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THE CHILEAN CONSTITUENT PROCESS: A Computational Social Science approach.

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Summary

In October 2015, the government of Chile started a constitution-making process, which allowed citizen participation. During the participatory phase, citizens gathered in local self-convoked encounters to debate on four dimensions: constitutional values, rights, duties, and institutions. For each one of these four dimensions, participants collectively selected seven concepts from a list provided by the government or added new ones. For each concept, they wrote down a short argument explaining why this concept should be included in the new constitution. Although this process did not result in a new Constitution, the citizen consultation resulted in a valuable and unique source of information about people's social and political preferences. The first objective of this work is related to the constitutional process itself and the citizen participation. The Chilean process exhibited two critical design weaknesses we analyze here. The first one is representativeness: the voluntary nature of the encounters increased participation biases, as those citizens who support the acting government were more likely to participate in the consultation. We study the determining factors of citizen participation in ELAs by setting up various regression models at the municipality-level. We found that engagement in politics and support for the government increases participation, which suggests that citizen involvement in the constitutional process may have been ideologically driven. The second weakness is the group deliberation quality. For a public deliberation to produce epistemic superiority, all the participants should have access to relevant and accurate information and evidence. Then, we analyze the written arguments for each selected concept, using structural topic modeling and natural language processing. We show that the emergent content can be ideologically differentiated, and that groups from municipalities with higher socioeconomic index, on average, produce higher-quality deliberation compared to groups from less developed municipalities. The second object of study comes from the data. The dataset gathered in the local participatory phase provides a rich source of information about people's political preferences. To map the political ideology, we built co-occurrence networks where the nodes represent the consti-

tutional concepts, and the links represent the association among them. Then, we aim to discover the structure of the ideology by examining the resulting networks, and identifying clusters - highly connected groups of concepts - inside them. The communities we found are consistent with the political conglomerates existing in Chile in 2016. Finally, using natural language processing techniques, we extracted psycho-linguistic features from the argument texts. These features are “internal factors”, for they respond to the intrinsic psychological, emotional, attitudinal or cognitive state of the subject, which affects their political ideology. Next, we set up a discrete choice model to study the effect of those features in cluster membership. We find that the progressive-left cluster shows a more propositive and non-agentic attitude when referring to values, as opposed to the traditional left. Regarding the dimension of rights, the right-wing cluster displays a more valorative attitude, suggesting that first-generation rights may also play the role of values. Throughout all chapters, and by the methods we use, this work attempts to contribute to the field of computational social science.

1. Introduction

In October 2015, the government of Chile started a constitution-making process, which allowed citizen participation. The process started with a phase of civic education, followed by a participatory phase. This phase had four stages: the first one was an online individual questionnaire; the second, local self-convoked encounters (ELAs, according to its initials in Spanish); the third and fourth levels also consisted in citizen dialogues which took place at the provincial and regional capital cities. In each stage, the participants were asked to debate on four dimensions: constitutional values, rights, duties, and institutions. The result of this consultation would serve as an input to the elaboration of a new Constitution proposal written by the executive power (OECD, 2017). The proposal was submitted to Congress in March 2018. Although this proposal did not move forward further in the Congress, the citizen consultation resulted in a valuable and unique source of information about people's social and political preferences [1]. Yet, - to our best knowledge - there is little research on the matter.

Two interesting objects of study arise from this experience. The first one concerns the constitutional process itself and the citizen participation in such instances. Given the increasing trend of public participation in political processes,

[1] The data is publicly available and can be found at http://constitucionabierta.cl/. The details of the data systematization can be found in the executive report: http://archivospresidenciales.archivonacional.cl/index.php/informe-ejecutivo-sistematizacion-de-la-etapa-participativa-del-proceso-constituyente-abierto-la-ciudadania, accessed on Januery 27, 2022

the Organisation for Economic Co-operation and Development (OECD) has proposed several recommendations for deliberative processes for public decision making (Chwalisz, 2020). In this regard, the Chilean process exhibited at least two critical design weaknesses we analyze here. The first one is representativeness: the voluntary nature of the encounters increased participation biases, as those citizens who support the acting government were more likely to participate in the consultation. The second one is the group deliberation quality. For a public deliberation to produce epistemic superiority, all the participants should have access to relevant and accurate information and evidence.

Beyond evaluating the constituent process, this exercise is an opportunity to explore new methodologies to assess the real effects of deliberative democracy. This is particularly important as citizen participation initiatives are becoming increasingly popular. As a mechanism of political participation, public deliberation by itself would confer legitimacy to any political process (Manin, 1987). Moreover, since group reasoning tends to outperform individual reasoning (Mercier and Landemore, 2012), deliberation would entail civility and argumentative complexity (Dryzek et al., 2019, p. 1145). However, the quality of the deliberative outcome is not independent on the arrangement of deliberative processes. In fact, critics of deliberative democracy have pointed to information asymmetries (Weinshall, 2003) as a major drawback of this kind of process. In sum, there is a need for more practical attempts to evaluate deliberative processes. In this work, we try to do it from texts, quantifying textual complexity and relating this to different sociodemographic variables.

The second object of study comes from the data. The dataset gathered in the local participatory phase provides a rich source of information about people's political preferences. Indeed, people all along the country voluntarily decided to

gather to discuss the values, rights, duties and institutions that the new Constitution should include. For each one of these four dimensions, participants collectively selected seven concepts from a list provided by the government or added new ones. For each concept, they wrote down a short argument explaining why this concept should be included in the new constitution. As the constitution is seen as a fundamental law, the concepts selected after the discussion reflect a prioritization of political ideas. Moreover, the broad set of concepts arisen from the process allow us to study political ideology from an operational aspect[2].

Most of recent studies of political ideology in Chile are based on factorial analysis (Bonilla et al., 2011; Bonilla and Silva, 2008; Lindh et al., 2019). These methods have been the standard in ideology estimation, because of their ability to reduce the number of dimension into a few ones, highly representatives. And they had been proved useful for characterize and interpret political positioning, and to examine trends over time. However, they are based on political actor's evaluation and therefore, use a symbolic aspect of ideology. In this sense, our study complements this field from a different perspective, and operational approach, letting communities emerge from concept associations.

As we have stated that the Chilean constituent process suffered from self-selection biases, one may be reluctant about using this dataset to study the political ideology. However, the method we proposed to map the ideology does not rely on absolute or relative frequency of concept selection, but on the association between pairs of concepts. In this sense, we represent ideology as a map (network) of concepts, where the strength of this association does not depend on the concepts popularity, but on the co-occurrence of such concepts among different

[2]Here we are using Jost et al. (2009) distinction between the "symbolic" and "operational" aspects of ideology. In this terminology, self-identification on a right-left scale is part of the symbolic aspect, since "right" and "left" are abstract and general categories. The operational aspect refers to more specific and concrete issues.

local encounters. Indeed, our method allows small but highly organized groups to emerge in the network.

The thesis roadmap is as follows: in Chapter 2, we study the determining factors of citizen participation in ELAs by setting up various regression models at the municipality-level. We included socio-demographic and political variables, as well as social capital indicators from different data sources, such as census, the Electoral Service, and the national municipal information system, among others. Regarding the influence of socio-demographic variables, one important finding is that engagement in politics and support for the government increases participation, which suggests that citizen involvement in the constitutional process may have been ideologically driven. Then, we analyze the written arguments for each selected concept. Given the increasing demands on social rights in Chile, we specifically focus on the dimension of *rights*. Finally, using structural topic modeling and natural language processing we identify the latent topics in the argument texts. We show that the emergent content can be ideologically differentiated, and that groups from municipalities with higher socioeconomic index, on average, produce higher-quality deliberation compared to groups from less developed municipalities.

The goal of Chapter 3 is to explore the political ideology underlying the concepts that people chose (or added) during the process. For each constitutional dimension, we built a co-occurrence network where the nodes represent the constitutional concepts, and the links are created by testing the pair-wise frequencies of all pairs of concepts. A positive and significant association between two concepts will generate a link between them in the network, whose weight will be related to this association. Then, we aim to discover the structure of the ideology by examining the resulting networks, and identifying clusters - highly connected

groups of concepts - inside them. The methodology we propose here is based on the idea that the co-occurrence networks represent the citizen's priorities, and therefore, their political location in each constitutional dimension. The communities we found are consistent with the political conglomerates existing in Chile in 2016. Furthermore, the presence of an organized religious-conservative cluster may be seen as a prelude of the recently created Republican Party in Chile.

Assuming that the clusters inside the co-occurrence networks represent political - ideological communities, we may go one step further and try to characterize these communities from a mental process perspective. This is what political psychology studies, and what the last chapter, Chapter 4, is about. Let us recall that in these encounters, participants had to write a short argument for each concept they selected. Therefore, if each community contains a set of concepts, and each concept is associated with a set of argument texts, we can describe the community through the texts. Using natural language processing (NLP) techniques, we extracted psycho-linguistic features, which are related to the concepts, and therefore to the group of people who wrote those arguments. These features are "internal factors", for they respond to the intrinsic psychological, emotional, attitudinal or cognitive state of the subject, which affects their political ideology. Next, we set up a discrete choice model to study the effect of those features in cluster membership. We find that the progressive-left cluster shows a more propositive and non-agentic attitude when referring to values, as opposed to the traditional left. Regarding the dimension of rights, the right-wing cluster displays a more valorative attitude, suggesting that first-generation rights may also play the role of values.

In Chapter 2 we contribute to the literature on political participation, particularly in constitutional moments, and also to the Public Ignorance Objection. Since

Chapter 3 aims to map the political ideology in Chile, its main contribution is focused on our country. However, we propose a new methodology, based on network analysis and community detection. The success of the outcome - i.e. the communities found within the network - will depend on the diversity of concepts included in the network. In this constitution-making process, the organizers provided a relatively broad pool of concepts, but - and most importantly - it allowed people to write their own concepts. Therefore, our database incorporates a sufficiently broad set of concepts to plausibly map Chilean's political groups. Moreover, - and given the nature of the data - we also cover topics on political economy, such as preference aggregation and organized groups. Chapter 4 is embedded in the political psychology literature, a highly popular field of study. While most of the research has been done by linking an internal factor with a left-right self-placement scale, some works have proposed more elaborated models - for example, two dimensional models - for political ideology (see the literature review in Chapter 6). In this regard, our method does not impose a structure to political ideology, but identifies groups using the association of concept selection. Although the previous methods - such as the use of left-right self-placement scale - has proved useful for voting behavior research, we hypothesize that psycho-linguistic feature extraction from texts can also develop the motivational processes underlying ideology. This contribution is relevant given the high volume of text available today on the internet.

As a whole, this work is entitled: "The 2106 Chilean constituent process: a computational social science approach". Throughout all chapters, and by the methods we use, our work attempts to contribute to the field of computational social science. In general terms, this field concerns the collection of large amounts of data - including unstructured data - and its analysis with powerful computational meth-

ods. This has allowed an improved understanding of social phenomena such as social networks, economics and voting behavior. For us, this is an opportunity to study old and new problems rigorously within a multidisciplinary perspective.

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2. Citizens at the forefront of the constitutional debate: Participation determinants and emergent content in Chile

Abstract [1]

In the past few decades, constitution-making processes have shifted from being undertakings performed by elites and closed off from the public to ones incorporating democratic mechanisms. Little is known, however, about the determinants of voluntary public participation and how they affect the outcomes of the deliberative process in terms of content and quality. Here, we study the process of constituent involvement in the rewriting of Chile's constitution in 2016. A total of $106,412$ citizens in $8,113$ different local encounters voluntarily congregated in groups of ten or more to collectively determine what social rights should be considered for inclusion in the new constitution, deliberating and then articulating in the written word why should be included. We brought our data to statistical regression models at the municipality level, the results show that the main determinants associated with increasing citizen participation are educational level, engagement in politics, support for the government, and Internet access. In contrast, population density and the share of Evangelical Christians in the general population decrease citizen participation. Then, we further analyze the written arguments for each collectively-selected constitutional rights. The findings suggest that groups from socioeconomically developed municipalities (with higher educational levels and where the main economic activities are more distant from natural resources), on average, deliberate consistently more about themes, concepts, and ideas compared to groups from less developed municipalities. These results provide an empirical ground on the driver factors of voluntary citizen participation and on the benefits and disadvantages of deliberative democracy. Hence, results can inform the organization of new deliberative processes.

[1] Submitted to PLOS One, November 2021

2.1 Introduction

The increasing rate of sociopolitical crises around the globe encourages us to rethink the mechanisms of democracy and how to improve its representativeness – how good the diversity is represented– and functionality –the quality of outcomes. The long tradition of constitutions produced by elite social classes is being challenged by a democratic constitution-making process because the former lacks legitimacy due to it consistently serving the needs of elites at the expense of the general population (Elster, 1993; Ginsburg et al., 2009; Hart, 2003). Deliberative democracy is emerging as an approach that fosters public involvement (Dryzek et al., 2019) where citizens can participate before, during and after the process of constructing the constitution that will govern their societies (Banks, 2007; Ginsburg et al., 2009; Hart, 2003). Yet, we still lack a full understanding of public participation in democratic and deliberative constitutional-making processes (Dryzek et al., 2019).

Here, we use data on Chile's deliberative constitution-making process in 2016 to understand public participation in a deliberative democracy setting. In October 2015, the Chilean government proposed a new constitution-making process with the final aim of generating a new governing document. The Chilean constituent process of deliberation represents a deliberative democratic exercise in which citizens are active participants at the forefront of the debate that generates inputs for the proposed new constitution.

