised financial markets and where business logic centres on maximising the value of the capital invested. This phenomenon, known as financialisation in the economic literature, also explains what has happened in cultural industries - and particularly in the birth of the above- mentioned media groups - with their business restructuring processes fostered largely by the nature of the stock markets (Plihon & Ponsard, 2001).

Of the set of measures driven by the financial markets that have affected the Spanish media system, the most apparent are mergers and acquisitions, operations that especially appeal to 'increasing share value by taking advantage of the positive synergies of the merged companies' (Santamaría, 2012). The same author points out that in the Spanish context these operations have also impacted significantly on the pluralism of the media 'limiting the right of the population to access communication' (Zallo, 2011: 76), intervening in both the media agenda (very conditioned in a period of reduced advertising on the part of banks and the IBEX35 companies) and the working conditions of teams of professionals (in terms of restructuring and redundancies.)

This media concentration into a small, powerful line-up of media groups closely related to the financial sector also encourages a trend towards the homogeneity of both information and the ways it is presented. Under the same logic that there are topics, for example health and science, that are rarely assigned a specific space or independent coverage in the media sphere (Revuelta, 2006), there is another group of issues (that include politics and the economy, among others), that manage to monopolise and proliferate within the multiplicity of media formats in the system - for example, debates - accompanied by what some time ago was considered as an homogenising exercise designed to address 'a minimum common denominator of opinions for the general public' (Blasco-Duatis et al., 2017).

The main media outlets operating in Spain, which comprise the sample group in this research, can be divided into five groups depending on their ownership status: RTVE group, the state-owned public corporation; Atresmedia (including Planeta-DeAgostini), Mediaset España, Prisa and Vocento, all publicly traded companies; Godó group, owned exclusively by a single family; COPE group, owned mainly by the Spanish Episcopal Conference; and the groups Unidad Editorial and Libertad Digital which, although they have shareholders in common, work from independent group structures that belong entirely to foreign investment groups. And yet this enormous concentration of media outlets not only works against informative pluralism, but also in itself clearly outlines a two-party framework wherein two large media groups (Mediaset España and Atresmedia), majority shareholders in the two benchmark Spanish TV platforms, generated (according to data provided by

Infoadex³) not only more than 80% of the income from TV advertising in 2016 and more than 50% of the total audience (according to data from Kantar Media for 2016⁴), but also, together with Prisa and Mediapro, overwhelmingly controlled the contents market (series, films, rights to broadcast sports, and so on).

This contextualisation essentially describes the relationship established over time between the power elites (political, economic, business, etc.) and the media, a relationship characterized by mutual interdependence in their strategies to attain their own specific objectives: the first to ensure favourable media coverage, and the second to make sure that the issues chosen by the elites reach their audiences (Blumler & Gurevitch, 1995; Blumler & Kavanagh, 1999). More recently, the main research on this subject has challenged these precepts, demonstrating that the power elites, in particular in the political arena, are becoming increasingly dependent on the media as a consequence of *mediatisation*, a term that refers to the level of independence there is between the power elites and the media (Blumler & Kavanagh, 1999; Marcinkowski, 2014; Mazzoleni & Schulz, 1999; Strömbäck, 2008). It is precisely these correlations that define the confrontation between these forces, which are also subject to the projection of the media, that subsequently reaches society.

This homogenisation of the ideological view of the world as one of the determinant axes of the proliferation of media groups (Serrano, 2010) poses a direct question to communication science academics and, in particular, to those who study the procedures derived from the AS research model. By definition, the AS theory establishes that the media defines the cognitive map of society based on how people experience the world they live in (Lippman, 1922), fostering a strong correlation between the emphasis the mass media places on certain matters and the importance the public attaches to them (Cohen, 1963; McCombs & Shaw, 1972). The complexity of social events subject to a non-stop barrage of information has overwhelmed citizens in terms of the way they see the world around them, leading the mass media to create a link between individuals and the world, providing them with a 'second-hand reality structured by the information journalists provide about these events and situations' (McCombs, 2006: 24).

In this context, the salience of certain issues in keeping with citizens' concerns makes them focus their attention, thoughts and actions on these issues, thus conferring the first level of public opinion forming. These issues are precisely the ones that society must think about and form an opinion on and are especially important in AS, describing the process known as thematisation. As a central element in the theoretical study of AS, this process has lead several theorists to base their studies on the genesis of the concept (Luhmann, 1973; Shaw et al., 1977; Lang & Lang, 1981; Dearing & Rogers, 1996; McCombs, 2006; Sábada, 2008). All of them agree that the importance of AS is defined from the informative hierarchy of the issues that are subject to media interest and presented to the public. The presence or absence of an issue on the agenda will determine the priority of interests and give preference to what is put forward for public debate. The 'prioritised' issue will thus be incorporated into the order of the day in the public space in a high-profile context which, in the words of (Marletti, 1982: 210) transforms 'a thematised content into media news.'

The mass media has been shown to be an extremely powerful tool for shaping the dominant mentality in contemporary societies. It is here, in how different actors attempt to influence the media agenda, where agenda-setting has evolved into agenda-building, involving not only a media hierarchy process before the public, but also the capacity of the

³ Access to the Infoadex study 2016: <http://bit.ly/2lzBiak>

⁴ *Kantar Media* is the data investment management arm of the British multinational company WPP (*Wire and Plastic Products*) and one of the largest information and consultancy groups in the world: <https://www.kantarmedia.com/es>

elites to earn media attention and use it as a stage for their respective agendas, managing to get their proposals and objectives championed by them (Valera Ordaz, 2014). This interaction between the power elites (politicians, business people, the media, and so on) is what makes Hallin & Mancini (2004: 86) include Spain in the archetype *polarised pluralism*, which they describe in their comparative study of media models as where an historical press tradition ends to make way for ideological battles and a tendency for media groups to support a particular political party. It is a framework which also denotes a high degree of correspondence between the structure of the media system and the power systems (Hallin & Mancini, 2004: 25).

The mass media plays a pivotal role in exercising ideological problematisation in the public sphere and on public opinion. As we have seen, it is not so much the media's direct influence on the point of view and opinions of citizens, but the power they wield to establish the issues put forward for debate. One of the most important conceptualisations of the effects produced by the mass media on public opinion in terms of this study is the priming effect. This perspective, which has its origins in cognitive psychology and was applied to the AS theory later, posits that the power of the media is such that it is capable of establishing the criteria that serve as receptors to develop the capacity to pass judgement on the public reality (Iyengar & Kinder, 1987). Priming is considered as closely related to AS, mainly because it explains how the public shapes its opinions based on the most high-profile events, which correlates directly with 'the ability to bring examples and associations to mind' (Tversky & Kahneman, 1973: 208). The concept was originally defined from the prioritisation or prominence given to a set of issues to serve as benchmarks to evaluate the different matters present in public life. Iyengar & Kinder (1987: 4 and 114), the intellectual fathers of transferring the concept to the area of political communication, point out that the importance of the process of prioritising certain issues for the public lies in how it manages to isolate minority opinion and reinforce the salient, or benchmark, issues.

