



## NETWORKS OF PARLIAMENTARY PERFORMANCE: A METHOD OF RELATIONAL STUDY THROUGH LEGISLATIVE PROPOSALS

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### 1 introduction

The development of mechanisms for the study of the performance of elected representatives, for both the Executive Branch and the Legislative Branch, is of fundamental importance for the strengthening of democratic dynamics, and political science has worked to provide resources that meet this demand (CORADINI, 2010; RODRIGUES, 2014; SILVA, ARAÚJO, 2013). In order to contribute to this effort, this article explores the propositions presented by four parliamentarians in the Chamber of Deputies and develops a methodology for observation and analysis of the web of subjects and themes of the propositions.

In order to carry out the work, 504 propositions presented by the deputies from Paraná members of the Frente Parlamentar Evangelica (FPE) in the Chamber of Deputies during the 54th Legislature (2011-2015) were classified and submitted to the methodology of analysis of social networks: André Zacharow (PMDB), Edmar Arruda (PSC), Fernando Francischini (PSDB) and Hidekazu Takayama (PSC)<sup>5</sup>.

The choice of evangelical deputies lies in the search for a group that, would have a majority action oriented to the interests of a considerable portion of the electorate who has been

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<sup>5</sup> The partisan affiliation of all the parliamentarians present in this study is in agreement with the information made available by the Chamber of Deputies and refers to the 54th Legislature of that house. <http://www2.camara.leg.br/deputados/pesquisa>

experiencing significant growth in its presence in the population and in politics. The option to circumscribe the initial selection to deputies of Paraná occurs due to the increased control of the analyzed data, necessary for an adequate modeling, being Paraná the political reality of knowledge closest to the authors.

The two cuttings adopted - bench and territorial - were important for the construction of the methodological model proposed here. During the search for reference points for the investigation, we did not find, in the literature consulted (ORO, 2007; 2011; BOHN, 2004; MARIANO, 2006; FISCHMANN, 2009; DANTAS, 2011; SMIDERLE; AZEVEDO, PEIXOTO, 2012; VITAL; LOPES, 2013, ALMEIDA, 2014, LUNA, 2014), any study that analyzed all the propositions of a group of parliamentarians of the evangelical group throughout the same legislature. Likewise, no research that applied the Social Network Analysis (ARS) to understand the performance of federal evangelical deputies was located.

According to Vincent Lemieux and Mathieu Ouimet (2004), Social Network Analysis has as its object the forms of relations between the actors, be they individual or collective, making possible the identification of the relationships that structure the social networks. The importance of this lies in the fact that the bonds that each actor maintains or does not with the other actors explain the situation of all in a web of sociabilities and transactions of resources. Following this principle, we carried out the identification of the coauthors of the propositions of the selected parliamentarians and, from the evangelical stand of Paraná, we built a network that includes 325 parliamentarians in action in the Chamber<sup>6</sup>.

Considering that the literature on evangelical parliamentarians affirms, on the one hand, there is no political and ideological homogeneity in this group, and, on the other, there is some unity among such parliamentarians only when it comes to themes related to Christian morality (ORO, 2007; BOHN, We identified, in the group of authors and co-authors, who and how many of them were members of the FPE in the 54th Legislature of the Chamber of Deputies. Among the 325 parliamentarians who divided the collective propositions with the four deputies from Paraná, there were 47 who composed the parliamentary front on screen, totaling 51 members of FPE members in the network object of this study.

The network of parliamentarians linked by co-authoring would already indicate a set of ties generated in the parliamentary performance. We proceeded, however, to classify the 504 propositions presented by the four deputies from Paraná (58 suggestions, 350 requests or requests and 86 bills) in 335 subjects. For the classification, we consider as a matter of priority the textual evidence of the menu of the proposition. In cases where this was not possible immediately, the texts of the laws and / or draft laws indicated in the proposition menu text, having again the textual evidence as reference. Subsequently, the subjects were aggregated into 45 categories using the

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<sup>6</sup> A co-author was not identified in the virtual database of the Chamber of Deputies and we chose to use the nomenclature Non Informed Parliamentarians.

criterion of similarity between the subjects.

The network constituted by the aggregation of the subjects into categories can be seen in the graph below (Figure 1). For the construction of this graph, we applied the class modularity computation feature, which allowed the distribution of nodes (points representing subjects or categories) in 29 communities, or "families" of categories and subjects formed by identity and proximity, possible be identified by the different colors.



Figure 1 – Graph of network of subjects of propositions of selected federal deputies presented in the Chamber of Deputies (2011-2015) aggregated by categories.  
Source: the authors (2017).

In the table below (Table 1), we can see 12 categories with the highest number of subjects related to them.

**Table 1** - Number of issues related to the category.

| Category                  | N Issues |
|---------------------------|----------|
| Investigation             | 66       |
| Public security.          | 33       |
| Penal Legislation         | 33       |
| Finance and Taxation.     | 21       |
| General Legislation.      | 20       |
| Career Plans.             | 18       |
| Health                    | 17       |
| Tribute                   | 12       |
| Regimental Procedure.     | 12       |
| Civil Legislation         | 10       |
| Agricultural Development. | 10       |
| Education                 | 10       |

Source: the authors (2017).