According to the OECD report(OECD Public Governance Reviews, 2017), Chile's case was unprecedented because of its high rate of participation (1.13%) across 98% of its territory, (Fig. 2.1B) ultimately involving $204,402$ individuals.[2] Moreover,

[2]Similar experiences in the constituent process in other countries resulted in lower rates of citizen participation. For instance, Colombia in 1991 achieved (0.06% citizen participation); Iceland in 2010, (0.3% citizen participation); and Tunisia

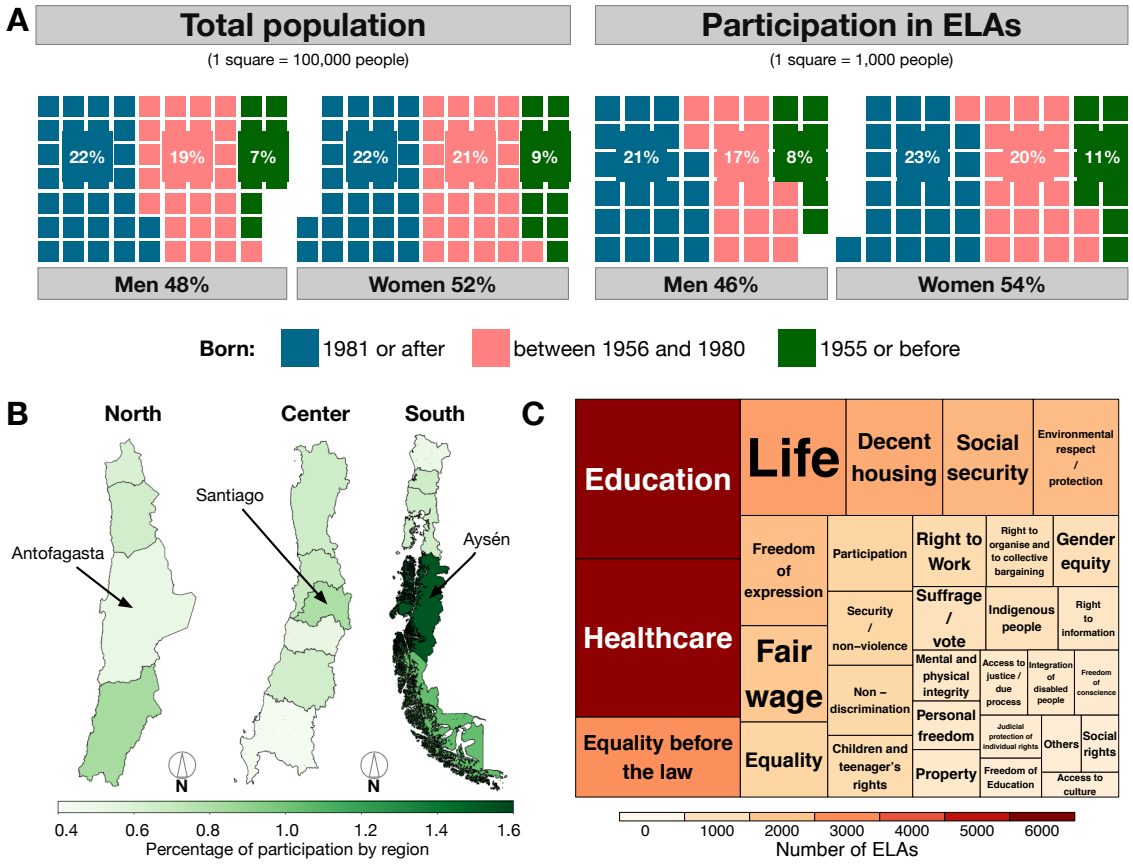

Figure 2.1: A) Composition of national population from Census 2017 data and of citizen participation in self-convoked encounters (ELAs), by gender and generational cohorts (colors). Participation distribution does not differ significantly from the population distribution. The contingency tables and chi-squared test results can be found in the appendix (Tables 2.6 and 2.7). B) Percentage of the population participating in ELAs per region in Chile. From left to right, the northern macro-zone, the center macro-zone, and the southern macro-zone. C) What constitutional rights do people select at the country level? The tree-map depicts the most selected constitutional rights in all the self-convoked encounters, ELAs. Color and size represent the number of ELAs in which those concepts were selected.

in terms of gender and age, the participation distribution in the Chilean deliberative process did not differ significantly from the population distribution, suggesting that it represents citizens at the country-level for these two dimensions (Fig. 2.1A).

The process started with government-convened sessions of civic education followed by a participatory phase divided into four stages: (i) an online individual

in 2011, (0.06% citizen participation (OECD Public Governance Reviews, 2017)).

questionnaire; (ii) local, deliberative self-convoked encounters (in Spanish *Encuentros Locales Autoconvocados*, henceforward "ELAs"); (iii) dialogues at the province level; and finally (iv) dialogues at the regional level. At each stage, citizens were asked to debate four constitutional dimensions: (i) Principles and Values, (ii) Rights, (iii) Duties, and (iv) Institutions.

Given the current increasing demands on social rights in Chile, we focused on the local, self-convoked encounters in the dimension of *Rights*. A total of $106,412$ citizens participated in $8,113$ ELAs (Ministerio Secretaría General de la Presidencia, 2018), and each ELA consisted of between 10 to 30 people, all over 14 years old (Jordán et al., 2016). For each of the four constitutional dimensions, participants collectively selected seven constitutional concepts from a list provided by the government or determined new constitutional concepts to be considered after group deliberation (Fig. 2.1C). For each chosen or determined concept, they wrote down a short argument explaining why this concept should be included in the new constitution. The result of this consultation served as an input to influence the process of the executive power writing the new constitution (OECD Public Governance Reviews, 2017). The proposal was submitted to Congress in March 2018.

Here, we study the determinants of citizen participation in ELAs through our setting up of various regression models at the municipality level[3]. We included sociodemographic and political variables as well as social capital indicators from different data sources such as the census, the Electoral Service, and the National Municipal Information System. Regarding the influence of sociodemographic variables, one important finding is that engagement in politics and support for the government increase participation, suggesting that citizen involvement may be

[3]Chile has 346 communes and 345 municipalities. In this work, we have exclude the data from the Chilean Antarctic Territory. Henceforward, we use the term municipality for simplicity.

ideologically driven. Next, we analyzed the effects of the citizen participation determinants and other relevant variables on the content and quality of the arguments. To do so, we first identified the latent topics in the argument texts using structural topic modeling. Then, we explored the content changes for each topic for cities with different characteristics, showing that the emergent content can be ideologically differentiated. Finally, we proposed a metric to establish the quality of arguments based on lexical and syntactic markers and similar but non-repeated terms. Our results show that municipalities with higher educational levels and where the main economic activities are relatively distant from natural resources (both proxies for a municipality's knowledge) deliberate on themes, concepts, and ideas, whereas municipalities with low education levels and where the main economic activities belong to the primary sector (extraction) deliberate more on actions without defending their points of view with themes, concepts, or ideas.

This paper is organized as follows. In the Introduction we review the main determinants of political participation, and the pros and cons of citizen participation in Constitution-making processes. The Methods section describes the statistical model used to evaluate the participation in ELAs and the content and quality of the arguments. Then we introduce our results on citizen participation, topic modeling and text analysis. Finally, we present our conclusions and findings.

2.1.1 Political Participation

In the last few decades, research on political participation has been mainly focused on voter turnout, engagement in political parties, and civil disobedience, categories in which the most important participation determinants are gender (Pachón et al., 2012; Programa de la Naciones Unidas para el Desarrollo (PNUD), 2017; Schlozman et al., 1999), age (Contreras and Navia, 2013; Highton and

Wolfinger, 2001; Wolfinger and Rosenstone, 1980), education, income (Corvalán and Cox, 2010; Programa de la Naciones Unidas para el Desarrollo (PNUD), 2017; Verba et al., 1995), and social capital (Bargsted et al., 2013; Campbell et al., 1960; Coleman, 1988; Hofferth and Iceland, 1998; Klesner, 2007; La Due Lake and Huckfeldt, 1998; McCulloch, 2003; Muller, 1970).

Here, we inspect some of the main findings on political participation in our context of deliberative processes. We acknowledge that both forms of citizen participation - voting and public deliberation - will be similar in some aspects and different in others.

Gender In Latin America, the World Economic Forum's gender gap index shows low performance in political empowerment when correlated to economic participation and opportunity, educational attainment, and health (Pachón et al., 2012). Overall, Latin American women are less likely to be involved in political activities, particularly protest demonstrations and engagement with a political party. This phenomenon is closely related to women's presences in the work force: in general, the greater the female labor force participation, the greater their political participation (Pachón et al., 2012). Schlozman et al. (1999) studied gender, employment, and political participation found a number of work-related factors that enhance political activity, such as getting requests for political activity on the job, supervising others, and exercising civic skills. Negative work-related factors are also impactful: the experience of being discriminated against on the basis of sex can also lead to political activity. Additionally, marriage and having children at home indirectly depresses political activity because caring for young children often prevents a woman's participation in the work force and political activity (Schlozman et al., 1999). However, a recent study on electoral turnout in Chile shows that for almost all age groups, voter turnout rates for women exceed voter turnout rates

for men (Programa de la Naciones Unidas para el Desarrollo (PNUD), 2017).

Age The relationship between voter turnout and age is well-established in the literature. The level of participation is relatively low during early adult life, gradually increases in middle age, and slowly declines with old age (Wolfinger and Rosenstone, 1980). This behavior has been connected to a variety of stages in adult life such as marriage, home ownership, steady employment, and leaving school (Highton and Wolfinger, 2001). However, in Chile there is also a generational effect in voter turnout due to the electoral system. Those who registered to vote in the 1988 plebiscite were enrolled in a system with mandatory voting until 2011; the increase in electoral participation with age is therefore not directly associated with the age of voters but with their registration rates. (See subsection *Determinants of citizen participation* for more political context.) Those who reached the voting age after the plebiscite show lower enrollment and participation rates (Contreras and Navia, 2013).

Education and Income Regarding socioeconomic resources, income and education level have a positive and significant effect on political participation. Economic and cultural resources engender the development of intellectual and cognitive skills that typically reduce the subjective costs of participation (Verba et al., 1995). In Chile, the young electorate is strongly class-biased, particularly by income, which causes voter registration rates in the upper class to be double those in the lower class (Corvalán and Cox, 2010). An analysis of the 2016 municipal elections in Chile shows a negative effect of income on voter turnout (Programa de la Naciones Unidas para el Desarrollo (PNUD), 2017). However, this effect reverses when the observations are limited to the Santiago Metropolitan Region. This implies that spacial socioeconomic segregation is stronger in Santiago than in the rest of Chile, where different socioeconomic classes coexist in the same

municipality (Programa de la Naciones Unidas para el Desarrollo (PNUD), 2017).

Social Capital The term social capital was introduced by Coleman (1988) as a conceptual tool to describe how rational or purposive action is shaped by the social context. While physical capital improves tools to facilitate production and human capital promotes the development of new skills and capabilities, social capital relies on the relations between persons to facilitate increased engagement in a broad range of traditional political activities (La Due Lake and Huckfeldt, 1998). Empirical evidence supports this finding.

For instance, a study conducted using data from Argentina, Chile, Mexico, and Peru shows that greater involvement in non-political organizations and higher levels of interpersonal trust lead to more participation in political activities (Klesner, 2007). Population density and rurality have been used as proxies for social capital. Population density has a negative and significant effect on voter turnout (Bargsted et al., 2013; McCulloch, 2003) while rurality has a positive but not significant effect on voter turnout (Bargsted et al., 2013; McCulloch, 2003). In other studies, exploration of the role of urban and rural residency in promoting political activity has reached mixed conclusions. While some studies have found that urbanization makes political participation easier,(Campbell et al., 1960; Muller, 1970) others have shown that isolation and the lesser availability of public services in rural areas increase a sense of responsibility to others (Hofferth and Iceland, 1998), which promotes social capital and, therefore, civic engagement.

The evidence in Chile shows a significant negative effect of population density on electoral participation but no significant effect from the rurality variable (Bargsted et al., 2013). On the other hand, participation in voluntary associations is commonly used to measure social capital (Putnam, 1995). This idea is based

on the assumption that membership in voluntary associations generates trust and facilitates cooperation among members. Also, citizens that join voluntary organizations usually meet more people and expand their social circle, and hence become more engaged in civic life (Verba et al., 1995). However, participation in associations represents only a small part of human interaction. Participation in other networks such as family, schools, work, media and internet has a strong impact on norms and values (Westlund and Adam, 2010). Therefore, the role of associations in social capital generation may be limited. Recent research has addressed the role of media in the production of social capital. The evidence suggests that use of the Internet supplements network capital by extending existing levels of personal and telephone contact, thereby increasing social contact and civic engagement (Horrigan, 2001; Shah et al., 2001). Thus, the more people are involved in online organizational and political activities, the more they are involved in such activities offline (Wellman et al., 2001).

2.1.2 Citizen Participation in Constitution-making Processes

Nowadays, it is widely believed that democratic constitutions should be created and adopted through democratic processes because elite-made constitutions suffer from a lack of legitimacy by representing the interests of the elites, often to the detriment to the interests of the people they govern (Elster, 1993; Ginsburg et al., 2009; Hart, 2003). This idea relies on the belief that the sense of ownership that comes from sharing authorship enhances the understanding, respect for, and support of the constitution's constraints. These assumptions, however, have only recently been significantly tested by any rigorous study of the precise relationships between constituents' participation and a constitution-making processes (Ginsburg et al., 2009), as have this idea's effects on democratic governance. A twelve-

country study, commissioned by the Institute for Democracy and Electoral Assistance (IDEA), found that “more representative and inclusive constitution building processes resulted in constitutions favoring free and fair elections, greater political equality, more social justice provisions, human rights protections, and stronger accountability mechanisms”(Samuels, 2006). Later, researchers found that the use of public referenda during the process makes constitutions more likely to include every category of right and to provide for universal suffrage, a secret ballot, a referendum process in ordinary government, and a public role in approving constitutional amendments (Ginsburg et al., 2009).

This new constitution-making process that incorporates citizen participation before, during, and after the text is finalized is supported by numerous international organizations and entities, including the European Union, the Commonwealth Human Rights Initiative, the United States Institute of Peace, and the Centre for Democracy and Development (Banks, 2007). Models of participation differ considerably, not only among countries, but within a country. The modal form of participation in constitutional design is the approval by referendum of the final document as a whole (Ginsburg et al., 2009). Other forms of participation include elections for constitution-making assemblies; civic education and media campaigns using newspapers, radio, television, web sites, and public meetings; prior agreement on broad principles as a first phase of constitution making; an interim constitution to create space for longer term democratic deliberation; and public deliberation (Ginsburg et al., 2009; Hart, 2003).

Public deliberation is particularly controversial. Theoretically, group discussions are more likely to produce better outcomes. The idea of sharing different perspectives to formulate political decisions has interested numerous thinkers, including Aristotle, who wrote: “The people, when they are assembled, have a com-

bination of qualities which enables them to deliberate wisely and to judge soundly" (*Pol*.III.11.1281 a12-b10 (Barker, 1948)). Nowadays, deliberative democracy is a field of study by itself. According to Habermas (Habermas, 1996), given the proper conditions of an inclusive and critical discussion in an argumentative form free of any internal or external coercion, public deliberation should reach consensus. In this context the idea of consensus is key, for it confers legitimacy to any political result and, in this case, to a constitution.[4] A more moderate view (which reconciles pluralism and consensus) accepts a meta-consensus instead of a consensus on the outcome.[5] In any case, whether consensus is reached or not, public deliberations have the potential to improve individual rationality (Landemore and Mercier, 2012), a positive effect. Furthermore, deliberation has an emancipatory effect, (Niemeyer, 2011) by which the participants develop integrative thinking on the discussed issues, overcoming preexisting distortions.