At this point, the theory of the spiral of silence posited by Noelle-Neumann (2003) must be mentioned because it is based on this principle of alienating minority views and is also linked with the hierarchisation processes practiced in AS, where certain issues are omitted or prioritised. The spiral of silence is based on four premises: first, that alienation is perceived as an innate fear in humans; second, that society threatens to isolate citizens that leave the mainstream; third, that this fear leads citizens to ascribe to dominant trends in public opinion; and fourth, that this all has an adverse effect on freedom of expression (Noelle-Neumann, 2003). Given this fear of rejection and social alienation, citizens are embroiled in a constant need to check what opinions and ways of behaving are acceptable or rejected to determine their own conduct.

In short, this research takes the fundamentals of the AS theory, in addition to the effects of priming and the spiral of silence, to mediate the compositional representation of the AS of the main Spanish media groups during the 2015 general election. The singular nature of this proposal, not only in that it represents the AS of the main Spanish media groups but also in that it is based on a new methodological framework little explored in this area, means that the evolution from a traditional focus for analysing content categories in the media (absolute and correlation methods) to a compositional method that prioritises the relative differences between sender and content categories should be taken into special consideration.

3. Traditional approach to analysing content categories in the media.

As indicated by Blasco-Duatis et al. (2018), the very nature of the AS theory has meant that content analyses have generally focused on the relative or comparative importance of some contents over others. It is assumed that some media or social actors are more active than

others regarding certain issues, leading to a general study of the relative volume of information about issues to the detriment of the detailed analysis of content. In most cases, this is evidenced in the formulation of hypotheses and research questions expressed in comparative, relative or competitive terms. Examples of research questions that clearly allude to a comparative focus about agenda-setting in different media are plentiful: ‘The journalistic *relevance* of international events may be the result of an AS process among the media’ (Golan, 2006); ‘What are the issues *emphasized* in the online public agenda, the media agenda and the policy agenda?’ (Luo, 2014: 1293); ‘What issues do the candidates in the televised campaign debates *emphasize*?’ (Trilling, 2014), ‘The MH370 incident quickly *dominated* the news agenda across many countries’ (Cui and Wu, 2017: 2), ‘Does the media agenda have *more influence* than the opposition parties over setting parliamentary control questions?’ (Vliegthart et al., 2016), ‘The assumption that news media *emphasize and highlight* certain events’ (Weimann-Saks et al., 2016: 730), ‘What were the *most important* attributes of the Iraq War in the newspaper coverage of the United States, Mainland China, Taiwan and Poland?’ (Guo et al., 2015: 349), ‘How did the news agendas of the Sunday Times and Rapport differ on their front pages, with regard to their *lead stories*?’ (Naudé & Froneman, 2003: 87), ‘What were the *most frequent* policy issues (issue agenda) discussed by the media regarding each object nation’ (Besova & Cooley, 2009: 225). The italics are ours.

The simplest way to assess similarity among senders of political information according to the relative importance of the content categories they send (issues) and to determine which of these categories contribute to their differences, is to compare the frequencies of the top contents (e.g., author et al., 2017; Guo et al., 2015; Jungherr et al., 2016).

Table 1 contains fictional data for six senders (E1 to E6) and their top three content frequencies (C1 to C5). For the sake of simplicity, only the similarity of E1 to all the other senders is assessed. To all intents and purposes, E2 looks identical to E1, even though the way the data are presented in absolute terms makes this difficult to discern at first glance. E3 also seems to be identical to E1. The first two categories in E4 and E5 are the same as in E1, but they differ in the content ranked third, while there is nothing to indicate whether one or the other is more dissimilar from E1. E6 has the same top three issues as E1, albeit with different frequencies. A key question misleading how a table like this is interpreted is that the different senders are compared based on a different set of issues. In other words, we do not know the frequencies of the omitted issues, which may be just marginally below the frequency of the third issue or may have a completely insubstantial frequency.

Table 1. Fictional top3 comparison of the six senders across the content categories C1 to C3 based on absolute frequency

	E1	E2	E3	E4	E5	E6
First	C1-150	C1-50	C1-150	C1-150	C1-150	C1-185
Second	C2-90	C2-30	C2-90	C2-90	C2-90	C3-60
Third	C3-60	C3-20	C3-60	C5-60	C4-60	C2-55

Source: Compiled by the author

The upper part of Table 2 is a comparison of the six senders based on the entire set of content categories that appear in the top three lists of at least one sender. In this way, we ensure that mutual comparisons among senders are made on a common basis. For ease of interpretation, the central part of the table contains proportions instead of absolute frequencies. Some authors prefer to use rankings (e.g., Besova & Cooley, 2009; Cui & Wu, 2017; Lim, 2011; Ragas & Kiouis, 2010), as shown in the lower part of the table.

Table 2. Fictional full comparison of the six senders across content categories C1 to C5 based on absolute frequencies (top), relative frequencies (centre) and rankings (bottom)

	E1	E2	E3	E4	E5	E6
C1	150	50	150	150	150	185
C2	90	30	90	90	90	55
C3	60	20	60	50	50	60
C4	45	15	10	10	60	45
C5	15	5	50	60	10	15
C1	0.417	0.417	0.417	0.417	0.417	0.514
C2	0.250	0.250	0.250	0.250	0.250	0.153
C3	0.167	0.167	0.167	0.139	0.139	0.167
C4	0.125	0.125	0.028	0.028	0.167	0.125
C5	0.042	0.042	0.139	0.167	0.028	0.042
C1	1	1	1	1	1	1
C2	2	2	2	2	2	3
C3	3	3	3	4	4	2
C4	4	4	5	5	3	4
C5	5	5	4	3	5	5

Source: Compiled by the author

From the second part of *Table 2* it can be deduced that sender 2 is identical to sender 1. On the other hand, sender 3 is markedly different. In comparison to sender 1, sender 3 has a threefold increase in C5 ($0.139 / 0.042 = 3.33$) and in comparison to sender 3, sender 1 has a fourfold increase in C4 ($0.125 / 0.028 = 4.50$).

It is also apparent that sender 4 is more different from sender 1 than sender 5 is. Compared to sender 1, sender 4 has a fourfold increase in C5 ($0.167 / 0.042 = 4.00$) and compared to sender 4, sender 1 has a fourfold increase in C4 ($0.125 / 0.018 = 4.50$). This is especially relevant in terms of the spiral of silence, which focuses on issues that form a minority content.

Regarding sender 6, the differences with respect to sender 1 seem sizeable in absolute terms, but not so much in relative terms, because they occur in content categories that have high proportions in both senders ($0.514 / 0.417 = 1.23$ and $0.250 / 0.153 = 1.64$). Thus, if the research questions focus on the relative importance of the contents, then this must be duly taken into consideration when analysing the data.