Note: data from the Chamber of Deputies of Brazil.

The following procedure consisted in associating subjects and categories to the 325

parliamentarians, authors and co-authors of the 504 proposals adopted for the analysis, which made it possible to explore, in a different way, the two classifications of propositions: (i) relations between parliamentarians and subjects of propositions and (ii) relations between parliamentarians and categories of propositions. The networks resulting from both clippings are presented in the following sections.

## 2 A dip in the communities of parliamentarians and subjects of their propositions

The network formed by the association of subjects and parliamentary authors and co-authors of the 504 propositions consists of 661 nodes and 1,306 edges, which can be observed in the graph below (Figure 2). The nodes represent the parliamentarians or subjects of propositions and are graded according to the number of connections formed between them. In blue, the subjects of the analyzed propositions are represented and in red, the four parliamentarians authors of the propositions and their respective co-authors.

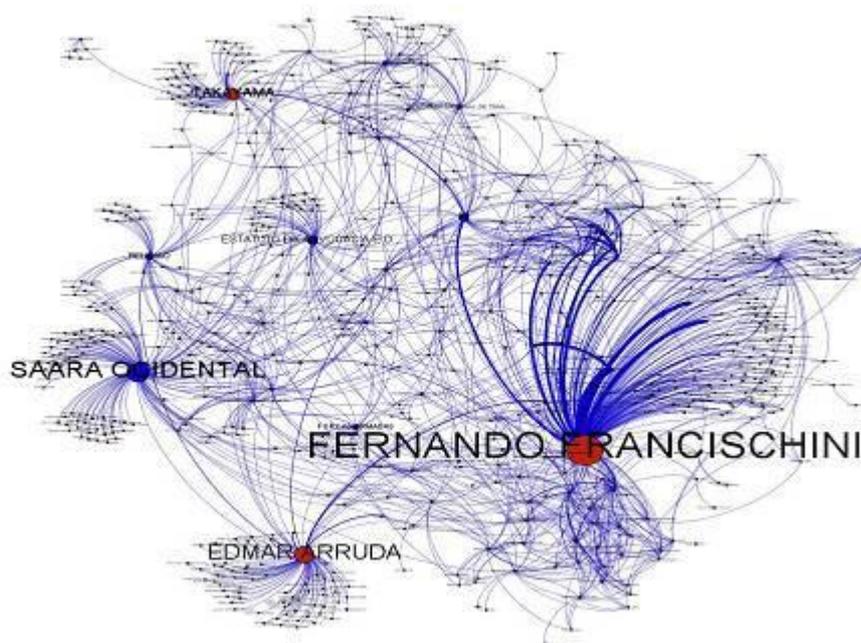


Figure 2 – Network graph of propositions and parliamentary subjects.  
Source: the authors (2017).  
Note: prepared with data from the Chamber of Deputies of Brazil.

The subject with the highest degree of connections in the above network is Western Sahara (left in the graph), which was highlighted by the participation of 128 parliamentarians who are proposing the recognition of Western Sahara as a nation state and the installation of offices in Brazil. This subject gained prominence in the diverse networks analyzed due to the high number of subscribers. Table 2 shows the number of relationships between subjects and parliamentarians.

**Table 2 - List of subjects and number of parliamentarians subscribing to classified proposals**

| Issue                          | N Parliamentarians |
|--------------------------------|--------------------|
| Western Sahara.                | 128                |
| Statute of Advocacy and OAB    | 53                 |
| Religion                       | 41                 |
| Indigenous Lands.              | 36                 |
| Unidentifieds (NI)             | 31                 |
| Decriminalization of Abortion. | 27                 |
| Safe Abortion.                 | 26                 |
| National Traffic Council.      | 25                 |
| Armed forces.                  | 25                 |

source: the authors (2017).

Note: elaborated with data from the Chamber of Deputies of Brazil..

In table 3, the eight parliamentarians with the highest number of relationships (degree) are arranged with the subjects related to the propositions subscribed by them in the set of 504 propositions. Fernando Francischini acquires relevance for being the one with the greatest number of links among the four federal deputies initially selected for the study, given that it is related to 201 among the 335 subjects of the network.

**Table 3 - List of parliamentarians and number of subjects with grade > 10 relative to the propositions subscribed.**

| Parliamentary         | N Issues |
|-----------------------|----------|
| Fernando Francischini | 201      |
| Edmar Arruda          | 88       |
| Hidekazu Takayama     | 55       |
| Eduardo Cunha         | 20       |
| André Moura           | 18       |
| André Zacharow        | 16       |
| Delegado Protógenes   | 16       |

Source: the authors (2017).

Note: elaborated with data from the Chamber of Deputies of Brazil.