However, for deliberation to be successful, no information asymmetry can exist. As pointed out by Weinshall (Weinshall, 2003, 32), "To claim that an instrumentally rational will be produced by democratic deliberation or discourse requires one to assume that the public is either very well informed or that it is capable of becoming adequately informed." If these assumptions fail, allowing public participation will not make rational outcomes more likely. (Weinshall, 2003) Other criticism focuses on the "group polarization effect," by which the members of a deliberating group push their initial individual positions to extremes though the process of deliberation (Stoner, 1961; Sunstein, 2002), as well as on the instability and inconsistency of citizens' political preferences (Sears, 1993), and the effect of cognitive biases (Caplan, 2011). Another concern has to do with the size of deliberating groups

[4]To Bernard Manin, the essential condition for legitimacy is public deliberation itself. Thus, a decision is legitimate not because it represents the will of all, but because it results from the deliberation of all (Manin, 1987).

[5]Meta-consensus can refer, for example, to agreement on the nature of the issues to discuss or on the domain of relevant reasons or consideration to be considered in the discussion (Niemeyer and Dryzek, 2007).

and the difficulty of reaching agreement. In larger groups, the costs of negotiation increase, making the *status quo* more difficult to change. This is particularly impactful when participants or groups have veto powers over the adoption of new rules. (Tsebelis, 2002).

We have reviewed several pros and cons of public deliberation, but in our inquiry into public deliberation, we focus on the Public Ignorance Objection (Somin, 1998; Talisse, 2004). According to Somin (1998), voters are ignorant about specific policies and the basic structure and functioning of government. Furthermore, most voters do not have a single analytical framework - a few basic principles - to integrate different political issues (Somin, 1998). In the same vein, Talisse (2004) identifies two types of ignorance. The first, Belief Ignorance, consists of the possession of false beliefs to such a degree that one cannot reach a correct conclusion. If the beliefs or premises are true, however, the conclusions will also be true, and so the presence of this type of ignorance alone is not enough to reject deliberative democracy. The second, Agent Ignorance, is a scenario in which the citizen, despite having the correct information on a given issue, reaches the wrong conclusions. This type of ignorance, "would prove devastating to any conception of democracy, not just deliverativist versions." (Talisse, 2004).

How can we quantify the extent of public ignorance in ELAs? In practice, none of the other types of ignorance can be tested; that would require evaluating the veracity of each argument text, and since most of them are deontic sentences, this cannot be done. [6]. We can, however, consider the quality of the argument. A truly rational deliberation needs individuals to communicate high-quality arguments that are suitable for evaluation and counterargument. But there can be a relevant number of low-quality arguments - that is, arguments that cannot be con-

[6] A deontic sentence is an expression of practical reasoning that cannot be verified because it expresses a desire whose content is a future action.

trasted and that do not contribute to the objective of group deliberation and thus to the epistemic improvement of individual reasoning (Landemore and Mercier, 2012). In this case, the result of the deliberation will probably not be as good as the deliberative democracy theorists expect. Although low-quality arguments do not necessarily imply false beliefs, they often lead to faulty or sub-optimal deliberations. In this work, we evaluate the quality of ELAs' argument texts by looking at justifications or testimonies in those deliberations. In this sense, we are not linking the quality of arguments to the possibility of verifying their contents. Instead, we will look for a functional quality related to the capacity of a sentence to contribute to the deliberation with useful information. In any case, low-quality arguments still have a value: they inform about the agent's ideological position on a particular issue.

2.2 Methods

The new constitution-making process held in Chile between April and August 2016 is particularly important worldwide because of its high levels of citizen participation and geographic coverage. In the entire four-stages of the process, more than $200,000$ citizens participated. Here, we focus on the ELA stage. For each ELA, the data includes the name of the commune in which the encounter took place, the age and gender of participants, the collectively agreed-upon constitutional rights, and the argument texts. We ran several statistical models to explain the number of ELAs held in each municipality. The data on ELAs used in this study is publicly available and was previously systematized, and all the argument texts were normalized (Fierro et al., 2017; Fuentes-Bravo and Martinez, 2018). Finally, we used complementary data on the 345 Chilean municipalities.

During the ELA meetings, the participants were asked to identify the most im-

portant constitutional concepts in four dimensions: Rights, Values and Principles, Duties, and Institutions. Given the recent social movement in Chile and the increasing demand for social rights (Ugalde et al., 2020), we focused our analysis on the constitutional concepts within the Rights dimension. The original list of rights provided by the government included 45 items, and ELA participants added 14 new rights in the process, resulting in 59 rights in total. Among the new concepts,Social Rights, Standard of Living, and the Right to Quality Public Health Care reaffirm the increasing demands for social rights in Chile, while Respect Life from Conception and the Right to Make One's Own Decisions About One's Life arise as specifications of the original Right to Life. Figure 2.1C shows that most rights deliberated upon and accepted in the ELAs are rights that would exist at the national level. The full list of rights available to ELA participants, along with the new concepts that emerged in the deliberation process, can be found in the appendix. For each selected constitutional right, each ELA wrote down a short argument about why that concept is relevant and why it should be included in the new constitution. These texts were subsequently processed and classified by combining experts' knowledge and machines tools by Fierro et al. (2017); Fuentes-Bravo and Martinez (2018).

2.2.1 Determinants of Self-convoked Citizen Participation

Statistical Model

According to Strauss and Howe (1991), historical events are associated with recurring generational archetypes. Therefore, we define age cohorts based on the Chilean political background. In 1973 the Chilean military, led by general Augusto Pinochet, staged a *coup d'état* against the socialist government of Salvador Allende. An authoritarian military regime ruled the country until the transition to

democracy in 1989. It has been found that people in younger cohorts are more likely to be less politicized than people in older ones, since they did not experience the military dictatorship nor the political climax that prevailed during the transition to democracy (Carlin, 2006). Here we use the three age cohorts proposed by Lindh et al. (2019): (i) Chileans who were over 18 years old when Pinochet took control in 1973; (ii) those born between 1956 and 1980 and who experienced life under the dictatorship until Pinochet's ousting in 1998; and (iii) those born in 1981 and after who became adults after the reestablishment of democracy.

Figure 2.1A shows the composition of the national population and citizen participation in ELAs by gender and generational cohorts. A chi-squared test was performed to test whether the distributions of age and gender are statistically equivalent between the national population and citizen participation in ELAs. In either case, we can reject the null hypothesis of the test; therefore, the participation distribution differs from the population distribution, at the 1% significance level. However, in both cases the effect size is quite small. The contingency tables and chi-squared tests results can be found in the appendix (Tables 2.6 and 2.7). In contrast, the share of population participating in ELAs is substantively different when measured according to geography. Figure 2.1B shows citizen participation at the regional level, and the same variability is observed at the municipality level.

Using ordinary least squares (OLS) models, we studied the effects of sociodemographic and political variables on citizen participation. Given that each ELA represents an instance of collective deliberation, we measured citizen participation as the total number of ELAs held in each municipality instead of the total number of participants in each municipality. Nevertheless, the main findings of this work do not significantly change when using the number of participants as a dependent variable (see appendix Table 2.13). A histogram of the ELAs' number

of participants at the national level is also provided in appendix Figure 2.3. The regression model specification is the following:

$$\log(1 + ELA_i) = \beta X_i + e_i, \tag{2.1}$$

where ELA_i is the total number of ELAs held in the municipality i, X_i is a vector of covariates, and e_i is a random error term. The coefficients of interest are the βs, which measure the effect of the covariates on citizen participation. Note that we add 1 unit to the dependent variable. This correction serves to account for zeroes at the logarithmic transformation (McCune et al., 2002).

Independent Variables We did not seek any any personal information about income, education, or political inclination from participants. Instead, we run municipality-level models and aggregated data on socioeconomic and demographic indicators such as population, rurality, population density, education, socio-demographic classification, and Internet penetration rate, among others. When analyzing the collective selection of constitutional rights we use a socioeconomic development index (SEDI) that is proposed by the Public Health Observatory in Chile and comprised of education, income, poverty and housing materiality (Gattini et al., 2014). For social capital, we used the number of community organizations in the municipality, such as parent centers, cultural centers, sport clubs, and others. We also included political variables such as voter turnout, party affiliation, and political orientation to assess the impact of political engagement. Finally, we included variables relative to the municipality in order to test whether people were mobilized to participate. Because evidence suggests that participation in Evangelical Christianity can provide skills that members can transfer to political activity (Jones-Correa and Leal, 2001), we added an additional variable to account for the share of Evangelical Christians living in the municipality.

We collected all the independent variables from official national sources like the population and housing census (CENSO), the Electoral Service (SERVEL), the National Municipal Information System (SINIM), the National Office for Regional Development (SUBDERE), and the National Socioeconomic Characterization Survey (CASEN). Table 2.1 presents a detailed description of those variables. The descriptive statistics and the correlation for the most relevant variables can be found in the appendix (Table 2.9 and Figure 2.4, respectively).

2.2.2 Latent Topics of Deliberative Arguments

The analysis of large text corpora has proven fruitful in studying a range of topics in social sciences, including the analysis of discourse surrounding social movements (Bail, 2012), content analysis for political texts (Grimmer, 2010; Grimmer and Stewart, 2013), mapping social conflicts from legal sentences (Aitken et al., 2016; Herrera et al., 2019), research choice and the production of scientific knowledge (Foster et al., 2015), and communication and collaboration within organizations (Goldberg et al., 2016) (For a review of the history of content and text analysis in sociology and the social sciences, see Evans and Aceves (2016).)

Topic modeling, a group of inductive techniques used to discover hidden topics contained in text documents, has been particularly effective in analysis of this corpora. In this frame, a corpus is a collection of M documents denoted by $D = w_1, w_2, \ldots w_M$, while a document is a sequence of N words denoted by $w = (w_1, w_2 \ldots w_n)$, where w_n is the n-th word in the sequence. In general, models within this category assume that each document in a text corpus is produced from a mixture of latent topics, which in turn consists of a collection of words. Topics are defined as the set of elements that can represent a theme present in a collection of documents without loss of statistical information (Blei, 2012). In our particular

context, a document corresponds to an argument text.

Among topic models, Structural Topic Modeling (STM) is a technique enabling researchers to incorporate document-level metadata information into analysis. The goal of STM is to discover topics and estimate their relationship to document metadata, conducting hypothesis testing of these relationships. STM has been used to find latent topics in social scientific research (Bohr and Dunlap, 2018; Lindstedt, 2019), analyze open-ended survey responses (Roberts et al., 2014), and to uncover the underlying network structures of groups and communities by identifying topics in publications regularly consulted by those groups (Almquist and Bagozzi, 2019).

To implement STM analysis, we use the standard *stm* R package developed by Roberts et al. (2019), and we follow a conventional approach. First, stop-words are filtered from texts (Wilbur and Sirotkin, 1992), then texts are tokenized and all the punctuation is removed (Webster and Kit, 1992). Finally, bi-grams and tri-gramas are created (Damashek, 1995) to capture significant co-occurrences of words. After pre-processing texts, we run the STM model where texts' metadata can be incorporated in two ways: (i) as topical prevalence, which refers to how much of a document is associated with a topic, and (ii) as topical content, which is related to the words used within a topic. The generative process incorporates the p covariates in a 1-by-p vector of document covariates X_d for document d.

2.2.3 Text Quality of Deliberative Arguments

Finally, to assess the quality of argument texts we propose a metric with two categories: (i) texts that offer only an assertion without adding a justification, and (ii) texts that offer an assertion and also justify the content with testimony or evidence of some kind. From these two categories, the former will be considered

as low-quality argument. For example, “We must preserve the environment for future generations” would be a low-quality argument, and “It is very important to live in a pollution-free environment and for that we must promote respect for nature, both as citizens and businessmen” would not be. In the second case there is a justification to promote respect for nature, which is the importance of living in a pollution-free environment. To identify the presence of evidence or testimony, we use all available lexical and syntactic markers (argumentative, causal and conclusive connectors; evidential markers; etc.) that allow us to isolate those sentence components. As we cannot rely on these markers nor on punctuation, we also consider the presence of two or more (non-repeated) related terms as an indicator of a subordinate clause[7]. If we perform this analysis by topic, we can extract these terms from the list of topic words[8].

The quality of argument texts is also complemented with the degree of conceptualization of the topic. Words have different psychological properties and often are processed in the brain very differently (Miller, 1995; Tausczik and Pennebaker, 2010). Typically, a content/style classification is used to distinguish between *what* people are saying (i.e., the content of a communication), and *how* people are communicating (i.e., the style words such as prepositions, conjunctions, articles, and auxiliary verbs). Since most style words - including nouns, adjectives, and adverbs - have been removed from the corpus for the purpose of the topic modeling, here we classify them according to function: action words and phrases and concept words and phrases. For example, all terms containing verbs like “must,” “be able to live,” or “there must be education” are classified as actions while nouns like “security” and “profit” and adjectives like “safe” and “familiar” are classified as

[7]Restricting this criteria to three related terms does not alter the significance (or non-significance) of our results.

[8]For each topic, we built a list with the first 30 highest probability n-grams plus the 30 first frequent and exclusive n-grams. We then deleted non-informative verbs and adjectives/adverbs (such as “must” or “same”), and also n-grams when all of their components were already included in the list as tokens.

concepts. As concepts describe what and how things are, the higher the conceptualization, the higher the knowledge.

2.3 Results and Discussion

2.3.1 Citizen Participation in ELAs

Table 2.2: OLS Regressions, p-value RESET test Model 1 = 0.109 , p-value RESET test Model 2 = 0.1418, p-value RESET test Model 3 = 0.3501. RESET test were performed on the second power of regressors.

	Outcome variable:		
	log (1 + ELAs)		
	(1)	(2)	(3)
Log (population)	0.528^{**}	0.718^{**}	0.778^{**}
	(0.131)	(0.142)	(0.164)
Higher Education	0.156^{**}	0.128^{*}	0.185^{**}
	(0.047)	(0.050)	(0.065)
Internet penetration rate	0.113^{**}	0.105^{*}	0.103^{**}
	(0.036)	(0.041)	(0.039)
SUBDERE groups$^{(1)}$ (control)	yes	yes	yes
Log (community organizations)	0.103^{*}	0.059	0.085
	(0.048)	(0.056)	(0.051)
Born in 1981 or after		-0.032	-0.008
		(0.052)	(0.056)
Rurality		-0.081	-0.052
		(0.056)	(0.054)
Log (population density)		-0.100^{*}	-0.139^{**}
		(0.050)	(0.053)
Women		0.067	0.066
		(0.072)	(0.069)
Two-parent family (with children)		-0.133^{**}	-0.093^{*}
		(0.040)	(0.043)
Single-parent family (with children)		-0.065	-0.101^{*}
		(0.041)	(0.043)
Votes for current president			0.148^{**}
			(0.046)
Municipal officials			-0.040
			(0.170)
Voter turnout			0.087
			(0.054)
Mayor (government)			0.063
			(0.069)
Mayor (opposition)			-0.099
			(0.079)
Party affiliation			0.161^{*}
			(0.066)
Incumbent Mayor (True)			-0.020
			(0.054)
Evangelical Christians			-0.075^{**}
			(0.027)
Constant	-0.072	0.042	0.037
	(0.192)	(0.203)	(0.209)
Observations	313	313	310
R^2	0.784	0.804	0.834
Adjusted R^2	0.777	0.790	0.814
Residual Std. Error	0.463 (df = 301)	0.449 (df = 291)	0.424 (df = 275)
F Statistic	99.586^{**}	56.800^{**}	40.652^{***}
F Statistic	(df = 11; 301)	(df = 21; 291)	(df = 34; 275)

Note: *p<0.05; **p<0.01

$^{(1)}$ SUBDERE groups are a socio-demographic classification based on county's dependence on the municipal common fund.