While the second part of *Table 2* could constitute a solid focus of analysis and similar tables are often used (e.g., Blasco-Duatis, 2017; Frederick et al., 2015; Luo, 2014; Min, 2004; Naudé & Froneman, 2003; Rogstad, 2016; Rubio-García, 2014), there is a general lack of interest in how content categories contribute to generating differences among senders, be they relative or absolute.

Such differences (or similarities) are often assessed by means of either Spearman's rank correlations among senders based on the lower part of *Table 2* (e.g., Conway et al., 2015; Cui & Wu, 2017; Lim, 2011; Luo, 2014; Ragas & Kioussis, 2010; Weimann-Saks et al., 2016) or other types of rank correlations (Min, 2004). This is tantamount to taking neither relative or absolute differences into consideration, but only the hierarchical order, thus wasting any other information. For instance, according to Spearman's correlations, in *Table 3* sender 3 is as similar to sender 2 as to sender 4.

Table 3. Spearman's rank correlations

	E1	E2	E3	E4	E5	E6
E1	1,000	1,000	.900	.700	.900	.900
E2	1,000	1,000	.900	.700	.900	.900
E3	.900	.900	1,000	.900	.700	.800
E4	.700	.700	.900	1,000	.600	.500
E5	.900	.900	.700	.600	1,000	.700
E6	.900	.900	.800	.500	.700	1,000

Source: Compiled by the author

4. Compositional analysis

Compositional Data analysis (CoDa) is the standard statistical method used when data only contain information about the relative importance of the parts of a whole. The CoDa tradition started with Aitchison's seminal work (1982, 1986) on chemical and geological compositions where only the proportion of each part or component is of interest, since absolute amounts are irrelevant and only tell about the size of the chemical or soil sample (e.g., Buccianti et al., 2006). Nowadays, CoDa spans almost all the hard sciences and has started to be used in several fields of the social sciences, such as education (Batista-Foguet et al., 2015), the economy (Fry, 2011), marketing (Vives-mestres et al., 2016), accounting (Linares-Mustarós et al., 2018), tourism (Ferrer-Rosell & Coenders, 2016), values (van Eijnatten et al., 2015), social networks (Kogovšek et al., 2013), time use (Martín-Fernández et al., 2015a) and election studies (Egozcue & Pawlowsky-Glahn, 2011; Liscano Fierro & Ortiz Rico, 2017). As far as we are aware, up to now CoDa has only been applied once to the analysis of the agenda-setting of political communication and the media (Blasco-Duatis et al., 2018). Content analysis in the study of the media and media groups and the analysis of the AS established in the communication of these media, pose similar problems in all respects to those encountered in chemical and geological analyses. Absolute data are irrelevant and mainly indicate the overall popularity of the sender or the content. In this sense, only the proportions of each content category or the relative size of one type of content in relation to another are truly informative.

In the last three decades, CoDa has provided a standardized toolbox for statistical analyses whose research questions are concerned with the relative importance of magnitudes. Dedicated user-friendly software has started to appear (van den Boogaart & Tolosana-Delgado, 2013; Palarea-Albaladejo & Martín-Fernández, 2015; Thió-Henestrosa & Martín-Fernández, 2005), as well as accessible handbooks (van den Boogaart & Tolosana-Delgado, 2013; Pawlowsky-Glahn & Buccianti, 2011; Pawlowsky-Glahn et al., 2015) What follows is a brief outline of the method.

Let composition \mathbf{x} be a real positive vector:

$$\mathbf{x} = (x_1, x_2, \dots, x_D) \quad \text{with} \quad x_j > 0 \quad \text{for all } j = 1, 2, \dots, D, \quad (1)$$

where D is the number of components, in our case, content categories. To focus on the relative importance of the components, \mathbf{x} is *closed* to a unit sum so that after its closure \mathbf{z} contains proportions of each content category.

$$\mathbf{z} = C(\mathbf{x}) = \left(\frac{x_1}{S}, \frac{x_2}{S}, \dots, \frac{x_D}{S} \right) = (z_1, z_2, \dots, z_D)$$

with $z_j > 0$ for all $j = 1, 2, \dots, D$; $S = \sum_{j=1}^D x_j$; $\sum_{j=1}^D z_j = 1$. (2)

Because of the restriction of fixed sum, most traditional statistical tools, such as mean, correlation and distance, are to a greater or lesser extent meaningless when applied to \mathbf{z} .

A proper measure of the centre of a sample of n compositions is the closed geometric mean. If g_j is the sample geometric mean of the component z_j for all n compositions, the centre is expressed as $C(g_1, g_2, \dots, g_D)$.

Euclidean distances among individual compositions (senders) are also meaningless (Aitchison et al., 2000). Euclidean distance considers that the pair of proportions 0.01 and 0.02 are as mutually distant as 0.11 and 0.12, while in the first pair the difference is 100% and in the second it is less than 10%.

4.1. Transformations, association and distance

The most common CoDa approach is to express the original composition of D components in log-ratios among components (Aitchison, 1986; Egozcue et al., 2003). The main arguments for log-ratios are that they constitute a natural way of distilling the information about the relative size of components and form the basis for defining association and distance in a meaningful way. Log-ratios may, for instance, be computed among each part and the geometric mean of all the components, in the so-called *centred log-ratios*:

$$\ln \left(\frac{z_j}{\sqrt[D]{z_1 z_2 \dots z_D}} \right)$$

with $j = 1, 2, \dots, D$. (3)

Aitchison's distance between two senders' compositions \mathbf{z} and \mathbf{z}^* considers that zero distance corresponds to identical content proportions and that two senders are more distant from each other when the difference between their log-ratios is likewise larger. Aitchison's distances can be expressed as Euclidean distances calculated not from the original composition, but from the centred log-ratios.

$$d(\mathbf{z}, \mathbf{z}^*) = \sqrt{\sum_{j=1}^D \left(\ln \left(\frac{z_j}{\sqrt[D]{z_1 z_2 \dots z_D}} \right) - \ln \left(\frac{z_j^*}{\sqrt[D]{z_1^* z_2^* \dots z_D^*}} \right) \right)^2}$$
(4)

Using log-ratios attaches greater importance to differences in content categories with low proportions.

4.2. Replacement of zeros

As is well known, calculating log-ratios implies that \mathbf{z} cannot contain zero values. If the \mathbf{z} vector contains zeros, they must be replaced beforehand (Martín-Fernández et al., 2011). When, like in this case, the data are counts of frequencies, the common framework for replacing the zeros is the *Bayesian-multiplicative approach* (Martín-Fernández et al., 2015b; Pierotti et al., 2009) In the Bayes-Laplace's rule, the z values are replaced with:

$$z'_j = \frac{1}{S + D}, \text{ for } z_j = 0 \quad (5)$$

Non-zero \mathbf{z} values are reduced by means of the so-called multiplicative replacement to preserve the unit sum and the ratios among non-replaced components (Martín-Fernández et al., 2003):

$$z'_j = z_j \left(1 - \sum_{z_j=0} z'_j \right), \text{ for } z_j > 0 \quad (6)$$

The fact that zero replacement methods assume that most of the values are greater than zero must be considered. For alternative treatment methods for data with prevalent zeros see Greenacre (2011).