From the network of simple relationships (Figure 2), we carried out a new study to identify the communities, or families, forged by the proximity between parliamentarians and the subjects to which they were attached when subscribing to the selected propositions. To do so, we apply a social network analysis feature: class modularity in resolution 1.0, to segment the network into 10 different groups. The following graph (Figure 3) allows the visualization of the different classes (communities) in different colors and of the nodes with greater centrality of degree (number of relationships).

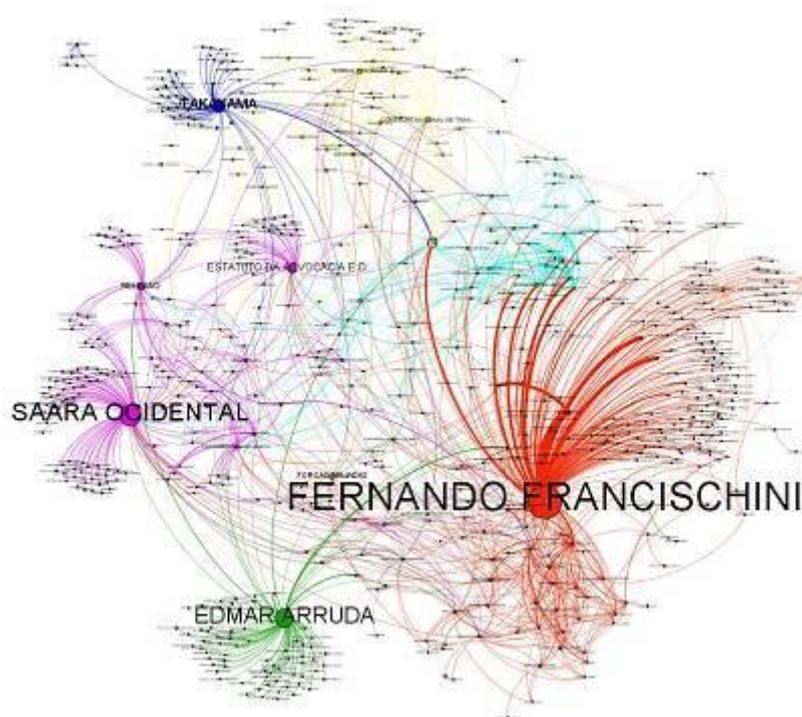


Figure 3 – Graph of network of subjects and parliamentarians by class modularity (communities of parliamentary subjects).

Source: os autores (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

In the previous graph, the community shown in red is formed by 43 parliamentarians and 124 subjects. This form of clustering of the network emphasizes the association of Fernando Francischini, who is more prominent, with parliamentarians Mendonça Filho (DEM-PE), Jovair Arantes (PTB-GO), Moreira Mendes (PPS- RO), Beto Albuquerque (PSB- RS), Antonio Imbassahy (PSDB-BA), Andre Moura (PSC-SE) and Eduardo Cunha (PMDB-RJ), among others. Among the topics covered by this group, the main ones are Petrobras, the Ministry of Health, Justice and Brazilian Municipalities.

Planned in green is the community formed by 10 parliamentarians and 77 subjects. In this presentation, Edmar Arruda, with the most important node, demonstrates the MP's association with MPs José Humberto (PHS-MG), Luiz Carlos Hauly (PSDB-PR), Akira Otsubo (PMDB-MS), João Dado SP), among others. The topics dealt with by these parliamentarians were mainly the My Home My Life Program, Intergovernmental Transfers, the Ministry of Sports and the National Physical Education Program<sup>7</sup>.

As for the other two members of the FPE, André Zacharow worked with Oziel Oliveira (PDT-BA), Giovanni Queiroz (PDT-PA) and Luiz Carlos Heinze (PP-RS) on Indigenous Lands, National Traffic Council, Agricultural Defenses and Foot and Mouth Disease. Hidekazu

<sup>7</sup> The parties that appear here correspond to those in which these parliamentarians were affiliated during the 54th Legislature of the Chamber of Deputies: <<http://www2.camara.leg.br/deputados/pesquisa>>; access between March 4 and September 29, 2015.

Takayama has weak ties with other parliamentarians, having dedicated itself to the themes Teaching Fundamental, Work, Environment and MEC-Homophobia.

In addition to the exercises that expose connectivity and the formation of communities between parliamentarians and proposition matters, we carried out two other exercises, one to identify the issues connected by the parliamentarians subscribing to the propositions and the other to identify the parliamentarians connected by the subjects of the propositions that they subscribe to. In order to form the (meta) connections between subjects and among parliamentarians, we use a dual mode - one mode (or dual class - one class)<sup>8</sup>.

For the first exercise, nodes referring to deputies are suppressed and the structure of the graph takes shape from the (meta) connection subject to subject. The graph of Figure 4 shows the conversion of the one mode network of subjects into communities represented by different colors. In this way it is possible that the parliamentary performance is seen in classes of subjects "without the presence" of the authors of the propositions.