$^{(2)}$ Only significant interactions are shown.

Table 2.2 reports standardized OLS regressions of the number of ELAs on several sociodemographic and political variables. Number of ELAs, Population, and Number of Organizations are count variables, and Mayor, Incumbent Mayor, and SUBDERE groups are categorical. The remaining variables are expressed as the share of the population. For instance, Rurality represents the share of the municipality-level population living in rural areas. Variables with high skewness have been transformed with a base 10 log function. The transformed variables are Number of ELAs, Population, Population Density, and Number of Community Organizations. The p-value of the Ramsey Regression Equation Specification Error Test (RESET) is provided in the caption of each table throughout this work. Only significant interactions are shown in Table 2.2, but the full list of interactions can be found in the appendix (Table 2.11).

The number of ELAs strongly depends on the population. As expected, this variable is the most variance-explicative predictor of citizen participation.

Model 1 Table 2.2 includes variables for socioeconomic and social capital. This model shows significant and positive effects for higher education, internet penetration rate, and the number of community organizations. According to the literature on political participation and social capital, education has a high impact both on social participation (Huang et al., 2009) and in the understanding of complex political information (Verba et al., 1995). As expected, our results confirm a significant and positive return to education (measured as the share of people with higher education) on the number of ELAs. Furthermore, from all the significant regressors of the full model, Education has the second-highest coefficient, after Population (Table 2.2).

Internet Penetration rate shows a consistent, positive, and significant effect on

the number of ELAs. This result is consistent with previous research showing a positive impact of the Internet on social relations and civic engagement. However, this variable has been derived from a CASEN survey that is representative only of 139 of the 346 municipalities in Chile. To assess the real impact of CASEN's lack of representativeness on the Internet penetration variable, we compared the following: (i) full model with all the 328 counties comprised in CASEN survey, (ii) full model with the 139 counties where the CASEN survey is representative, and (iii) bootstrapping of the full model with random samples of 139 counties (The actual number of observations in each case is slightly different due to missing values.) We used (iii) to evaluate whether the changes from (i) to (ii) resulted from the reduction of the sample size. The result of this comparison is shown in Table 2.17. We show that when considering only the 139 counties for which the CASEN survey is representative, the effect of the Internet penetration rate becomes non-significant. However, in the bootstrapped regression the effect is also non-significant and the error increases, suggesting that the loss of statistical significance may be due to the smaller sample.

The socioeconomic factor, represented here by the SUBDERE groups, shows no significant effect in the number of ELAs [9]. SUBDERE classification reflects the municipality's dependence on the Municipal Common Fund, and it is used here as a proxy for municipal residents' incomes. Since the sociodemographic groups created by SUBDERE incorporate the population in the municipality classification, this variable may be correlated with population density. Therefore, Model 3 in Table 2.2 (henceforth called "the full model") was repeated, replacing SUBDERE classification with a poverty measure, which also shows no significant effect (appendix Table 2.14). The regression results using Poverty are shown in appendix

[9] http://www.subdere.gov.cl/documentacion/definición-de-tipologías-comunales-municipales-reconociendo-la-diversidad-territorial-

Table 2.14. Replacing SUBDERE with Poverty in the model does not substantially change the effect of the other socioeconomic or sociodemographic variables.

Model 1 Table 2.2 also includes the number of community organizations in our model as a proxy for social capital at the municipality level. The result shows a positive but non-significant effect, suggesting that this variable can be correlated to another sociopolitical variable or that the number of community organizations does not represent actual participation in those organizations.

Model 2 Table 2.2 includes Population Density and Two-parent Family (with Children) as demographic variables that show significant and negative effects. The negative effect of population density is in agreement with previous research reporting that high population density has a negative impact on social capital (McCulloch, 2003). Regression results show a positive effect on the share of women and a negative effect on the youngest age cohort. Even though both effects are non-significant, their signs are in agreement with voting behavior in Chile, where the younger cohorts exhibit the lowest participation rate, and voter turnout rates for women exceed those for men (Programa de la Naciones Unidas para el Desarrollo (PNUD), 2017). Our model also indicates that fewer ELAs were organized in municipalities with a higher proportion of single-parent families and two-parent families with children. An intuitive explanation is that people with children have less time to engage in social activities. However, previous research has reported a negative effect of having children in female labor force participation, which in turn, has a negatively impact on their social capital and political participation (Schlozman et al., 1999).

Finally, Model 3 incorporates political variables (For a performance plot, see appendix Fig. 2.5.) The share of votes going to the winning candidate in the

first round of the presidential election has a positive and significant effect on participation. This effect remains when considering the voting of the second ballot (appendix Table 2.15). This result suggests that people who supported the winning candidate were more willing to organize and participate in an ELA since the whole idea of the new constitution was devised and started by the government they chose. On the other hand, voter turnout for the first round of the 2013 presidential election had a positive but non-significant effect in the number of ELAs (Table 2.2). For the runoff election, however, the effect became positive and significant (appendix Table 2.15). Note that voter turnout for the second round was about seven percentage points lower than for the first round (50% in the first round, 43% in the runoff ballot), which is not unusual. The phenomenon of turnout decline in runoff elections has been studied for the past 40 years. In particular, the decline is higher when the election result seems predetermined, and when the vote proportion received in the first round by candidates not qualifying for the runoff goes up (Pierce, 1981; Wright, 1989). The latter implies that the runoff election does not involve the diversity of ideas that led many voters to turn out at the first ballot. In simple words, many of those who abstain from the second ballot do so because no candidate represents them. Therefore, the positive and significant effect of voter turnout in the runoff election may also reflect citizen support for the winning candidate.

Party affiliation, when considered as a variable including parties both within the government coalition and within the opposition coalition, is a positive and significant variable (Table 2.2). When the model incorporates only parties within the government coalition or only parties within the opposition coalition, the effect remains positive and significant. This suggests that people more actively engaged in politics have a better disposition to participate in an ELA, even if they dislike the

government proposing the constitution-making idea. We also explored political mobilization by evaluating the political affiliation of the mayor. No significant effect was found. To test whether mobilization was driven by members of Parliament, we created a new variable we named Government Influence that combines the political affiliation of mayors and deputies. In appendix Table 2.16, the variables Mayor and Incumbent Mayor were replaced with this variable, but this effect was not significant.

Finally, the negative and significant effect of the share of Evangelical Christians on the number of ELAs presents a question on the role of religion in society. It has been argued that churches in the United States play an important role in building up the civic skills of those otherwise least likely to participate in politics (Jones-Correa and Leal, 2001). This might not be true for Chilean evangelicals, who often perceive themselves as second-class citizens legally and socially disadvantaged in comparison to the members of the Catholic Church (Boas, 2016) and who therefore might be inclined to disengage from political activity.

As for robustness checks, we note that the variance inflation factors are all less than 5 except for Education (5.5) and Population (10.3) (appendix Table 2.10). On the other hand, considering that the dependent variable in equation 2.1 is a count variable, we ran a negative binomial regression, which accounted for overdispersion (see appendix Table 2.12). Comparison with Model 3 Table 2.2 shows no significant changes for the main results. Therefore, all subsequent models were estimated using OLS.

2.3.2 Topic Modeling and Text Analysis

We analyzed the argument texts using STM because that tool enables the estimating of topics conditioned to document-level metadata. The corpus consisted of

all argument texts that were written for Constitutional Rights throughout all ELAs. Each text corresponds to a document of the corpus, and the constitutional concept to which the text refers was incorporated as prevalence document metadata.

Table 2.3: Word sets for three topics. All the STM analysis has been performed with the original texts in Spanish. The words shown here have been translated into English.

	Highest Probability	Frequent and exclusive
Topic : Life	be, right, violence, all, death, conception, abortion, protect, respect, any, existence, natural, moment, human, nobody, born, euthanasia, life, obligation	be, violence, death, conception, abortion, moment, born, euthanasia, respect, considered, fist, die, grounds, sentence, gestation, mothers, start, take off, pregnancy, fetus
Topic: Environment	must, environment, resources, nature, natural, children, have, water, contamination, free, generations, respect, use, preservation, parents, sustainable, teaching, preserve, protection	environment, nature, natural, children, water, contamination, generations, padres, sustainable, futures, healthy, clean, sustainability, environmental, air, planet, ecosystem, fauna
Topic: Social security	social, must, security, system, condition, have, pensions, guarantee, economic, higher, disability, matter, age, decent, economic, old age, AFP*, sexual, race	social, condition, pensions, disability, age, old age, AFP, race, retirement, solidarity, pension, prevision, nationality, orientation, pay-as-you-go, color, unemployment

* The acronym AFP stands for *Administradoras de Fondos de Pensiones* (Pension Fund Administrators), Chilean private entities that manage private pension funds through an individual defined-contribution-based system.

We estimated an STM with 23 topics in our corpus. We chose the number of topics by performing various model diagnostics such as Held-Out Likelihood and the Semantic Coherence for a different number of topics (See appendix Figure 2.6.) We also included the constitutional rights concepts as prevalence covariates in the model, and the authors manually assigned the topic labels by looking at two sets of words for each topic. The first is a set of highest probability words inferred directly from topic-word distribution. The second is a set of words that are both frequent and exclusive for each topic (Bischof and Airoldi, 2012). Both sets of words can be found in appendix Figures 2.7 and 2.8.

Table 2.4: OLS regressions results for STM. Table shows the top three categories for each regression. Concepts in italic font were not included in the original list of concepts proposed by the government, and were added by ELAs participants. The last two columns in the table show the word sets for three topics. The words shown here have been translated into English. All the STM analysis has been performed with the original texts in Spanish.

Topic	Right	*Outcome variable:* Topic	Highest Probability	Frequent and exclusive
Education	Education	$0.336\ (0.004)^{***}$	education, quality, for-free, must, access, universal, public, level, free education, (there must) be education, profit, public education, secular, integral, free-of-charge, public for-free, higher, opportunity, civic	for-free secular, integral education, quality for-free, university, teacher, room, public free education, free education, free-of-charge, public education, higher education, (there must) be education, must guarantee education, decent education, (there must) be free education, guarantee education, student, free access
	Right to quality public health care	$0.092\ (0.014)^{***}$		
	Freedom of Education	$0.091\ (0.007)^{***}$		
Equality	Equality before the law	$0.345\ (0.005)^{***}$	equality, law, must, same, to-exist, justice, (there must) be equality, opportunity, must exist, treatment, access, same right, process, privilege, gender, to-treat, can, egalitarian	must exist difference, same condition, due process, have equality, military, exist difference, (there must) be equality , justice, same right, equal treatment, equality, law, to-exist equality, privilege, must exist equality, same treatment, to-exist privilege, same opportunity, must have equality
	Access to justice / due process	$0.286\ (0.009)^{***}$		
	Equality	$0.258\ (0.005)^{***}$		
Security	Security / non-violence	$0.358\ (0.005)^{***}$	to-live, must, violence, security, safe, can, peace, space, to-feel, quiet, get-better, can live, crime, home, house, fear, tranquility, (there must) be security	(there must) be greater, to-feel, must live, insecurity, neighborhood, crime, (there must) be protection, peace, violence, can live, (there must) be security, quiet, street, safe, tranquility, to-live quietly
	Freedom of movement	$0.112\ (0.019)^{***}$		
	Decent housing	$0.089\ (0.004)^{***}$		
Environment	Environmental respect / protection	$0.468\ (0.008)^{***}$	must, environment, resource, good, natural, better, nature, natural resource, to-live, water, generation, pollution, free, use, future, to-preserve, respect, sustainable	ecosystem, environment free, better quality, pollution, future generation, healthy environment, environment, better, water, good, must preserve, clean, natural resource, nature, sustainable, sustainability, sustainable development
	Right to water	$0.295\ (0.023)^{***}$		
	Conservation of cultural and historical heritage	$0.147\ (0.055)$		

$^{***}p < 0.001, {}^{**}p < 0.01, {}^{*}p < 0.05$

Table 2.4 shows both sets of words for four different topics (Education, Equality, Security, and Environment). These topics were selected as examples because they cover a broad range of themes and show considerable differences in content when comparing groups across different determinants.

We then considered how each constitutional concept affects the topic proportion. We ran a regression model in which each document is an observation;

the outcome variable is the probability that a specific topic generates each document in the STM model (Remember that we model each document as a weighted combination of topics.), and the explanatory variables are all constitutional rights. Therefore, the estimated coefficients represent, for each topic, the effect of the constitutional rights on the topic. Table 2.4 shows the regression results for the same four topics. Since each topic has 59 explanation variables (the total number of constitutional rights), we display here only the top three categories, (i.e., the constitutional concepts with the highest topic proportion) within each topic, for each regression. The results show agreement between the topics emerging from the argument texts and the concepts that originated those texts. The regression results for the remaining topics can be found in Table 2.18.