4.3. The CoDa biplot

Like standard data, compositional data require visualization tools to help researchers interpret large data tables with various senders and many content categories. To this end, Aitchison (1983) extended the well-known principal component analysis procedure to the compositional case. The extension boils down to submitting centred log-ratios (3) to a standard principal component analysis based on the covariance matrix. Such is the case that, once the zeros have been replaced and the log ratios calculated, any programme or software package capable of carrying out a principal component analysis based on the covariance matrix can be used.

Together with Gabriel's (1971) biplot, which represents cases and variables together in a principal component analysis, this served as the basis for Aitchison and Greenacre (2002) developing CoDa biplots.

A CoDa biplot can be understood as the most accurate representation possible of a compositional table in two dimensions. As in standard principal components, overall biplot accuracy can be assessed from the percentage of explained variance for the first two dimensions. More specifically, the form biplot optimises the representation of Aitchison's distances among senders. The content categories appear as rays emanating from a common origin and senders appear as points. The interpretation is as follows (see Aitchison & Greenacre, 2002; van den Boogaart & Tolosana-Delgado, 2013; Pawłowsky-Glahn et al., 2015 for further details):

1. Distances between two points are approximately proportional to Aitchison's distances (4) between the two senders. Senders with similar content compositions appear close together.
2. The lengths of the content category rays are proportional to the quality of the representation of contents in the two-dimensional space, whose average across all the contents is the percentage variance explained by the first two dimensions. Unlike in the classic biplot, the angles between the rays have no interpretation.
3. The orthogonal projection of the senders in the direction defined by a ray shows an approximate ordering of the importance of that content category for each sender and can be used to show how the content category contributes to differentiating senders.
4. The origin of all the rays is both the coordinate centre and the geometric mean. A sender close to this centre behaves like the geometric average of all the senders with respect to their content share.

In this article, we use the biplot as a visualisation technique to represent the relations between senders and contents, using the above-mentioned rules of interpretation. Obviously, principal component analysis can also be used as a data reduction technique, and the coordinates of the senders on the dimensions can be used as variables in later statistical analyses. In this case, like in standard principal components, the statistical analyses are interpretable to the same extent the dimensions are and each dimension must be interpreted from the coefficients of their associated eigen vector. Positive coefficients of a content in the eigen vector corresponding to a dimension indicate that the coordinate of the sender on the dimension tends to increase when the relative importance of the content likewise increases.

For all the analyses we use the functions `prcomp` and `biplot` of the R programme, but once the data is transformed any statistical programme that allows for extracting principal components from covariance matrices will give identical results, as mentioned above.

5. Content analysis

To obtain the visualization (mapping) of the AS of the opinion makers of the main Spanish media groups during the period of the Spanish general election in 2015, we use a mixed methodology based on content analysis (Berelson, 1952; Krippendorff, 2004; Wimmer et al., 2006) and CoDa analysis in the area of communication (Blasco-Duatis et al., 2018). Regarding the content analysis, the set of media groups selected for this study were subject to the following delimitations:

1. Delimiting the time: The study focuses on the the 2015 Spanish general election, and more specifically on the 30-day period from the beginning of the electoral campaign on 4th December 2015 to 4th January 2016, which were the two weeks prior to and immediately following the election held on 20th December 2015). A balance is thereby obtained between the analysis of the days of the electoral campaign itself and the days of the post-electoral campaign, omitting the day of the election itself due to the media groups altering their standard programming on that day.
2. Delimiting the space: The media groups with different types of media (TV channels, radio broadcasters and/or the press) with integrated coverage across the whole country that imparted general information (or thematic information about political opinion) and with political opinion/discussion spaces were selected. To ensure the reliability of this choice, the media outlets were also selected based on data gathered in the General Media Study (EGM) from October 2015 to May 2016⁵ and compared with data from the OJD platform (Audit Bureau of Circulations) and the *Kantar Media* study. The following premises were also considered: i) Regarding the press, all the generalist newspapers with integrated coverage across the whole country were selected (El País, ABC, El Mundo, La Razón and La Vanguardia). Furthermore, these five newspapers 'outline a spectrum that goes from El País to ABC, spanning practically all the ideological opinions with political representation in our country' (López García 2004:15); ii) Regarding radio media (RNE, Ser, Cope, Onda Cero and esradio) and TV media (TVE, 24h, Antena 3, La Sexta, Telecinco and Cuatro) all the 'non-paying' general information media outlets were selected, in addition to the non-paying themed political opinion media such as '24h', except for the COPE group's TV channel '13TV', which was discarded because its audience data could not be compared as it did not participate in the audiences report of the Spanish communications media offered by *Kantar Media*.

⁵ Access to the General Media Study (October 2015 to May 2016): <http://bit.ly/2iX8Koy>

Compositional representation (CoDa) of the Agenda-setting of the political opinion makers in the main Spanish media groups in the 2015 general election

3. Delimiting the theme: i) The press articles were analysed and codified based on their printed version as this was a more reliable way of deciding which of them fit into the genre of political opinion due to their formal structure and content. Thus, all the opinion articles from the different sections of each newspaper were selected, excluding the editorials (because following Marques de Melo (1985), even when formally directed at public opinion they 'conceal a relationship of dialogue with the state'). ii) The radio and TV programmes with sections of political debates were codified based on the web portal of each programme and from the respective 'a la carte' audiovisual publications libraries after analysing the entire debate for each programme in the set broadcast during the delimited time period.

In line with these delimitations, a database was compiled that included the set of political opinion articles from the five daily newspapers and the set of radio and TV political debates broadcast by the media outlets included in the study. *Table 4* shows that a total of 376 political debate spaces from the sample group of radio and TV programmes were codified along with the 655 political opinion articles selected from the press headlines.