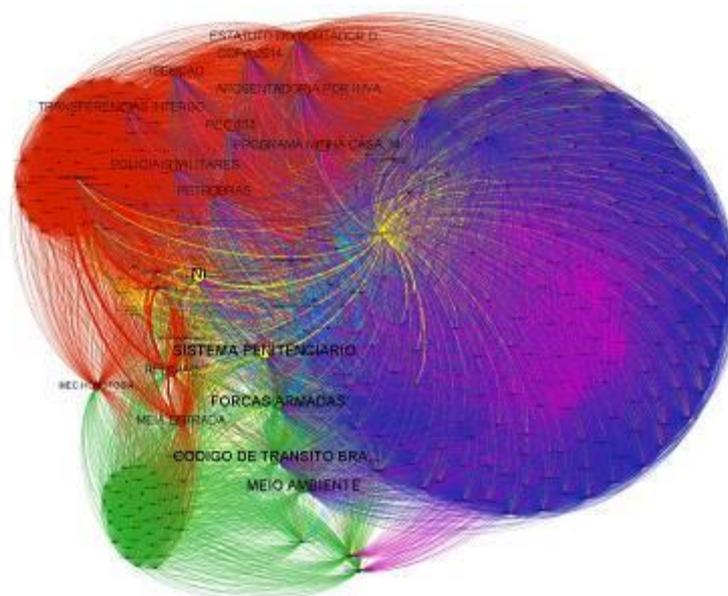


Figure 4 – Network graph one mode of subjects connected by parliamentarians.

Source: the authors (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

In the previous graph, the subjects of the Armed Forces, the Brazilian Transit Code and the Environment stand out in the green community. In the red community, the most significant issues are the Disabled Person's Statute, 2014 World Cup, Retirement for Disability, Military Police Officers, Petrobras, My Home My Life Program, Intergovernmental Transfers, PEC 158, Religion and Half-entry. The yellow community is centered on the subject Penitentiary System and the large blue community is composed of a set of dispersed subjects that have reduced expression alone.

<sup>8</sup> For a better understanding of the one-mode feature see Newman (2010, p. 123).

The second research exercise of the metaconnectivity of the parliamentary-affairs network is to suppress issues and verify the forged connectivity between parliamentarians. The previous graph of Figure 5 shows the communities formed by the parliamentarians connected by the subjects of the propositions that subscribe.

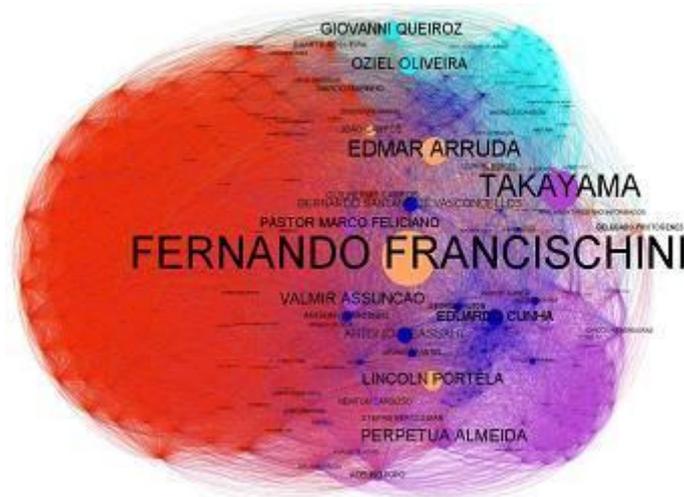


Figure 5 – Network graph one mode parliamentarians connected by subjects.  
Source: the authors (2017).  
Note: prepared with data from the Chamber of Deputies of Brazil.

In addition to Edmar Arruda, João Campos (PSDB), Delegate Protogenes (PCdoB-SP) and Lincoln Portela (PR-MG) shared the Fernando Francischini community in the previous model (Figure 5). is identified in light brown color. The Hidekazu Takayama community is shared by Valmir Asuncion (PT-BA), Perpétua Almeida (PCdoB-AC) and Marco Feliciano (PSC-SP), and is identified by the purple color. The dark blue community is shared by Eduardo Cunha (PMDB-RJ), Anthony Garotinho (PR-RJ), Antonio Imbassahy (PSDB-BA) and Bernardo Santana (PR-MG). The bright blue community is shared by Giovanni Queiroz (PDT-PA) and Oziel Oliveira (PDT-BA). Finally, the large red community is composed of a group of parliamentarians who share a small number of propositions.

The exploration of the network of subjects allowed to probe the positionality, central or peripheral, of the action of the parliamentarians, in the condition of both authors and co-authors. The communities of parliamentarians forged by the connection established by the different subjects subscribed were identified, as well as the communities of subjects formed by parliamentarians.

Throughout this study, only six of the 504 propositions analyzed deal with themes related to Christian or moral religions. The cases are related to the themes of Same-Sex Marriage, Abortion, Decriminalization of Abortion and Family Valuation. Only two of these propositions were classified under Religion, one in the Human Rights category and the other in Civil Legislation. The first case is a petition authored by Congressman Edmar Arruda seeking to obtain, according to information from the Chamber of Deputies, "the approval of a motion of repudiation

regarding the decision of the Iranian court that determined the death penalty to the pastor Yousef Nadarkhani because he would have refused to renounce his Christian faith." In the second case, it is a bill (PL 2756/2011) proposing "to assure clerics the exercise of liturgical acts in strict accordance with their respective religious orders," which had 41 co-authoritative parliamentarians.