How do the sociopolitical determinants of citizen participation affect topics discussions? To address this question, we estimated a second STM model with prevalence and topic content covariates. Recalling that, while topic prevalence captures how much each topic contributes to a document, topic content variables enable the vocabulary used to discuss a particular topic to vary. Here, we use three different determinants as covariates: Presidential Votes, Socioeconomic Development, and Primary Economic Activity. For each variable, we compared the municipalities in the top and bottom quartiles. Figure 2.2 shows the differences in vocabulary by association level with the determinants for those same four topics: Education, Equality, Security, and Environment. The list of words for each group and topic along with representative phrases can be found in Tables 2.19 to 2.22. In the case of the topic Environment, the word “water” is strongly associated with the top government supporting left-wing municipalities, municipalities with low population density, and those with a lower proportion of highly educated people (appendix Figure 2.9). This is also related to the concept *Right to Wa-*

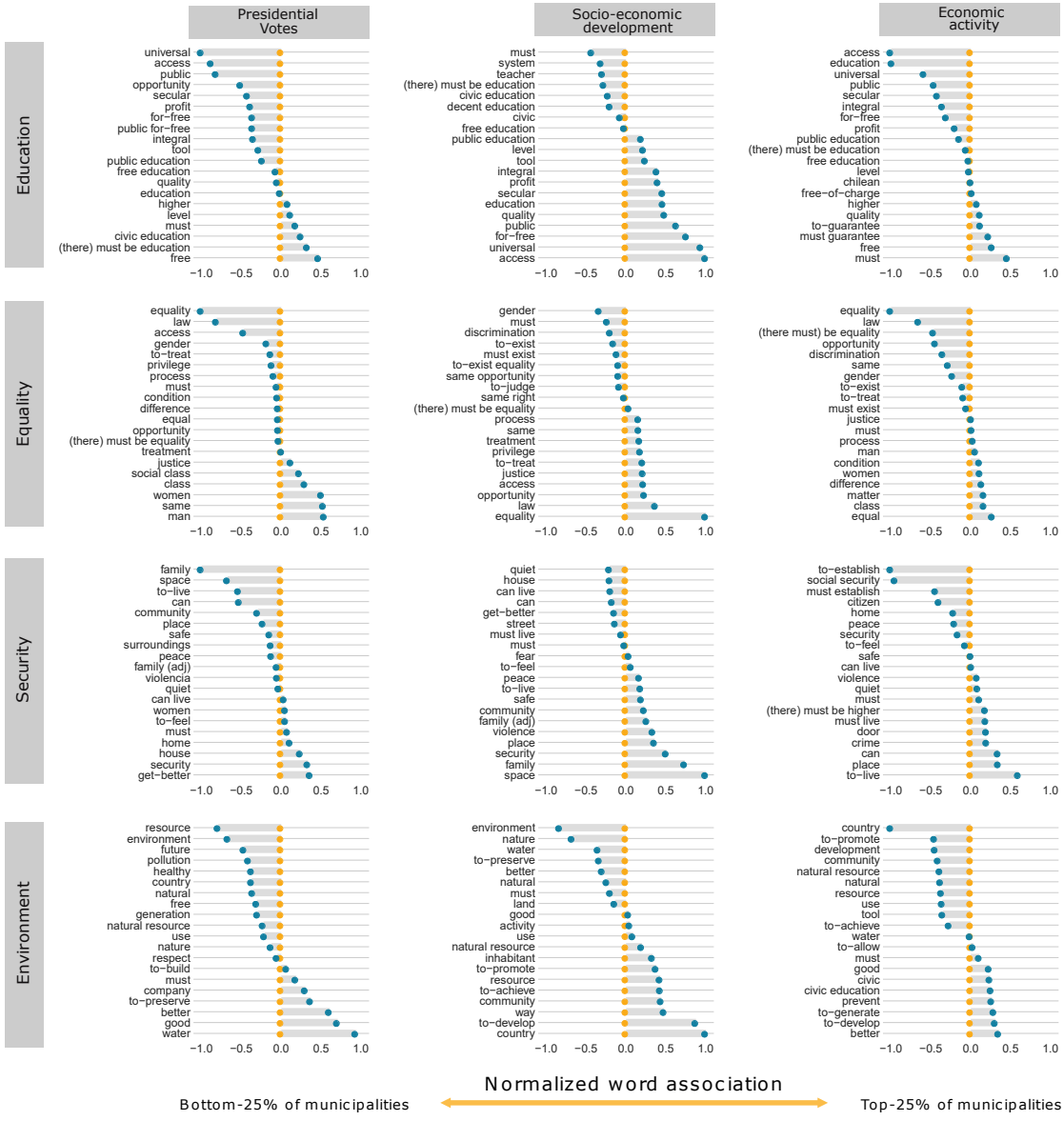

Figure 2.2: A word comparison of the constitutional rights debate, at the municipality level. We show the emergent topics: Education, Equality, Security, and Environment for three different citizen participation determinants: presidential votes, socioeconomic development, and economic activity. Words are oriented along the X-axis based on how much they are associated to the inspected determinant. For instance, in the Education topic and Presidential Votes determinant, the word “universal,” which is on the left side, is associated with the municipalities where the elected president got the least votes. The word “free,” which is on the right side, is associated with the municipalities where the elected president got most of the votes. We note that for the topic Equality, the word “process” comes from “due process” and “treatment” refers to “behaviour towards.” Likewise, for the topic Security, “door” comes from “revolving door,” which refers to inmate release and recidivism, and “be able to live” comes from “be able to live peacefully in our neighborhood.”

ter that emerged during the ELAs, and supports the nationalization of natural resources. On the other hand, the topic Education shows a transverse support for free and public education, while words like “access” and “universal” predominate in highly educated, more socioeconomically developed, and right-wing municipalities. For topic Equality, highly educated, more socioeconomically developed, and right-wing municipalities discuss “law” and “equality” more, while the opposite groups are more concerned about "gender equality" and "social classes."

Topic modeling also enables us to explore the emergent content of the whole corpus. Given that each document is associated with a particular constitutional concept, the STM shows us how different constitutional concepts mix into topics. For instance, the topic Equality (Table 2.4) contains three related concepts of similar proportions (*Equality Before the Law, Access to Justice*, and *Equality*). This mixture of topics is especially relevant to many of the concepts added by the participants, even though they were already variations or combinations of existing concepts. For example, the topic Environment comprises the *Right to Water*, which was not included in the original list. Figure 2.2 shows that the word “water,” probably arising from the *Right to Water*, is strongly associated with a political position. It is worth noting that the concept *Freedom of Movement* is associated with the topic Security, suggesting that this right is interpreted as “moving safely” rather than the right to travel from place to place or to change the place where one resides or works.

Finally, the terms shown in Figure 2.2 can also be categorized according to their linguistic usage, (i.e. according to a content/style classification). We used the same four topics to assess the difference in argument quality, but focused only on Socioeconomic Development and Primary Economic Activity determinants because the presidential vote may illuminate political differences in language usage

but is unlikely to directly affect the quality of the deliberation, which is our main interest in this final section.

For each topic, we extracted the argument texts from the top three rights related to that topic (See Table 2.4). Then we compared the proportion of texts that were classified as low-quality arguments within the municipalities of the top and bottom quartiles (See Table 2.5 and Figure 2.10.) We performed this comparison using a two-sample test for equality of proportions (χ^2 test). For example, for a given topic and covariate, we estimated the proportion of high quality arguments for that topic between the top 25 percent and the bottom 25 percent of municipalities on that covariate. We found no significant differences for the topic Security, but for the topics Environment and Education, both variables showed significant differences: for the topic Environment, 53% of texts were classified as high quality for the top quartile of Socioeconomic Development, versus 40% for the bottom quartile , and 34% of texts were classified as high quality for the top quartile of Primary Economic Activity versus 53% for the bottom quartile. For topic Education 53% of texts were classified as high quality for the top quartile of Socioeconomic Development, versus 46% for the bottom quartile , and 46% of texts were classified as high quality for the top quartile of Primary Economic Activity versus 54% for the bottom quartile. For topic Equality, only the socioeconomic development shows significant difference (49% of high quality text for the top quartile versus $\%41$ for the bottom quartile). The percentages reported here were estimated with a 2-terms search. Table 2.5 shows the list of terms, and the p-values for a 2-terms and 3-terms search.

For the topics Environment and Equality, we found that municipalities with a higher socioeconomic development index produce higher quality arguments (Fig. 2.10). Also, these municipalities use more concepts than their less devel-

oped peers, particularly for topics Equality and Security, whereas the municipalities with a higher share of people engaging in primary economic activity use more for the topic Security as well. It is therefore hypothesized that conceptualization is related to knowledge. Knowledge facilitates proposing themes, concepts, and ideas. Therefore, at the municipality level, the greater the knowledge, the greater the conceptualization. Furthermore, the use of verbal forms such as “There must be,” and “must have,” are linked to normative or prescriptive intentions. In many of our cases, the terms classified as actions are actually this type of verbal form.

Table 2.5: p-values, Chi-Square test for differences in the proportion of the argument quality.

Topic	Variable	p-value (2 terms)	p-value (3 terms)	List of terms
Equality	SEDI Prim. Econ. Act.	0.02 0.16	0.05 0.31	igualitario, sentencia, normas jurídicas, trato igualitario, diferencia, justicia, mismas normas, proceso judicial, género, condición, político, existir persona, debe indemnizar, oportunidad, afectación grave, misma forma, ley, juicio justo, privilegio, mismas oportunidades, mismos derechos, mismas leyes, proceso, igualdad, condiciones, acceso, carga público, mismo derecho, ley acceso, inocencia, proceso justo, judicial, mismo trato, debido proceso, grupo privilegiado, rico.
Security	SEDI Prim. Econ. Act.	0.76 0.64	0.15 0.55	caminar, tranquilidad, calle, comunidad, barrio, seguridad, espacio, tranquilo, preso, casa, debe haber política, vivir, paz, inseguridad, seguridad ciudadana, violencia, país seguro, lugar, delincuente, haber protección, sentir, seguro, seguridad personal, ciudad, policía, miedo, delincuencia, hogar.
Education	SEDI Prim. Econ. Act.	0.04 0.01	$<$0.01 $<$0.01	cívica, nivel, sala, oportunidad, formación, superior, públic, preescolar, universal, lucro, secundaria, sala cuna, universitaria, conocimiento, inclusiva, laica, acceso, gratis, gratuita, integral, calidad, igualitaria.
Environment	SEDI Prim. Econ. Act.	0.01 $<$0.01	0.06 $<$0.01	aire, renovable, fauna, mejor sociedad, ambiente libre, contaminación, sustentable, natural, futuras generaciones, energía, planeta, ecosistema, futuro, conservación, desarrollo, ambiente limpio, entorno, generación, ambiente sano, flora, alimento, ambiente saludable, sustentabilidad, recurso, agua.

Now let us take a look at the topic Security in the context of the Socioeconomic Development variable (Figure 2.2). The four actions most associated with the less developed municipalities are “be able to live,” “can,” “must live,” and “must.” This indicates a predominantly normative intention from this group. However, a sentiment analysis also reveals that these terms score higher (positively) when compared to the more developed municipalities (appendix Table 2.23). This is mainly caused by the predominant use of verbs by this group. In general, verbs in this corpus have a positive connotation: “get-better,” “guarantee,” and “be able to

live," for example. All of this suggests that this normative intention may be driven by the sentiment that if the matter concerns you, you probably won't produce conceptually dense arguments; rather, you will express a desire and a proposal for action.

2.4 Conclusions

The Chilean constitution-making process of 2015-2016 was a unique experiment in terms of the political history of the country and the unprecedented high level of participation and territory coverage when compared to similar processes held in other countries (OECD Public Governance Reviews, 2017). Our results (Table 2.2) show that engagement in politics and support for the government increased participation. However, no evidence of political mobilization by mayors or deputies was found, suggesting that citizen involvement in the constitutional process was not ideologically biased but rather voluntarily biased. As the OECD report conjectures, "Those citizens who support the acting government may be more likely to participate in the consultation, even when all citizens are given that opportunity." (OECD Public Governance Reviews, 2017) On the other hand, when using a structural topic modeling approach, we found that the emerging content from ELAs can be mapped ideologically.

Although the Chilean constitution-making process reached a high level of citizen participation, this does not necessarily imply it generated high-quality public deliberation. Our analysis suggests that the high-quality argumentation came from the municipalities with the highest level of socioeconomic development (Fig. 2.10). Moreover, the STM results show that people in municipality with high levels of socioeconomic development and comparatively more complex economic structures (both proxies for knowledge) use more themes, concepts, and ideas than

actions when deliberating, suggesting that knowledge facilitates conceptualization. Finally, our citizen participation model also indicates (as is widely known in political science) that education increases political participation. In sum, these results point to the Public Ignorance Objection, an important criticism of deliberative democracy, that claims that the privileged and educated citizens of a society have the most effective tools to deliberate. Such groups resemble “epistemic communities,” (Haas, 1992; Vähämaa, 2013) for they can provide information and advice, becoming actors in political decision-making processes.

Today’s discussion is not about the pros and cons of a participatory democracy, but rather the extent of its expression and how we can improve its function. The Chilean processes exhibited at least two critical design weaknesses: (i) the voluntary nature of the encounters increased participation biases, thus diminishing representativeness and, (ii) the presence of a minority group of people who possess higher knowledge and thus produce higher-quality deliberation.

Nonetheless, the participative phase of the Chilean constitution-making process still played an important role in gathering information and visualizing people’s needs. Our results can inform new deliberative and massive consulting processes, which soon may be convenient means of political participation. Future research should explore the complexity of deliberative discussions for different sociocultural contexts, aiming to evaluate how the deliberative process can generate solutions for complex problems.

Table 2.1: Variable description and data.

Name	Description	Source	Year	N	Type
Population	Municipal population over 14 years old (only people over the age of 14 were allowed to participate in an ELA).	CENSO	2017	345	Count
Higher education	Share of municipal population who have successfully completed a higher education degree (advanced technician, bachelor, MSc, PhD.)	CENSO	2017	345	Continuous (0-1)
Internet penetration rate	Constructed as the interaction of two variables from CASEN survey: (i) share of households with at least one internet-connected device, (ii) number of different uses of Internet.	CASEN	2015	324	Continuous (0-1)
SUBDERE groups	Socio-demographic municipal classification based on the dependence on the municipal common fund and the local population. This typology divides municipalities in 7 groups plus an exception group with the highest income municipalities. Group 1 is the most vulnerable.	SUBDERE	2005	335	Categorical
Poverty	Income poverty rate by municipality, based on income information from CASEN survey, using a method of Small Area Estimation (SAE).	INE	2017	344	Continuous (0-1)
SEDI	Socio-Economic Development Index, which comprises education, income, poverty, housing and sanitation.	OCHISAP	2013	324	Continuous (0-1)
Community organizations	Number of community organizations in the municipality, such as parent centers, cultural centers, sport clubs, among others.	SINIM	2015	342	Count
Participation in comm. org.	Share of municipal population that declares to participate in a community organization	CASEN	2015	324	Continuous (0-1)
Population density	Number of people living in the municipality, per square kilometer (km^2)	SINIM	2015	345	Continuous
Rurality	Share of municipal population living in rural areas. A rural area is defined as an agglomeration with more than 1,000 inhabitants, or between 1,001 and 2,000 inhabitants where more than 50% of the economically active population is engaged in primary economic activities.	CENSO	2017	345	Continuous (0-1)
Born in 1981 or after	Share of municipal population born in 1980 or after, which represents the youngest cohort of our study.	CENSO	2017	345	Continuous (0-1)
Women	Proportion of women in the municipality	CENSO	2017	345	Continuous (0-1)
Single-parent family with children	Share of single-parent families, with children, in the municipality.	CENSO	2017	345	Continuous (0-1)
Two-parent family with children	Share of two-parent families, with children, in the municipality.	CENSO	2017	345	Continuous (0-1)
Party affiliation	Share of municipal population affiliated to any political party.	SERVEL	2016	345	Continuous (0-1)
Voter turnout	Voter turnout in 2013 presidential elections at the municipal level.	SERVEL	2013	345	Continuous (0-1)
Votes for standing president	Share of votes received by the winning candidate in 2013 presidential elections by municipality.	SERVEL	2013	345	Continuous (0-1)
Municipal officials	Share of municipal population employed by the city hall.	SINIM	2015	345	Continuous (0-1)
Mayor	3 dummy variables to take into account the political party which supported the winning candidate for mayor, during the 2012 municipal elections: the first one is equal to 1 if the party is within the government coalition, and 0 otherwise; the second one is equal to one if the party is in the opposition, and 0 otherwise; the third dummy variable is assigned to 1 when the mayor ran for office with no formal party support.	SERVEL	2012	345	Categorical
Incumbent mayor	Dummy variable that takes the value 1 if an incumbent mayor is reelected, and 0 otherwise.	SERVEL	2012	345	Categorical
Government influence	Consists of the sum of: (i) the share of votes obtained by the pro-government deputies, relative to the total votes obtained by both elected deputies; (ii) 1, if the mayor was supported by the government coalition, and 0 otherwise.	SERVEL	2012	345	Continuous (0-2)
Evangelical Christians	Share of municipal population who declared to profess an evangelical Christian religion.	CENSO	2012	341	Continuous (0-1)

Notes: (i) The administrative division of Chile consists of 346 municipalities, from which we excluded the municipality of Antártica becaus of its special situation. (ii) Sources: Population and housing census (CENSO); Electoral Service (SERVEL); National municipal informatio system (SINIM); National office for regional development (SUBDERE); National Socio-Economic Characterization Survey (CASEN); Publi Health Observatory in Chile (OCHISAP); National Institute of Statistics (INE). (iii) CASEN survey lacks representativity at municipal level; (iv

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Wright, S. G. (1989). Voter turnout in runoff elections. *The Journal of Politics*, 51(2):385–396.