Table 4. Media groups, the media and the number of pieces analysed

MEDIA GROUPS	PROPERTY OF THE MEDIA	TELEVISIONS				RADIOS				NEWSPAPERS
RTVE	TVE, 24H, RNE : Ministry of the Presidency and for Territorial Administrations, Government of Spain.	TVE		24h	RNE					
		Los Desayunos de TVE	La mañana	El debate de la 1	La noche en 24h	Las mañana de RNE	24h			
		13	18	2*	12	19	16			
PRISA	SER : 100% Prisa Radio. El País : 100% Prisa Noticias.					SER				
						Hoy por hoy	Hora 25		EL PAÍS	
						21	19		66	
VOCENTO	ABC : 100% Comeresa Prensa.									ABC
										149
UNIDAD EDITORIAL	El Mundo : 100% Unidad Editorial, Información General.									El Mundo
										153
COPE	COPE : 43% Radio Popular + participation of Spanish Episcopal Conference (52%) and La Información (5%).					COPE				
						Herrera en COPE	La linterna			
						18	17			
ATERSMEDIA	Antena 3 y La Sexta : 100% Atresmedia. Onda Cero: Uniprex and 100% Atresmedia.	Antena 3	La Sexta			ONDA CERO				
		Espejo Público	Al rojo vivo	La Sexta noche	Más vale tarde	Más de uno	Julia en la Onda	La Brújula		
		20	20	4*	20	18	18	17		
PLANETA CORPORACIÓN	La Razón : 28% Audiovisual Española 2000 + participation of Planeta Corporación (57%) and Antena 3 Noticias (15%).									La Razón
										149
GRUPO GODÓ	La Vanguardia : La Vanguardia Ediciones, 100% participation of Gupo Godó de Comunicación.									La Vanguardia
										138
MEDIASET ESPAÑA	Telecinco and Cuatro : 100% Mediaset España Comunicación.	Telecinco	Cuatro							
		El Programa de Ana Rosa	Las Mañanas de Cuatro	Un tiempo nuevo						
		18	19	2**						
LIBERTAD DIGITAL	esradio : 100% Libertad Digital.					esradio				
						Es la mañana	Es la tarde de Dieter	En Casa de Herrero	Sin Complejos	
						20	18	18	9***	

* Weekly program.

** Weekly program canceled in the second half of observation.

*** Weekly program (weekend).

Source: Compiled by the author

The parameters set for constructing the database were: date the piece was broadcast/published, the media, the total number of debate participants (except for opinion articles, where only the writer was recorded), the gender of the participants and the identification of the content dealt with in the piece based on key words and up to a maximum of 6 issues per piece. The debates and opinion articles were codified manually

with a codifier, taking the set of issues covered in each piece into consideration. The need to know the exact content of each debate or article from a global perspective meant that other methods such as text mining had to be ruled out because while in some cases a content could be associated with a certain key word or words easy to detect with this method (e.g. terrorism), in others this was not possible (e.g. constitution, which depending on the context could refer to compliance with it – within the framework of Catalan independence or its reform) Within the same context of the 2015 Spanish general election, and taking the study on the press content that articulated the political agenda in this period (Blasco-Duatis, 2017) as a benchmark, a total of 350 issues associated with the set of pieces analysed were identified (press, radio and television) and codified from 1 to 6 according to the number of issues they covered. The 350 issues were then grouped by conceptual similarity into 34 broad categories, from which 18 with sufficient weight were selected, from now on referred to as the top18: (1) pacts (the politics of pacts between parties, dialogue, understanding, forming a government, the great coalition pact PP-PSOE, in favour of a national pact PP-PSO-C's, pact C's-PSOE, governing from the centre, from the presidency of Congress, and so on); (2) Catalan independence (against nationalism/separatism, sovereignty of the Spanish nation, in favour of Spanish unity, conservatism and against the right to decide in Catalonia, Catalan cultural policy, difficulties in forming an autonomous government in Catalonia, in favour of an agreed, legal referendum in Catalonia, and so on); (3) gender inequality and domestic violence (on sexist comments from certain politicians, proposals for the law on domestic violence, labour conciliation, sexual abuse, violence against women, and so on); (4) terrorism (the Syrian war, jihadism, DAESH, ISIS, ETA, and so on); (5) corruption (tax amnesty, under indictment, tax fraud, parliamentary immunity, IMF Lagarde case, and so on); (6) politainment (candidates' participation in talk shows, political discussions or entertainment shows); (7) economy/crisis (the global economy, the Spanish economy, austerity, cutbacks, economic recovery, bailout, at risk of poverty, campaign promises about Personal Income Tax and taxes, and so on); (8) institutional stalemate (ingovernability, post-electoral state, blockage in forming a government, failure to reach an agreement); (9) education (reform of the Law on Education, Vocational Training, grant system, academia and science, and so on); (10) regeneration/change (old politics, new parties, end of the two-party system, the traditional parties, resistance to change, fragmentation of parties and votes, and so on); (11) constitutional reform (national transition, territorial reform of the privileges of the Spanish regions, and so on); (12) statistics and CIS (publishing statistics, CIS, evolution of the vote during campaigns, electoral law, election exit polls, and so on); (13) voting/electoral process (campaign launch, floating vote, anarchy and not voting in elections, tactical voting, postal voting, reflection forum, electoral commission, and so on); (14) debates (following electoral debates on TV); (15) international politics (Spanish-European relations, European politics, refugees, international politics, and so on); (16) the environment (climate change, the environment, Paris Congress, and so on); (17) PSOE crisis (PSOE leadership crisis, internal dispute between socialist barons, and so on); (18) assault on Rajoy (youth assaulting President Rajoy during a campaign rally).