Two other propositions, although dealing with themes related to Christian morality (Union of Same Sex People and Valorization of the Family), presented a low participation of parliamentarians in the authorship. Two other requirements were also identified that address issues related to Christian morality: Safe Abortion and Decriminalization of Abortion. In the first case, the petition had 26 coauthors who sought information from the then Minister of Health on official international travel by officials of that ministry to research and follow up on safe abortion programs and projects. The second request, with 27 coauthors, requested information from the then health minister on terms of cooperation and agreements for research on abortion and decriminalization of abortion in Brazil.

The number of coauthors of these propositions is much lower than the number of federal deputies that made up the FPE between 2011 and 2015, which proves the little integration in the action of the evangelical group around the subjects researched. In this study it was verified that not even the four parliamentarians with whom we started this study participated in the authorship, or co-authorship, in the six cases. This situation corroborates formulations present in the bibliography regarding the reduced political and ideological integration of the evangelical group (ORO 2007, BOHN 2004, DANTAS 2011, VITAL, LOPES 2013 and LUNA 2014). We present in the next section the results of the exploration carried out in the network of subject categories.

### **3 The parliamentary performance of FPE / Paraná through networks of subject categories**

The network consisting of the categories of subjects and their respective authors and coauthors consists of 370 nodes (325 of which are parliamentarians and 45 categories) and 832 edges, thus considering the relationship lines. In the graph below (Figure 6), the blue knots represent the parliamentarians; the red knots, the categories of parliamentary propositions.

Graphs 5 and 6 show the distribution of parliamentarians in the same committees, but now in relation to the Senate. As can be seen, in the Senate the distribution of vacancies in these committees does not operate according to the areas of training and performance of senators



Figure 6 – Network graph of categories of propositions and selected parliamentarians (authors and co-authors) of propositions presented in the Chamber of Deputies (2011-2015).

Source: the authors (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

**Table 4** - Degree of entry of categories.

| Category                 | N Parliamentary Participation. |
|--------------------------|--------------------------------|
| External Relations.      | 137                            |
| Civil Legislation.       | 95                             |
| Public security.         | 66                             |
| Investigation.           | 57                             |
| Human rights.            | 47                             |
| Regimental Procedure.    | 46                             |
| Health.                  | 35                             |
| Career Plans.            | 32                             |
| Penal Legislation.       | 28                             |
| General Legislation.     | 27                             |
| Transit Legislation.     | 27                             |
| Finance and Taxation.    | 25                             |
| Agricultural Development | 25                             |
| Tribute                  | 23                             |
| Cup 2014                 | 22                             |

Source: the authors (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

The red lines have different widths because the greater the number of parliamentary links with a category, the greater the thickness of the edge that connects them. This is the case, for example, of the connection between Fernando Francischini and Investigation. The diameter of the circumferences of the nodes differ according to the centrality of degree that they present. The circumference of the node will be greater the greater the number of parliamentarians connected to it, as in the case of the Foreign Relations category. Table 4 shows the 16 categories that most counted on parliamentary participation.

In order to "ease" the number of points represented in the categories graph and parliamentarians, in order to improve visualization, we performed reduction of degree two, that is, we removed the nodes that had only one relationship. Thus, we maintained in the graph (Figure 7) only those parliamentarians and categories that present at least two or more connections. The categories External Relations and Civil Legislation, for example, "lost" the connections of parliamentarians who subscribed only one proposition aggregated to one of these categories.