Appendix

Age and gender

Table 2.6: Contingency table for participants in ELAs and national population, by age cohorts. Pearson's Chi-squared test results for age cohorts: X-squared = 78.989, p-value $< 2.2 \cdot 10^{-6}$

	Born in 1980 or after	Born between 1956 and 1980	Born in 1955 or before
National population	6146410	5656007	2483653
Participants in ELAs	46078	39902	18216

Table 2.7: Contingency table for participants in ELAs and national population, by gender. Pearson's Chi-squared test results for gender : X-squared = 277.61, p-value $< 2.2 \cdot 10^{-6}$

	Female	Male
National population	7361978	6924092
Participants in ELAs	56393	47803

Statistical model: Size of ELAs

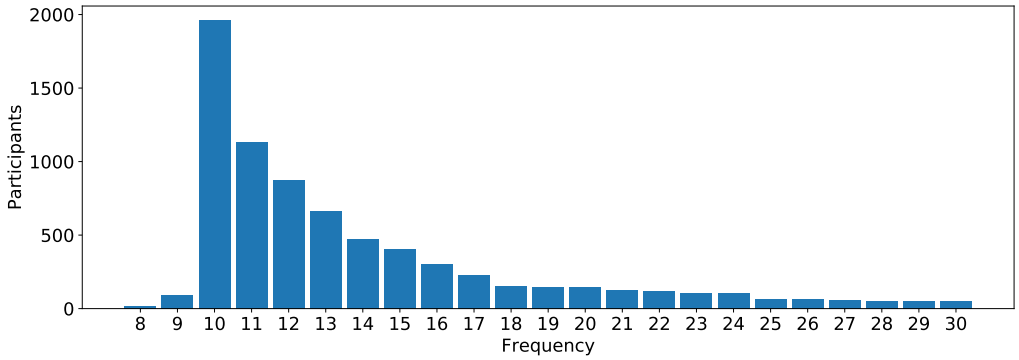


Figure 2.3: Histogram of ELAs number of participants.

ELAs : Questions and concepts.

What should be the fundamental and universal RIGHTS contained in the Constitution? Choose up to seven topics among the list below or suggest others in the free space.

Table 2.8: ELAs : Questions and concepts.

Original concepts:	
Suffrage/vote	Honor/reputation
Nationality	Right of association
Election to public office	Peaceful assembly
Participation	Request before the authorities
Life	Freedom to work
Mental and physical integrity	Freedom of Education
Security/non-violence	Right to Work
Equality	Fair wage
Non-discrimination	Decent housing
Equality before the law	Healthcare
Access to justice/due process	Education
Equality in relation to public burdens	Social security
Tax equality	Right to organize and to collective bargaining
Gender equity	Right to strike
Children's and teenager's rights	Access to culture
Integration of disabled people	Cultural identity
Personal freedom	Indigenous people
Freedom of movement	Environmental respect/protection
Freedom of conscience	Property
Freedom of expression	Judicial protection of individual rights
Right to information	Free economic initiative/free enterprise
Access to public information	None
Privacy and intimacy	Others, specify
New concepts:	
Standard of living	Cultural identity of indigenous people
	Freedom of worship
Respect life from conception	Right to water
Right to make one's own decisions about one's life	Freedom
Right to work and a decent wage	Human Rights
Social Rights	Freedom of information and speech
Animal rights	Conservation of cultural and historical heritage

Table 2.9: Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Max
Number of ELAs	345	22.31	52.65	0	530
Number of participants	345	302.02	705.62	0	7,233
Population	345	41,408.90	64,527.83	230	453,530
Population density	345	953.44	2,989.08	0.03	17,144.86
Rurality	345	0.36	0.29	0.00	1.00
Higher education	345	0.19	0.10	0.06	0.76
Number of organizations	342	472.99	599.02	3.00	4,892.00
Participation in comm. org.	324	0.07	0.08	0.0000	0.65
Internet penetration rate	324	0.05	0.12	-0.20	0.90
SEDI	324	0.54	0.12	0.24	0.99
Poverty	344	0.13	0.08	0.001	0.42
Born in 1981 or after	345	0.40	0.05	0.29	0.60
Men	345	0.51	0.06	0.44	0.86
Women	345	0.49	0.06	0.14	0.56
Single-parent family with children	345	0.12	0.02	0.01	0.17
Two-parent family with children	345	0.28	0.05	0.07	0.45
Voter turnout	345	0.50	0.08	0.15	0.68
Votes for current president	345	0.52	0.09	0.13	0.73
Voter turnout (runoff)	345	0.43	0.08	0.10	0.63
Votes for current president (runoff)	345	0.64	0.09	0.18	0.82
Party affiliation	345	0.08	0.07	0.01	0.94
Municipal officials	345	0.01	0.01	0.001	0.09
Evangelical Christians	341	0.13	0.08	0.01	0.49

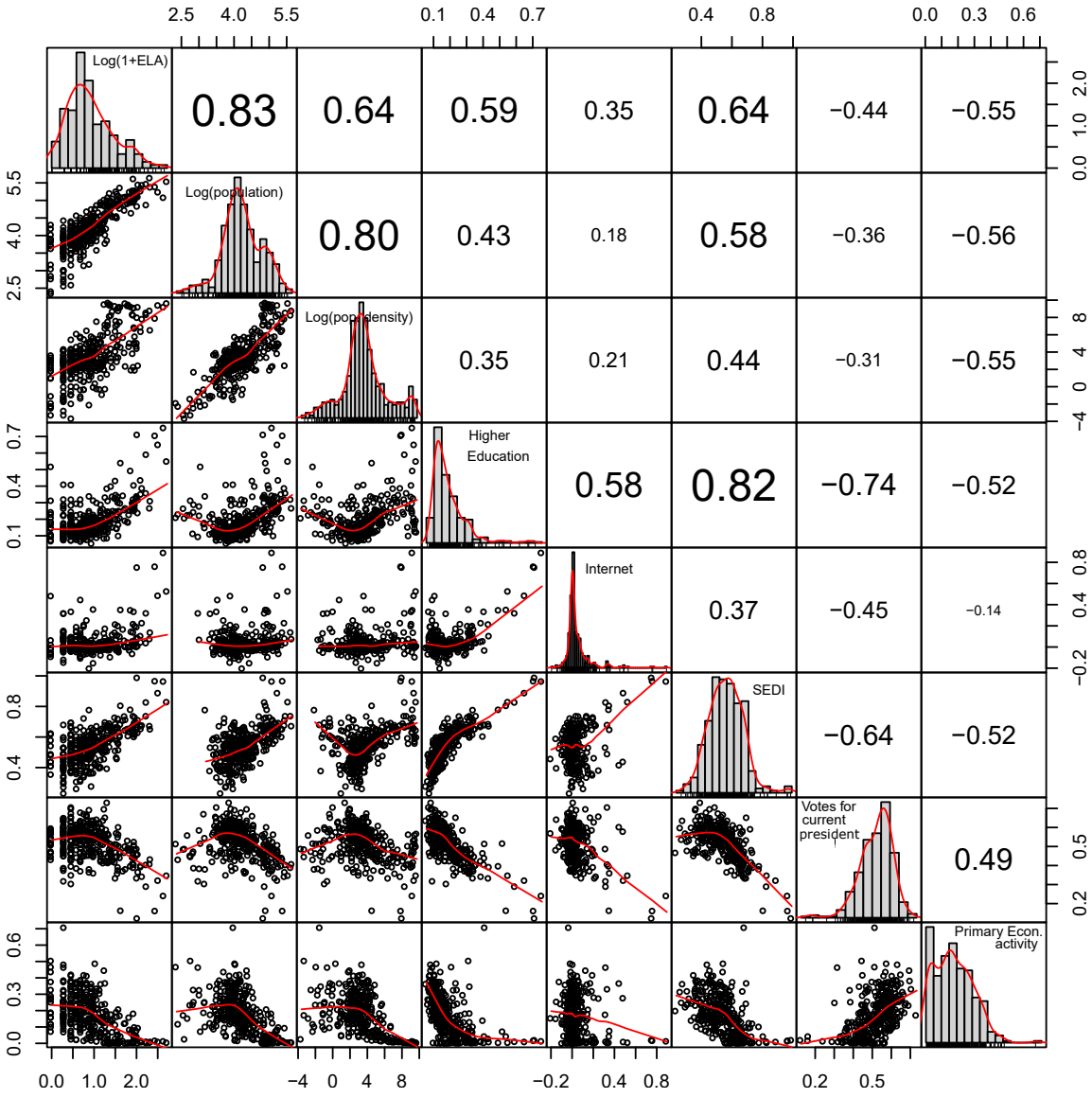


Figure 2.4: Correlogram of main variables. All Pearson correlations are significant at the $p < 0.05$ significance level.

Results

Table 2.10: Variance inflation factor (VIF) for predictors in OLS model.

Regressor	VIF
Log (population)	10.3908
Higher education	5.5627
Internet penetration rate	2.0860
Log (community organizations)	3.0870
Born in 1981 or after	3.0040
Rurality	3.0160
Log (population density)	3.4063
Women	2.5619
Two-parent family (with children)	1.9531
Single-parent family (with children)	1.4367
Votes for current president	2.9716
Municipal officials	3.1048
Voter turnout	2.4574
Party affiliation	1.7249
Evangelical Christians	1.2018

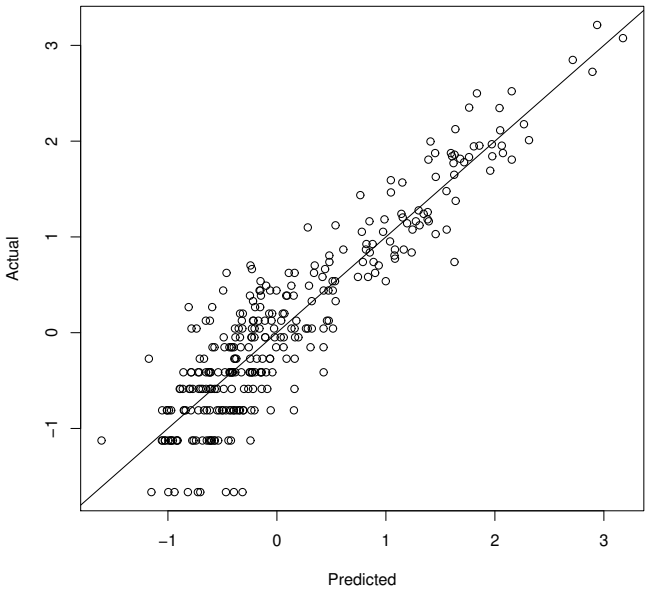


Figure 2.5: Actual versus Predicted values for the number of ELAs, model (3) of Table 2.2.

Table 2.11: OLS estimates for the standardized full model with robust standard errors, p-value RESET test = 0.3501. RESET test were performed on the second power of regressors.