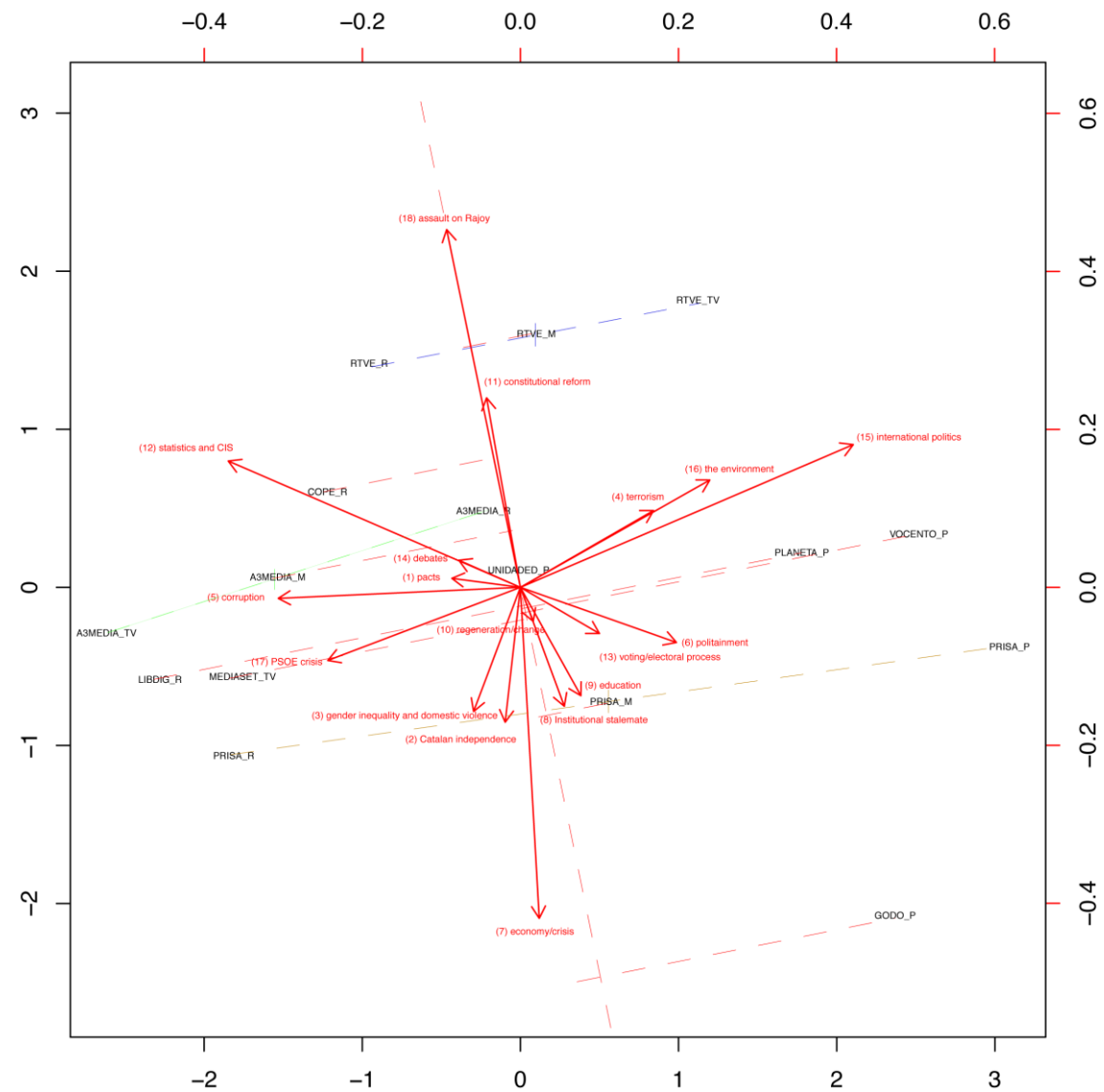
6. Results

The results derived from applying the CoDa method to the data obtained from the content analysis are shown below. Essentially, what we show is the representation of the AS theory for the 2015 electoral period and the agendas of the main Spanish media groups. Following the framework set out in *Table 4*, the set of radio/TV programmes with political debate spaces and the opinion articles on politics featured in the newspapers were incorporated into their appropriate media group structures with the aim of visualising the AS of the set of media groups under study.

Compositional representation (CoDa) of the Agenda-setting of the political opinion makers in the main Spanish media groups in the 2015 general election

In *Figure 1* the AS theory for the whole period is represented, based on the form biplot made up of the top18 issues and their senders (media groups) under the premise that the interest lies in the relative/comparative volume of the contents and not in the absolute volume which, as discussed earlier, the usual statistical methods do not allow for. A first formal reading highlights the fact that the degree of representation of the variables (issues) in the analysis in principal components is highly reliable, given that the first two components together explain 75% of the total variance. On a different note, the closed geometric means of the top18 issues, which in turn define the origin of the coordinates in the biplot, indicate that the most prominent of the top18 issues across the set of media groups are, in this order: (1) *pacts*, (2) *Catalan independence*, (10) *regeneration/change*, (14) *debates*, (8) *institutional stalemate* and (13) *voting/electoral process*.

Figure 1. Form biplot of the AS of the top18 issues during the whole period by media groups and by types of media (radio R, television T, press P)



Source: Compiled by the author

Table 5. Closed geometric means of the top18 issues

Top18 issues	Closed geometric means
(1) pacts	0.162
(2) Catalan independence	0.140
(3) gender inequality and domestic violence	0.021
(4) terrorism	0.047
(5) corruption	0.048
(6) <i>politainment</i>	0.029
(7) economy/crisis	0.039
(8) Institutional stalemate	0.084
(9) education	0.009
(10) regeneration/change	0.095
(11) constitutional reform	0.024
(12) statistics and CIS	0.031
(13) voting/electoral process	0.082
(14) debates	0.091
(15) international politics	0.026
(16) the environment	0.013
(17) PSOE crisis	0.039
(18) assault on Rajoy	0.020

Source: Compiled by the author

The media who behave similarly with respect to their content composition and, consequently, whose opinion makers focus their attention on similar issues, can be deduced from the biplot in *Figure 1*. A first general reading shows that three of the five press groups (*El País*, *ABC* and *La Razón*) quite obviously have similar content compositions. These compositions, however, are different from those of the TV and radio media (and also from the newspaper *El Mundo*), whose sets of issues are clearly dissimilar from each others'. The case of the newspaper *La Vanguardia* also stands out because while its content axis is closer to those of the other press outlets, its composition of issues is clearly different from those of the media groups as a set.