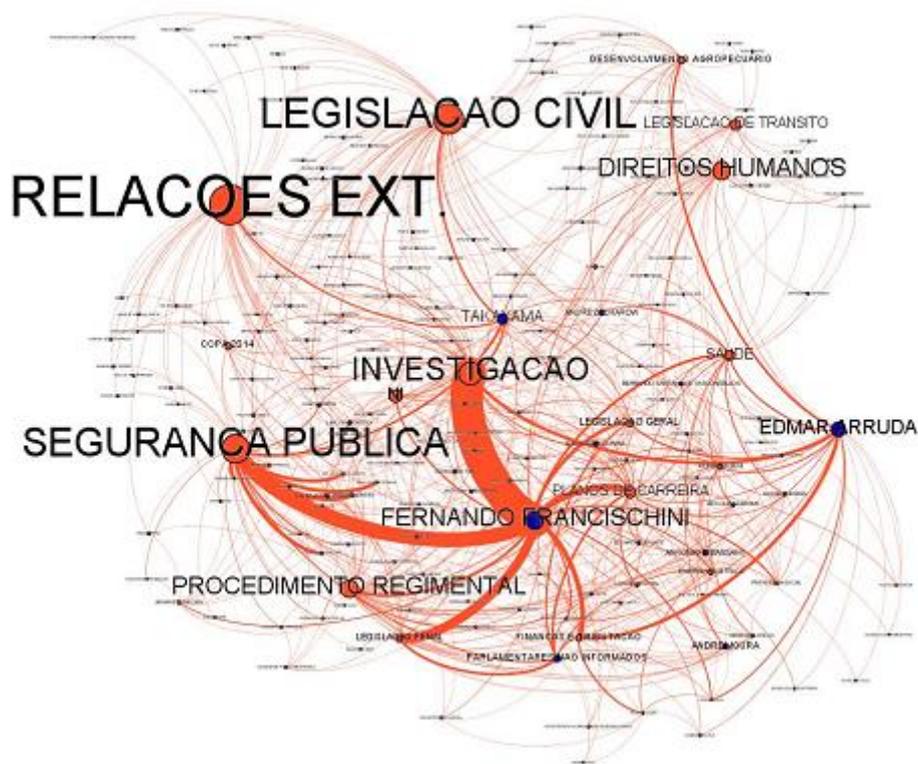


Figure 7 – Network graph of categories and parliamentarians of proposals presented in the Chamber of Deputies (2011-2015) - Reduced to Grade 2.

Source: the authors (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

The previous graph (Figure 7) shows that Fernando Francischini acted more frequently in propositions categorized as Investigation, Public Security, Procedural Regimental, Finance and Taxation, Career Plans, Health and Criminal Legislation. Hidekazu Takayama presents, in turn, stronger links with the categories Civil Law, Foreign Affairs, Research and Public Security.

Already Edmar Arruda, with the categories Finance and Taxation, Agricultural Development and Research.

In the exploration of the simple graph of the relation between categories and parliamentarians, we repeated what we had done in the simple graph of subjects, that is, we used the feature of class modularity to identify the "communities" of categories of parliamentary performance. To facilitate the visualization we reduced the network in grade 2, keeping only those parliamentarians that acted on two or more categories and the categories that counted on the participation of two or more parliamentarians. The result can be seen in the graph below (Figure 8), in which the different classes (communities) are represented in four different colors and the nodes are sized according to the number of relationships established.

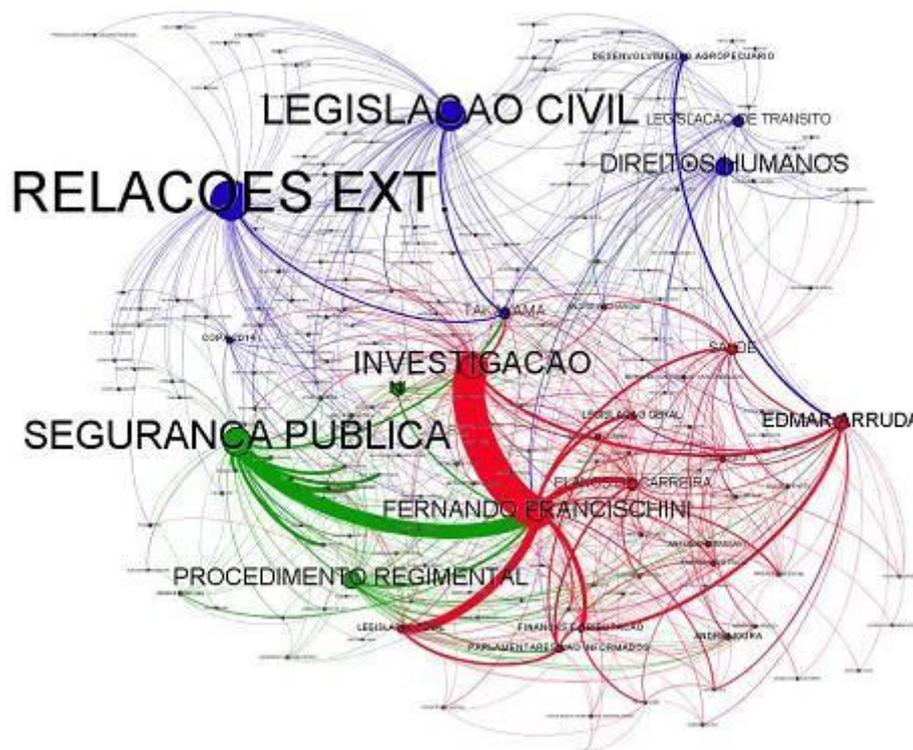


Figure 8 – Network graph of categories and parliamentarians by class modularity (communities of parliamentary subjects) - Reduced to Grade 2.

Source: the authors (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

Two communities stand out in the graph, both formed by the relations established by Fernando Francischini (PSDB), that shelter the categories Public Safety (green) and Investigation (red), containing in their "community" the legislators Edmar Arruda (PSC) and André Zacharow (PSC). On the other hand, the blue community, formed by the categories Foreign Relations, Civil Legislation and Human Rights, appears almost isolated due to the removal of high number of parliamentarians who only had a relationship in the network.