	Dependent variable:
	log (1 + ELAs)
Log (population)	$0.778\ (0.164)^{**}$
Higher education	$0.185\ (0.065)^{**}$
Internet penetration rate	$0.103\ (0.039)^{**}$
SUBDERE groups	
Group 2	$-0.122\ (0.154)$
Group 3	$-0.234\ (0.196)$
Group 4	$-0.129\ (0.224)$
Group 5	$0.016\ (0.277)$
Group 6	$0.297\ (0.351)$
Group 7	$0.497\ (0.417)$
Group 8	$0.236\ (0.421)$
Log (community organizations)	$0.085\ (0.051)$
Born in 1981 or after	$-0.008\ (0.056)$
Rurality	$-0.052\ (0.054)$
Log (population density)	$-0.139\ (0.053)^{**}$
Women	$0.066\ (0.069)$
Two-parent family (with children)	$-0.093\ (0.043)^{*}$
Single-parent family (with children)	$-0.101\ (0.043)^{*}$
Votes for current president	$0.148\ (0.046)^{**}$
Municipal officials	$-0.040\ (0.170)$
Voter turnout	$0.087\ (0.054)$
Mayor (government)	$0.063\ (0.069)$
Mayor (opposition)	$-0.099\ (0.079)$
Party affiliation	$0.161\ (0.066)^{*}$
Incumbent mayor (True)	$-0.020\ (0.054)$
Evangelical Christians	$-0.075\ (0.027)^{**}$
Rurality * Evangelical Christians	$0.040\ (0.049)$
Log (population density) * Evangelical Christians	$-0.055\ (0.067)$
Log (community organizations) * Born in 1981 or after	$-0.054\ (0.043)$
Born in 1981 or after * Internet penetration rate	$0.005\ (0.018)$
Rurality * Log (community organizations)	$-0.053\ (0.050)$
Log (population density) * Log (community organizations)	$-0.054\ (0.041)$
Municipal officials * Voter turnout	$0.039\ (0.095)$
Municipal officials * Mayor (government)	$0.204\ (0.181)$
Municipal officials * Mayor (opposition)	$-0.027\ (0.184)$
Constant	$0.037(0.209)$
Observations	310
Adjusted R^2	0.814
Residual Std. Error	0.424 (df = 275)
F Statistic	40.652^{**} (df = 34; 275)

Note: *p<0.05; **p<0.01. The base categories for dummy variables are: “Group 1” for SUBDERE groups, “False” for Incumbent Mayor an “Independent” for Mayor. See Appendix Table AI for more detailed variable definitions and sources

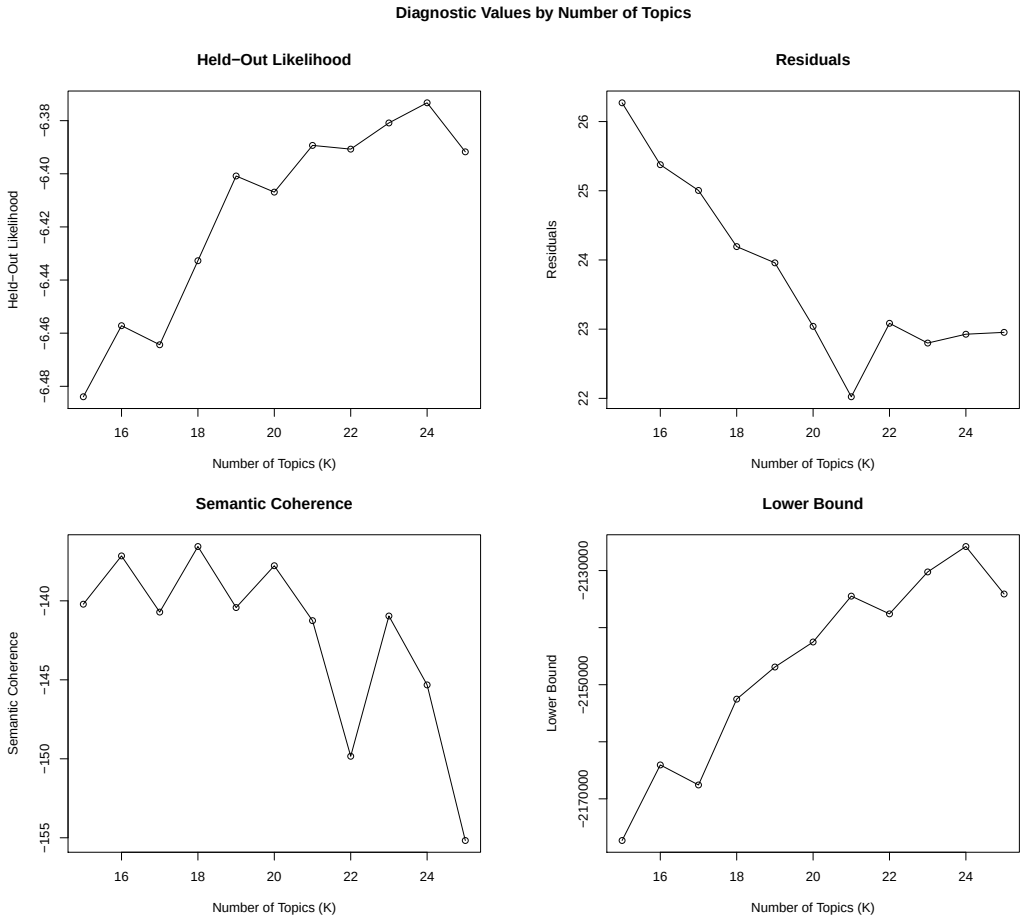


Figure 2.6: Diagnostic values by number of topics. The optimal number of topics should seek to maximize the Held-Out Likelihood (top-left panel) and the Semantic Coherence (bottom-left panel), and minimize the residual dispersion (top-right panel). For 23 topics, both the Held-Out Likelihood and the Semantic Coherence are reasonably close to their maximum values, while the residual dispersion has reached a stationary value (see (Mimno et al., 2011; Taddy, 2012; Wallach et al., 2009) for further information on these indicators).

Table 2.12: OLS and Negative Binomial estimates for the full model.

	Dependent variable:	
	OLS	Negative binomial
	log (1 + ELAs)	ELAs
Log(population)	0.778^{**}	1.263^{**}
	(0.164)	(0.218)
Higher education	0.185^{**}	0.282^{**}
	(0.065)	(0.099)
Internet penetration rate	0.103^{**}	0.116^{*}
	(0.039)	(0.054)
SUBDERE groups		
Group 2	-0.122	-0.221
	(0.154)	(0.285)
Group 3	-0.234	-0.403
	(0.196)	(0.336)
Group 4	-0.129	-0.327
	(0.224)	(0.368)
Group 5	0.016	-0.212
	(0.277)	(0.421)
Group 6	0.297	0.038
	(0.351)	(0.507)
Group 7	0.497	0.222
	(0.417)	(0.570)
Group 8	0.236	-0.142
	(0.421)	(0.572)
Log (community organizations)	0.085	0.128
	(0.051)	(0.077)
Born in 1981 or after	-0.008	-0.072
	(0.056)	(0.085)
Rurality	-0.052	-0.119
	(0.054)	(0.083)
Log (population density)	-0.139^{**}	-0.238^{**}
	(0.053)	(0.073)
Women	0.066	0.045
	(0.069)	(0.098)
Two-parent family (with children)	-0.093^{*}	-0.135^{*}
	(0.043)	(0.059)
Single-parent family (with children)	-0.101^{*}	-0.146^{*}
	(0.043)	(0.065)
Votes for current president	0.148^{**}	0.231^{**}
	(0.046)	(0.065)
Municipal officials	-0.040	0.008
	(0.170)	(0.279)
Voter turnout	0.087	0.135
	(0.054)	(0.090)
Mayor (government)	0.063	0.072
	(0.069)	(0.108)
Mayor (opposition)	-0.099	-0.211
	(0.079)	(0.129)
Party affiliation	0.161^{*}	0.239^{*}
	(0.066)	(0.096)
Incumbent mayor (True)	-0.020	-0.004
	(0.054)	(0.073)
Evangelical Christians	-0.075^{**}	-0.084^{*}
	(0.027)	(0.041)
Constant	0.037	2.308^{***}
	(0.209)	(0.340)
Observations	310	310
Adjusted R^2	0.814	
Log Likelihood		-930.405
θ		6.338^{**} (0.893)
Akaike Inf. Crit.		1,930.810
Residual Std. Error	0.424 (df = 275)	
F Statistic	40.652^{**} (df = 34; 275)	

Note: *p$<$0.05; **p$<$0.01. The base categories for dummy variables are: “Group 1” for SUBDERE groups, “False” for Incumbent Mayor an “Independent” for Mayor. Only significant interactions are shown. For both models, all independent variables have been standardized. The dependent variable (*ELAs*) is also standard-

Table 2.13: OLS estimates for the number of ELAs (log (1 + ELAs), p-value RESET test = 0.3501) and the number of participants (log (1 + participants), p-value RESET test = 0.4672). RESET tests were performed on the second power of regressors.

	Outcome variable:	
	log (1 + ELAs)	log (1 + participants)
Log(population)	0.778^{**}	0.747^{**}
	(0.164)	(0.181)
Higher education	0.185^{**}	0.148^{*}
	(0.065)	(0.073)
Internet penetration rate	0.103^{**}	0.114^{*}
	(0.039)	(0.045)
SUBDERE groups		
Group 2	-0.122	-0.067
	(0.154)	(0.210)
Group 3	-0.234	-0.153
	(0.196)	(0.261)
Group 4	-0.129	0.020
	(0.224)	(0.290)
Group 5	0.016	0.154
	(0.277)	(0.352)
Group 6	0.297	0.250
	(0.351)	(0.439)
Group 7	0.497	0.385
	(0.417)	(0.500)
Group 8	0.236	0.044
	(0.421)	(0.501)
Log (community organizations)	0.085	0.103
	(0.051)	(0.061)
Born in 1981 or after	-0.008	0.041
	(0.056)	(0.066)
Rurality	-0.052	0.014
	(0.054)	(0.061)
Log(population density)	-0.139^{**}	-0.076
	(0.053)	(0.063)
Women	0.066	0.017
	(0.069)	(0.095)
Two-parent family (with children)	-0.093^{*}	-0.100^{*}
	(0.043)	(0.050)
Single-parent family (with children)	-0.101^{*}	-0.078
	(0.043)	(0.053)
Votes for current president	0.148^{**}	0.135^{*}
	(0.046)	(0.056)
Municipal officials	-0.040	0.024
	(0.170)	(0.194)
Voter turnout	0.087	0.178^{*}
	(0.054)	(0.075)
Mayor (government)	0.063	0.095
	(0.069)	(0.088)
Mayor (opposition)	-0.099	-0.136
	(0.079)	(0.100)
Party affiliation	0.161^{*}	0.200^{*}
	(0.066)	(0.078)
Incumbent mayor (True)	-0.020	-0.005
	(0.054)	(0.067)
Evangelical Christians	-0.075^{**}	-0.071^{*}
	(0.027)	(0.033)
Constant	0.037	0.008
	(0.209)	(0.272)
Observations	310	310
Adjusted R^2	0.814	0.698
Residual Std. Error (df = 275)	0.424	0.511
F Statistic (df = 34; 275)	40.652^{**}	22.046^{**}

Note: *p<0.05; **p<0.01. The base categories for dummy variables are: “Group 1” for SUBDERE groups, “False” for Incumbent Mayor an “Independent” for Mayor. Only significant interactions are shown.

Table 2.14: OLS estimates for the full model (p-value RESET test = 0.3501), and replacing *SUBDERE groups* with *poverty* (p-value RESET test = 0.2828). RESET tests were performed on the second power of regressors.

	Outcome variable:	
	log (1 + ELAs)	
	SUBDERE Groups	Poverty
Log(population)	0.778^{**}	0.971^{**}
	(0.164)	(0.112)
Higher education	0.185^{**}	0.248^{**}
	(0.065)	(0.071)
Internet penetration rate	0.103^{**}	0.071
	(0.039)	(0.043)
SUBDERE groups		
Group 2	-0.122	
	(0.154)	
Group 3	-0.234	
	(0.196)	
Group 4	-0.129	
	(0.224)	
Group 5	0.016	
	(0.277)	
Group 6	0.297	
	(0.351)	
Group 7	0.497	
	(0.417)	
Group 8	0.236	
	(0.421)	
Poverty		0.033
		(0.041)
Log (community organizations)	0.085	0.085
	(0.051)	(0.051)
Born in 1981 or after	-0.008	0.003
	(0.056)	(0.047)
Rurality	-0.052	-0.028
	(0.054)	(0.056)
Log (population density)	-0.139^{**}	-0.124^{*}
	(0.053)	(0.052)
Women	0.066	0.077
	(0.069)	(0.073)
Two-parent family (with children)	-0.093^{*}	-0.106^{*}
	(0.043)	(0.042)
Single-parent family (with children)	-0.101^{*}	-0.094^{*}
	(0.043)	(0.048)
Votes for current president	0.148^{**}	0.153^{**}
	(0.046)	(0.045)
Municipal officials	-0.040	0.013
	(0.170)	(0.146)
Voter turnout	0.087	0.065
	(0.054)	(0.055)
Mayor (government)	0.063	0.120
	(0.069)	(0.068)
Mayor (opposition)	-0.099	-0.036
	(0.079)	(0.078)
Party affiliation	0.161^{*}	0.217^{**}
	(0.066)	(0.068)
Incumbent mayor (True)	-0.020	-0.013
	(0.054)	(0.052)
Evangelical Christians	-0.075^{**}	-0.087^{**}
	(0.027)	(0.031)
Constant	0.037	-0.043
	(0.209)	(0.055)
Observations	310	320
Adjusted R^2	0.814	0.810
Residual Std. Error	0.424 (df = 275)	0.432 (df = 291)
F Statistic	40.652** (df = 34; 275)	49.414** (df = 28; 291)

Note: *p<0.05; **p<0.01. The base categories for dummy variables are: "Group 1" for SUBDERE groups, "False" for Incumbent Mayor an "Independent" for Mayor. Only significant interactions are shown

Table 2.15: OLS estimates for the full model (p-value RESET test = 0.3501) and replacing the votes for the incumbent president and the voter turnout with the corresponding runoff variables (p-value RESET test = 0.4605). RESET tests were performed on the second power of regressors.

	Dependent variable:	
	log (1 + ELAs)	
	First round	Runoff
Log(population)	0.778^{**}	0.763^{**}
	(0.164)	(0.168)
Higher education	0.185^{**}	0.131^{*}
	(0.065)	(0.060)
Internet penetration rate	0.103^{**}	0.111^{**}
	(0.039)	(0.039)
SUBDERE groups		
Group 2	-0.122	-0.123
	(0.154)	(0.155)
Group 3	-0.234	-0.236
	(0.196)	(0.197)
Group 4	-0.129	-0.115
	(0.224)	(0.229)
Group 5	0.016	0.043
	(0.277)	(0.282)
Group 6	0.297	0.352
	(0.351)	(0.361)
Group 7	0.497	0.567
	(0.417)	(0.429)
Group 8	0.236	0.297
	(0.421)	(0.428)
Log (community organizations)	0.085	0.085
	(0.051)	(0.051)
Born in 1981 or after	-0.008	0.006
	(0.056)	(0.061)
Rurality	-0.052	-0.048
	(0.054)	(0.055)
Log (population density)	-0.139^{**}	-0.175^{**}
	(0.053)	(0.053)
Women	0.066	0.065
	(0.069)	(0.070)
Two-parent family (with children)	-0.093^{*}	-0.110^{*}
	(0.043)	(0.046)
Single-parent family (with children)	-0.101^{*}	-0.098^{*}
	(0.043)	(0.043)
Votes for current president	0.148^{**}	
	(0.046)	
Votes for current president (runoff)		0.089^{*}
		(0.038)
Municipal officials	-0.040	-0.043
	(0.170)	(0.170)
Voter turnout	0.087	
	(0.054)	
Voter turnout (runoff)		0.155^{*}
		(0.060)
Mayor (government)	0.063	0.064
	(0.069)	(0.069)
Mayor (opposition)	-0.099	-0.117
	(0.079)	(0.080)
Party affiliation	0.161^{*}	0.161^{*}
	(0.066)	(0.067)
Incumbent mayor (True)	-0.020	-0.022
	(0.054)	(0.054)
Evangelical Christians	-0.075^{**}	-0.074^{**}
	(0.027)	(0.028)
Constant	0.037	0.016
	(0.209)	(0.213)
Observations	310	310
Adjusted R^2	0.814	0.813
Residual Std. Error (df = 275)	0.424	0.425
F Statistic (df = 34; 275)	40.652^{**}	40.479^{**}

Note: *p<0.05; **p<0.01. The base categories for dummy variables are "Group

Table 2.16: OLS estimates for the full model (p-value RESET test = 0.3501), and replacing the variables Mayor and Incumbent Mayor with a governments' influence variable (p-value RESET test = 0.6196). RESET tests were performed on the second power of regressors.