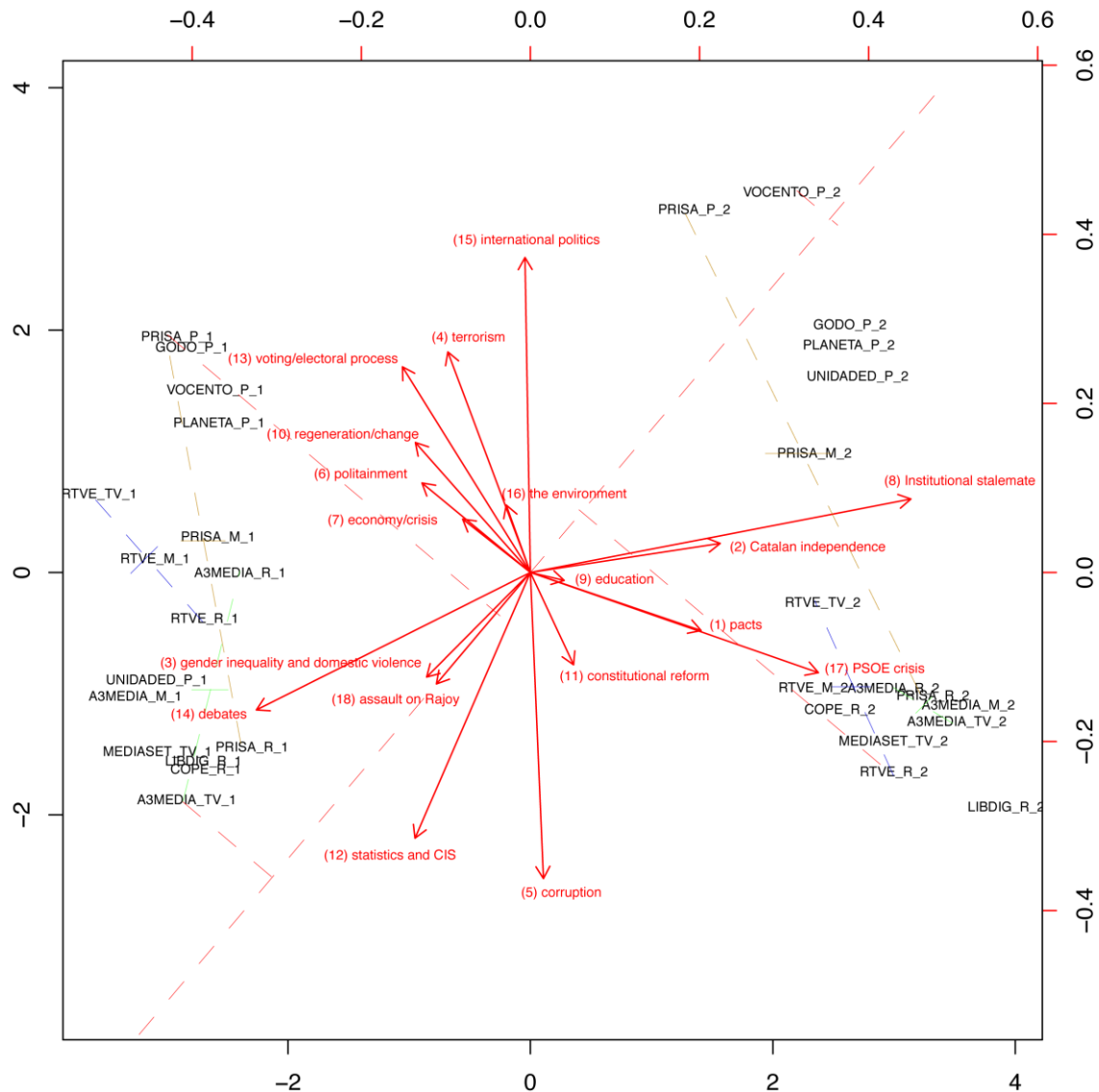
The information provided by this visualisation method is especially interesting for interpreting the *level of proportionality in establishing each sender's (media group's) issues* in relation to the top18 issues that comprise the representation of the AS. If we take the centre of the diagram as the paradigm of proportionality (i.e., the point that corresponds to the media groups that cover the set of top18 issues in the same proportion as the overall proportion of all the groups) and we look at how far each group is from the centre, we can order the ones that most closely to least closely mirror this proportionality in their coverage of the set of issues analysed. Where the media groups are comprised of different media type(s) –press (P), radio (R) or television (T)– this is represented in the biplots, and the middle point which homogenises the media groups they correspond to is also indicated (as in the cases of RTVE, Atresmedia and Prisa, differentiated by the line that joins the vertexes of the two media groups in each case and their middle point marked with an M). From this perspective, and from a global reading of the media outlets that make up the ten media groups analysed in this study, it can be seen that the group Unidad Editorial is the one whose opinion makers cover the top18 issues most proportionately, followed closely (and in this order) by the groups Prisa, Atresmedia, COPE and RTVE. On a latitude somewhat further from the centre (also in this order) there are Mediaset España, Planeta, Libertad Digital and Vocento. And last, the group Godó stands out as the media group that covers the top18 issues least proportionately; in other words, certain issues among the set that make up the media agenda in that period occupy more opinion spaces in their agenda than others. Thus, the relative positions of each media group in relation to the centre indicates that from Unidad Editorial to Grupo Godó there is a scale of inequality in their coverage of the issues

set in the agenda. In other words, this scale corresponds to a media group talking ‘a little about a lot of issues’ (most obviously the group Unidad Editorial) or ‘a lot about few issues’ (which is clearly the case with the Godó group). Also of note is the fact that the state-owned media group RTVE is considerably distant from the centre of proportionality, with its axis clearly located on the theme line (18) *assault on Rajoy* and (11) *constitutional reform*. This difference is surprising more evident in *Figure 2* and for the case of the RTVE TV group (bearing in mind that it is a state-owned media group), which is shown to be the media outlet located furthest from this proportionality of issues that make up the agenda.

The representation of the biplot of the compositional coverage of the data takes on another level of significance in the transition from being a static mapping model of AS to a dynamic conception. A practice widely used among academics interested in the AS theory consisting of comparing the agendas of the same sender in two different periods must be developed to shape this dynamic representation. Following this structure, a dynamic scenario to study the agenda is thus shaped which, in the context of compositional analysis and its representation with biplots, is especially interesting (in relative terms) to visualise the dynamics of the presence/absence or omission/signification of issues in the agenda. In other words, this representation visualises the phenomenon of the spiral of silence because the dynamics established by the thematic hierarchization process and AS result in the signification of certain issues to the detriment of others, which are relegated or omitted.

Figure 2 illustrates how in the transition phase between the first period (the electoral campaign identified by a 1) and the second phase (post-electoral period identified by a 2) a first level of the spiral of silence is constructed, because an agenda characterised by 10 issues in the first period (represented on the biplot by a semicircle that goes from issue (4) *terrorism* to issue (12) *statistics and CIS*) transforms into an agenda reduced to basically six issues in the second period: (2) *Catalan independence*, (1) *pacts*, (9) *education*, (11) *constitutional reform*, (17) *PSOE crisis* and (8) *Institutional stalemate*. The last two issues particularly stand out from the rest in this second period. It is important to contextualise that in the first period the focus is on seeking electoral support (electoral campaign) and the issues are at the service of the confrontation between the electoral programmes of opinion makers; whereas in the second period (post-electoral period), it is enlisting ideology and the search for common ground among candidates that dictates what issues are now preeminent. The fact that the biplot compares the relative importance of the issues (in our case between media groups and moments in time) must be taken into consideration. Thus, the global importance or lack of importance of an issue is better illustrated by Table 5. Furthermore, the group of issues discarded due to their small volume when the top18 were determined must be considered, as must (following Neumann’s fundamentals) the issues that the opinion makers did not focus any attention on and so did not feature in the thematic agendas of the media groups.

Figure 2. Form biplot of the AS of the top18 by two-week period (1=first two-week period and 2=second two-week period) by media groups and by type of media (radio R, television T, press P)



Source: Compiled by the author

Again in *Figure 2*, focusing on the study of the issues that make up the AS and their relationships with the senders (media groups), the content pairings which are nearly parallel are *-(2) Catalan independence and (8) Institutional stalemate*, *(1) pacts and (17) PSOE crisis*, *(3) gender inequality and domestic violence and (18) assault on Rajoy*, *(6) politainment and (7) economy/crisis*– tend to maintain a proportional relationship, i.e., if one of the media groups broadcasts relatively more about *(2) Catalan independence* than any other media group, they also tend to broadcast more about *(8) Institutional stalemate*. Contrarily, and we will use it as an example, the contents *(15) politainment and (5) corruption*, whose extreme points are far from each other, have a mutual ratio that differs substantially among the media groups. In short, the relationships that are established among issues and senders in terms of proportionality outline a particular scenario for each media group of the issues that their opinion makers address in varying degrees. Furthermore, the similarities and differences in the prioritization of the issues in the agendas proposed by these same opinion makers in the different media groups is also reflected.