For studies on the relationship between categories and parliamentarians, we converted the dual mode network once again to one mode, that is, we suppressed the parliamentarians and

verified the metaconnections between categories established by suppressed parliamentarians. Next, we deleted the categories and obtained the metaconexions among parliamentarians constituted by the suppressed categories. The graph below (Figure 9) shows the result of the first conversion.

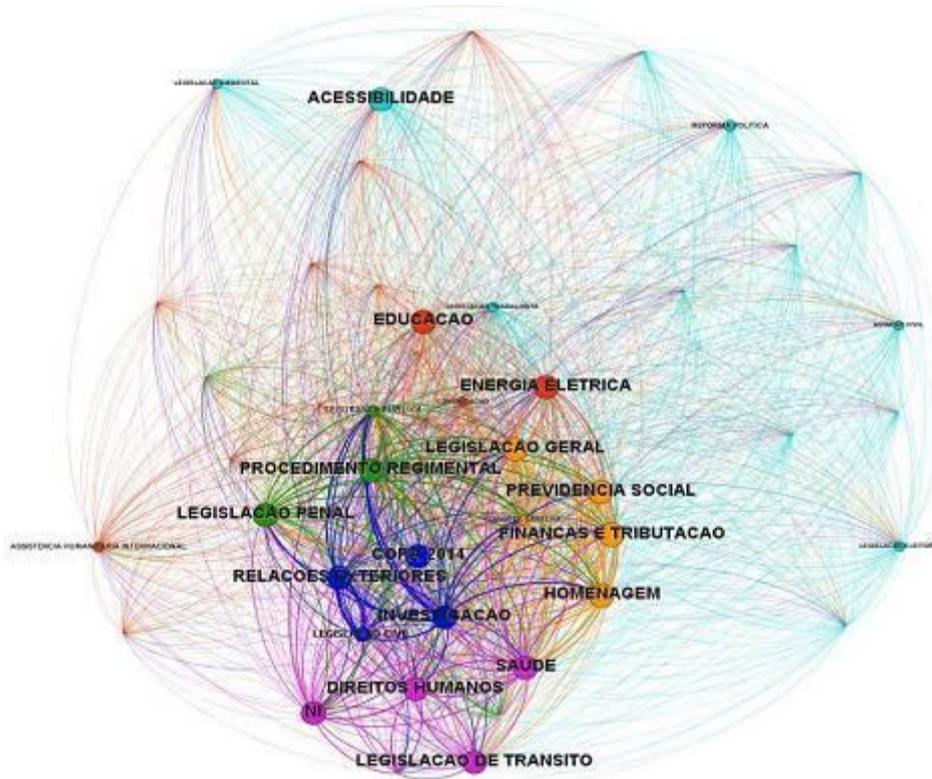


Figure 9 – Network graph one mode of categories connected by parliamentarians.

Source: the authors (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

The graph shows that the categories most strongly connected by the 325 parliamentarians studied are Research, 2014 World Cup, Foreign Affairs and Civil Legislation, represented by the dark blue color. Other communities include the categories Human Rights, Health and Traffic Legislation (pink), General Legislation, Social Security, Finance and Taxation (orange), and Procedural Regimental and Criminal Law (green). A small community of categories connected by parliamentarians, in red, brings together Education and Electric Energy. In addition, the bright blue community occupies ample space. There is, however, a marked dispersion in categories with a small number of parliamentarians who articulate them, a factor that gives them a low degree of centrality and consequent representation by small points, with the exception of the Accessibility category. This indicates a relative fragility in the relationship established by the parliamentarians that integrate this community and those that integrate the other five communities of the network.

Another effort to explore the existing metaconnections in the network under study was the one-mode generation of communities of parliamentarians connected by the 45 categories. The result of this work can be seen in the graph below (Figure 10).

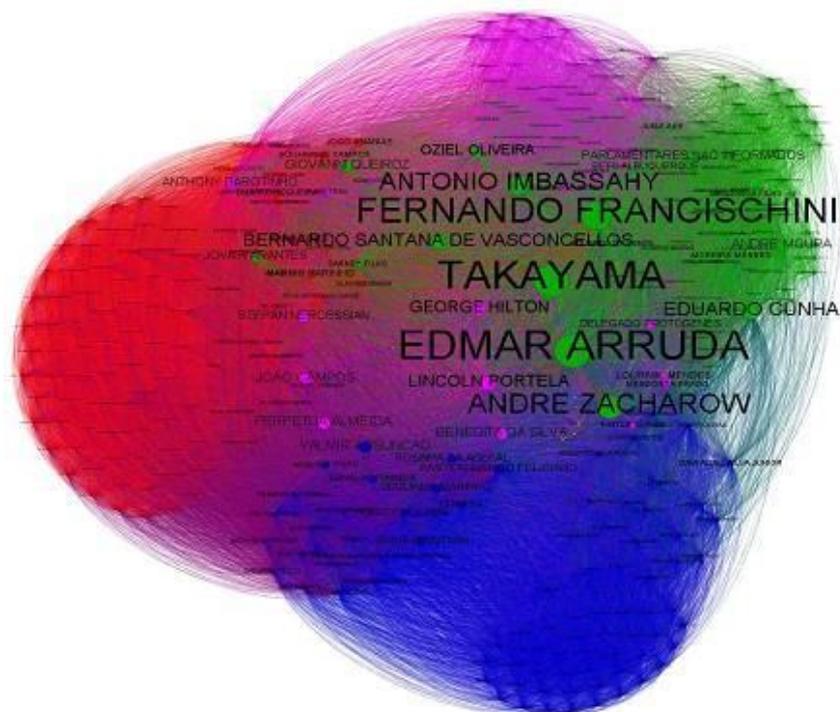


Figure 10 – Graph of network one mode of parliamentarians connected by categories.