Continuing with the study of ratios among issues and senders in the form biplot in *Figure 1*, if we project the media groups orthogonally in the direction of the content (18) *assault on Rajoy* (letting them fall at an angle of 90 degrees to the direction defined by the vector-issue, as represented by the broken line), we see that the media outlet that covers this content most is clearly the RTVE group, followed closely by the COPE group and Atresmedia. Some way behind we find the groups Unidad Editorial, Libertad Digital, Mediaset España, Planeta, Vocento and Prisa, and last the Godó group, whose opinion makers address this issue least and so gives it least media coverage. Furthermore, if we take the same vector-issue case in *Figure 2* (data dispersed by campaign period and post-electoral period), substantial differences appear between the two periods: while in the global study of the AS in *Figure 1* the group that covered this issue most was RTVE and the one that covered it least was Godó, what we see in *Figure 2* is that in the campaign period it is the Atresmedia opinion makers who cover this issue most and the Prisa group opinion makers who cover it least, while in the post-campaign period, it is RTVE who addresses this issue most and the Vocento group least. Thus, it is imperative not to take just one global reading of the moment for each issue/media group. A general overview must be accompanied by a specific, detailed look at moments and issues/media groups to enrich the debate.

Regarding the example of the orthogonal projection in *Figure 2*, and for the press media groups, what must be pointed out is while in the first period the issues that make up the AS form a semi-circle that goes from (4) *terrorism* to (7) *economy/crisis*, in the second post-electoral period this semicircle of issues breaks up substantially and the issues-vectors appear opposite each other. This relative dissociation of the absence/presence in the dynamic reading arising between the first and the second periods of analysis of the AS, provides us with the possibility to complement the point brought up previously about the dynamics of omission/signification of the issues in the AS and, in short, to visualise the phenomenon of the spiral of silence.

Especially interesting in this period are the relationships that are established among the senders and the contents, because each media group's relative position is closely described by the distribution of the contents in the same biplot. Thus, the orthogonal projections derived from each content and for each media group mentioned above describe to us both the issues that are most associated with each media group and the content that least defines the composition of issues in their agendas. Essentially, what derives from this reading of the biplot visualisation of the compositional analysis of the data could be considered as the representation of the priming effect for each media group and set of contents of the AS. If we understand that each vector-issue is represented with different emphasis by the various media outlets (in other words, they describe the benchmarks of priming) we can identify, and more importantly map, that not only do certain issues recur in a global sense (*Table 5*), but they are also associated with a certain media group among other associations, but in the sense of their relative absence. Thus, taking the RTVE group in *Figure 1* as the example, the benchmarks that define the salient issues for the opinion makers of this group are essentially (18) *assault on Rajoy* and (11) *constitutional reform*. This relationship, which can be studied in detail for each media group, explains the relationship between the issues most addressed in the AS for each sender, developing a process of prioritisation of the salient issues for their public typical of the genesis of the priming effect.

Thus, from the information provided by *Figure 2*, what is required is a global reading of the distribution of the media groups in the coordinate space according to the type of media. If we divide the space into four parts, using the axes of the coordinates with their extremes on the respective points (0, 0.0), we can see that the press groups are concentrated in the upper right-hand and left-hand quadrants, while TV and radio media groups occupy the spaces in the lower quadrants. What is important to point out here is that beyond the typical

differences among the issues that make up the AS for each media group, there is a second ordering that is described by the type of media groups. The groups identified as press media (Prisa, Vocento, Godó, Planeta and Unidad Editorial) share a semantic field typical of the issues of the AS that is different from the groups that are exclusively radio/TV media (RTVE, Mediaset España, Atresmedia, COPE and Libertad Digital), whose opinion makers address the issues they focus on proportionately differently.

Continuing with the study of the issues that make up the AS in *Figure 2*, the substantial concentration of issues-vectors in the first part of the analysis (electoral campaign space) compared with in the second period (post-electoral space) must be pointed out. If we consider that the issues (5) *corruption* and (15) *politainment* have similar ratios in the two parts of the period analysed - in other words, opinion makers have addressed these issues in both periods - what stands out is that the AS in the electoral campaign period covers a space of ten issues with larger ratios, in contrast to the six issues addressed in the post-electoral phase. What is especially significant in this post-electoral space is how all the TV and radio media groups appear united on the issues (17) *PSOE crisis* and (1) *facts*.

Last, it is essential for the study to identify the differences in the AS of the various media in the same group. To do so, as pointed out at the beginning, the compositional study of the groups must be broken down by type of media (press, radio, TV). *Figure 2* shows that there are substantial differences among the different types of media within the groups RTVE, Prisa and Atresmedia (between radio and TV in the case of RTVE and Atresmedia, and between the press and radio in the case of the Prisa group). Furthermore, and once again comparing the electoral campaign space and the post-electoral space, we can see that in the case of Prisa the distance between the types of media increases and so the differences in the AS of the opinion makers likewise increase. In the case of RTVE, the distance between the types of media remains similar in the two periods, and in the case of Atresmedia what happens is the opposite to Prisa, their distances reducing in the AS in the post-electoral space.

7. Discussion and conclusions

The compositional study of the AS of the main media groups in Spain has allowed us to represent their agendas in an intuitive way, helping to focus the analysis on the relative importance of each type of content. Thus, we have been able to visualise which media types or groups emphasise which contents, which senders or contents are similar to each other and which are not, which issues in the agenda are correlated similarly or differently by the senders (priming) and which contents are subject to an omission/prioritisation process (spiral of silence). We have also been able to represent the similarities and differences among media groups and their associated thematic universes.

Regarding the case study on the media groups, some contributions must be specifically highlighted. This study has demonstrated the need to observe each type of media that forms part of a group independently, visualising not only the position of the media groups in the coordinate space but also the position of each type of media in the context analysed as represented in the individualised study. This analysis of the parts also foments the possibility of comparing the media of different groups according to their type (press, radio or television), thus contributing to an exercise of primary analysis between equals which later, in a second level of study, complements the definition of each media group in the observed universe. Furthermore, the representation of the AS by means of biplots enables us to compare the public and private media groups, determining the position of each one in relation to the set of the media systems analysed.

The contributions in the dynamic phase of the compared time periods must also be highlighted as they help to identify the contents and volume that characterise the agenda of

the opinion makers for each time period. In this sense, the study has demonstrated the compositional capacity for visualising and studying the groups of issues which, associated among each other, signify a priming effect. Furthermore, the research has also represented the spiral of silence in a study, which visualises the presence/absence of the issues in the agendas as they evolve in each study period.

Last, regarding the CoDa biplot, it must be pointed out that this method is also highly recommended for data collection methods based on text mining and for visualising content analysis processes in communication sciences, especially those derived from studies on the media. In this sense, an oft-mentioned limitation of CoDa must be mentioned: it is not a suitable method for sparse data tables. As stated previously, zero replacement methods (Martín-Fernández et al., 2015b) when their number is reduced do exist. Nonetheless, as Blasco-Duatis et al. (2018) state, this limitation can be minimised by developing AS studies with a larger volume of data and by applying a two-stage issue codification/categorisation process that allows various sub-issues (codes) to be included within a similar broader issue (category), known as amalgamation in CoDa terminology.

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