Source: the authors (2017).

Note: prepared with data from the Chamber of Deputies of Brazil.

The 325 parliamentarians who form the basis of study are divided into four large communities. The most expressive community is represented by the green color, whose deputies are more connected to each other through the categories of subjects of the propositions that subscribe in the condition of authors or co-authors. The four MPs initially selected were Fernando Francischini (PSDB), Hidekazu Takayama (PSC), Edmar Arruda (PSC) and André Zacharow (PMDB). Also included are Antônio Imbassahy (PSDB-BA), Eduardo Cunha (PMDB-RJ), Oziel Oliveira (PDT-BA), Bernardo Santana (PR-MG), Giovanni Queiroz (PDT-PA) and Jovair Arantes -GO). These parliamentarians are thus positioned because they have strong ties in acting together, capable of resulting in parliamentary proposals widely shared by the same community.

The community represented by pink color "connects" the others. It is composed of parliamentarians with some relevance of connection between the categories, it has as highlights George Hilton (PRB-MG), Lincoln Portela (PR-MG), Benedita da Silva (PT-RJ), João Campos (PSDB- GO), Stepan (PCdoB-AC), Delegate Protogenes (PCdoB-SP), Lourival Mendes (PTdoB-MA) and Anthony Garotinho (PR-RJ). The other communities represented by the colors blue and red are composed of two sets of parliamentarians weakly integrated by the categories of propositions that subscribe. These are cases of parliamentarians who share a small number of propositions among themselves.

By exploring the network formed by the relations between parliamentary authors and co-authors with the categories of the subjects of their propositions, we were able to identify the themes to which the deputies most devote themselves. Regarding the evangelical parliamentarians

of Paraná, Fernando Francischini worked mainly on the categories of Investigation, Public Security, Procedural Regimental, Finance and Taxation, Career Plans, Health and Criminal Legislation. Hidekazu Takayama has stronger links with the categories Civil Law, Foreign Affairs, Research and Public Security. Edmar Arruda, in turn, with the categories Finance and Taxation, Agricultural Development and Research; and André Zacharow, with the categories Human Rights, Traffic Law, Agricultural Development and Health. In short, despite being gathered in the same evangelical group, their work shows quite different focuses.

#### **4 Final considerations**

Throughout the article, we tried to demonstrate the feasibility of a methodology for analyzing parliamentary activity focused on examining the relationships established by proposers and their respective themes. The empirical object was initially composed by the contents of the proposals of four members of the Evangelical stand of Paraná during the 54th Legislature of the Chamber of Deputies (2011-2015). We associate with them the coauthors of the matters, evangelicals or not, with which we constitute the investigated network.

Our main finding is in relation to the literature on evangelical parliamentarians, which affirms, on the one hand, that the political and ideological homogeneity between them is not so expressive and, on the other, that if any unity can be found within this group, it includes themes related to Christian morality. However, not even the 51 members of the FPE in the period that appeared on the network are authors of central propositions of subjects related to these themes, confirming their fragile uniformity. It is worth noting the very pulverized performance of three members of the paraniacan evangelical group. Hidekazu Takayama was linked to 55 different subjects, Edmar Arruda to 88, and Fernando Francischini to 201 (in a different direction, André Zacharow subscribed to propositions classified in only 16 different subjects).

The fundamental contribution we seek, however, has a methodological character. The purpose of this paper is to explain how the use of social network analysis (ARS) opens up perspectives for the constitution of new forms of study of parliamentary activity, by orienting an investigation on the themes of parliamentary propositions and congressional networks within the parliament and considers such initiatives as a key part of the.

Having demonstrated the feasibility of the model, the next step is its improvement. Among the innumerable possibilities in this sense, one of the ones that presents greater analytical potential is the inclusion of attributes of the parliamentarians, besides the reference of belonging to specific groups, such as: unity of the federation; political capital; genre; source of campaign funding; ideological orientation of the party; occupancy of leadership positions, in committees and at the board of directors; among others. These attributes could be related to variables of positionality (central or peripheral) of these actors in the network of subjects, considering not only the themes, but the connotation (favorable, unfavorable, propositive) of the positions assumed by

the parliamentarians vis-à-vis the subjects of the propositions and so on. In addition, it is possible to apply the methodology in the examination of other legislative houses and deliberative spaces in which the actors and their performances are documented and can be arranged in a network. The model we propose can, in short, produce a promising research agenda.

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