	Dependent variable:	
	log (1 + ELAs)	
	Mayor	Gov. Influence
Log(population)	0.778^{**}	0.775^{**}
	(0.164)	(0.158)
Higher education	0.185^{**}	0.195^{**}
	(0.065)	(0.062)
Internet penetration rate	0.103^{**}	0.097^{*}
	(0.039)	(0.039)
SUBDERE groups		
Group 2	-0.122	-0.119
	(0.154)	(0.159)
Group 3	-0.234	-0.222
	(0.196)	(0.198)
Group 4	-0.129	-0.131
	(0.224)	(0.226)
Group 5	0.016	0.009
	(0.277)	(0.276)
Group 6	0.297	0.305
	(0.351)	(0.344)
Group 7	0.497	0.496
	(0.417)	(0.408)
Group 8	0.236	0.238
	(0.421)	(0.408)
Log (community organizations)	0.085	0.083
	(0.051)	(0.050)
Born in 1981 or after	-0.008	-0.012
	(0.056)	(0.056)
Rurality	-0.052	-0.065
	(0.054)	(0.053)
Log (population density)	-0.139^{**}	-0.143^{**}
	(0.053)	(0.053)
Women	0.066	0.055
	(0.069)	(0.071)
Two-parent family (with children)	-0.093^{*}	-0.099^{*}
	(0.043)	(0.044)
Single-parent family (with children)	-0.101^{*}	-0.097^{*}
	(0.043)	(0.043)
Votes for current president	0.148^{**}	0.159^{**}
	(0.046)	(0.045)
Municipal officials	-0.040	-0.005
	(0.170)	(0.149)
Voter turnout	0.087	0.077
	(0.054)	(0.053)
Mayor (government)	0.063	
	(0.069)	
Mayor (opposition)	-0.099	
	(0.079)	
Gov. influence		0.027
		(0.032)
Party affiliation	0.161^{*}	0.161^{*}
	(0.066)	(0.068)
Incumbent mayor (True)	-0.020	
	(0.054)	
Evangelical Christians	-0.075^{**}	-0.069^{*}
	(0.027)	(0.027)
Constant	0.037	0.020
	(0.209)	(0.206)
Observations	310	310
R^2	0.834	0.831
Adjusted R^2	0.814	0.813
Residual Std. Error	0.424 (df = 275)	0.425 (df = 278)
F Statistic	40.652^{**} (df = 34; 275)	44.234^{**} (df = 31; 278)

Note: *p$<$0.05; **p$<$0.01. The base categories for dummy variables are: "Group 1" for SUBDERE groups, "False" for Incumbent Mayor, and "Independent" for Mayor

Table 2.17: OLS estimates for the full model (p-value RESET test = 0.3501) using all the municipalities, and the municipalities where CASEN is representative (139 municipalities). The third column shows the result of a bootstrap of 139 samples.

	Dependent variable:		
	log (1 + ELAs)		
	Full sample	CASEN sample	Bootstrap
Log(population)	0.778^{**}	1.045^{**}	0.815^{**}
	(0.164)	(0.218)	(0.247)
Higher education	0.185^{**}	0.284^{*}	0.209^{*}
	(0.065)	(0.124)	(0.102)
Internet penetration rate	0.103^{**}	0.009	0.086
	(0.039)	(0.072)	(0.061)
SUBDERE groups			
Group 2	-0.122	-1.254^{**}	-0.137
	(0.154)	(0.446)	(0.248)
Group 3	-0.234	-1.058^{**}	-0.263
	(0.196)	(0.370)	(0.300)
Group 4	-0.129	-1.215^{**}	-0.156
	(0.224)	(0.422)	(0.348)
Group 5	0.016	-1.102^{*}	-0.050
	(0.277)	(0.472)	(0.422)
Group 6	0.297	-1.153^{*}	0.219
	(0.351)	(0.570)	(0.542)
Group 7	0.497	-1.227	0.405
	(0.417)	(0.628)	(0.652)
Group 8	0.236	-1.458	0.177
	(0.421)	(0.745)	(0.790)
Log (community organizations)	0.085	-0.010	0.075
	(0.051)	(0.093)	(0.089)
Born in 1981 or after	-0.008	0.205	-0.025
	(0.056)	(0.119)	(0.085)
Rurality	-0.052	-0.076	-0.042
	(0.054)	(0.139)	(0.090)
Log (population density)	-0.139^{**}	-0.233^{*}	-0.114
	(0.053)	(0.102)	(0.105)
Women	0.066	0.236	0.012
	(0.069)	(0.269)	(0.144)
Two-parent family (with children)	-0.093^{*}	-0.229^{**}	-0.094
	(0.043)	(0.072)	(0.068)
Single-parent family (with children)	-0.101^{*}	-0.270^{*}	-0.057
	(0.043)	(0.107)	(0.100)
Votes for current president	0.148^{**}	0.201^{**}	0.125
	(0.046)	(0.075)	(0.130)
Municipal officials	-0.040	0.111	0.015
	(0.170)	(0.398)	(0.275)
Voter turnout	0.087	0.196	0.096
	(0.054)	(0.112)	(0.094)
Mayor (government)	0.063	-0.137	0.020
	(0.069)	(0.155)	(0.125)
Mayor (opposition)	-0.099	-0.523^{*}	-0.084
	(0.079)	(0.248)	(0.169)
Party affiliation	0.161^{*}	0.118	0.192
	(0.066)	(0.172)	(0.142)
Incumbent mayor (True)	-0.020	0.140	-0.013
	(0.054)	(0.080)	(0.078)
Evangelical Christians	-0.075^{**}	-0.017	-0.071
	(0.027)	(0.064)	(0.048)
Municipal officials * Voter turnout	0.039	0.453^{*}	0.067
	(0.095)	(0.224)	(0.206)
Constant	0.037	1.092^{**}	0.087
	(0.209)	(0.418)	(0.327)
Observations	310	132	
Adjusted R^2	0.814	0.853	
Residual Std. Error	0.424 (df = 275)	0.370 (df = 97)	
F Statistic	40.652^{**} (df = 34; 275)	23.431^{**} (df = 34; 97)	

Note: *p<0.05; **p<0.01. The base categories for dummy variables are: “Group 1” for SUBDERE groups, “False” for Incumbent Mayor an “Independent” for Mayor. Only significant interactions are shown.

Table 2.18: OLS regressions results for STM. Table shows the top three categories for each regression. Concepts in italic font were not included in the original list of concepts proposed by the government and were added by ELAs participants.

		Outcome variable: Topic
Topic 1: Environment	Environmental respect / protection	$0.468\ (0.008)^{**}$
	Right to water	$0.295\ (0.023)^{**}$
	Conservation of cultural and historical heritage	$0.147\ (0.055)$
Topic 2: Life	*Respect life from conception*	$0.401\ (0.047)^{**}$
	Life	$0.265\ (0.004)^{**}$
	Mental and physical integrity	$0.164\ (0.007)^{**}$
Topic 3: Public policy	*Animal rights*	$0.409\ (0.044)^{**}$
	Privacy and intimacy	$0.100\ (0.012)^{**}$
	Right of association	$0.099\ (0.011)^{**}$
Topic 4: Unclassified	Election to public office	$0.102\ (0.015)^{**}$
	Decent housing	$0.097\ (0.004)^{**}$
	Freedom to work	$0.094\ (0.013)^{**}$
Topic 5: Non - discrimination	Non - discrimination	$0.293\ (0.008)^{**}$
	Gender equity	$0.105\ (0.006)^{**}$
	Equality	$0.101\ (0.004)^{**}$
Topic 6: Development	Free economic initiative / free enterprise	$0.209\ (0.013)^{**}$
	Human Rights	$0.171\ (0.014)^{**}$
	Property	$0.142\ (0.009)^{**}$
Topic 7: Participation	Participation	$0.457\ (0.012)^{**}$
	Suffrage / vote	$0.424\ (0.011)^{**}$
	Election to public office	$0.407\ (0.023)^{**}$
Topic 8: Rights	Judicial protection of individual rights	$0.204\ (0.008)^{**}$
	Respect life from conception	$0.189\ (0.032)^{**}$
	Life	$0.145\ (0.003)^{**}$
Topic 9: Security	Security / non-violence	$0.358\ (0.005)^{**}$
	Freedom of movement	$0.112\ (0.019)^{**}$
	Decent housing	$0.089\ (0.004)^{**}$
Topic 10: Education	Education	$0.336\ (0.004)^{**}$
	Right to quality public health care	$0.092\ (0.014)^{**}$
	Freedom of Education	$0.091\ (0.007)^{**}$
Topic 11: Equality before the law	Equality before the law	$0.345\ (0.005)^{**}$
	Access to justice / due process	$0.286\ (0.009)^{**}$
	Equality	$0.258\ (0.005)^{**}$
Topic 12: Social security	Social security	$0.261\ (0.005)^{**}$
	Decent housing	$0.257\ (0.008)^{**}$
	Right to work and a decent wage	$0.148\ (0.014)$
Topic 13: Unclassified	Tax equality	$0.437\ (0.027)^{**}$
	Equality in relation to public burdens	$0.194\ (0.042)^{**}$
	Request before the authorities	$0.112\ (0.022)^{**}$
Topic 14: Indigenous people	Indigenous people	$0.520\ (0.011)^{**}$
	Cultural identity of indigenous people	$0.506\ (0.060)^{**}$
	Cultural identity	$0.471\ (0.017)^{**}$
Topic 15: Labor rights	Right to organize and to collective bargaining	$0.413\ (0.009)^{**}$
	Right to strike	$0.378\ (0.013)^{**}$
	Right to work and a decent wage	$0.302\ (0.016)^{**}$
Topic 16: Freedom of education	Freedom of Education	$0.437\ (0.012)^{**}$
	Free economic initiative / free enterprise	$0.304\ (0.022)^{**}$
	Property	$0.286\ (0.012)^{**}$
Topic 17: Integration	Integration of disabled people	$0.243\ (0.009)^{**}$
	Equality before the law	$0.150\ (0.005)^{**}$
	Non - discrimination	$0.110\ (0.004)^{**}$
Topic 18: Childhood	Children and teenager's rights	$0.295\ (0.007)^{**}$
	Human Rights	$0.141\ (0.012)^{**}$
	Judicial protection of individual rights	$0.132\ (0.009)^{**}$
Topic 19: Social rights	*Social rights*	$0.184\ (0.009)^{**}$
	Social security	$0.129\ (0.005)^{*}$
	Standard of living	$0.117\ (0.008)$
Topic 20: Healthcare	Healthcare	$0.296\ (0.006)^{**}$
	Right to quality public health care	$0.273\ (0.018)^{**}$
	Access to public information	$0.194\ (0.011)^{**}$
Topic 21: Freedom	*Freedom of worship*	$0.551\ (0.017)^{**}$
	Freedom of information and speech	$0.435\ (0.039)^{**}$

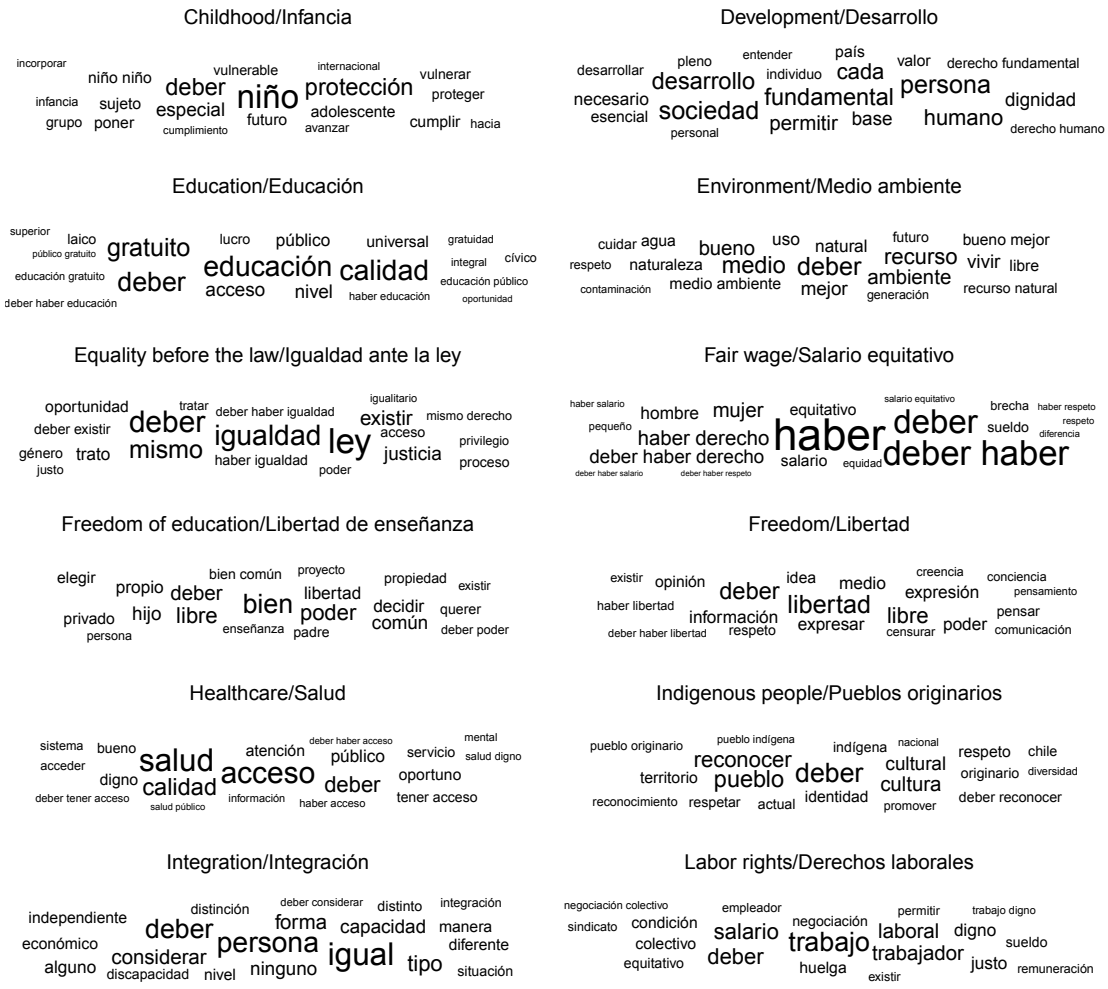
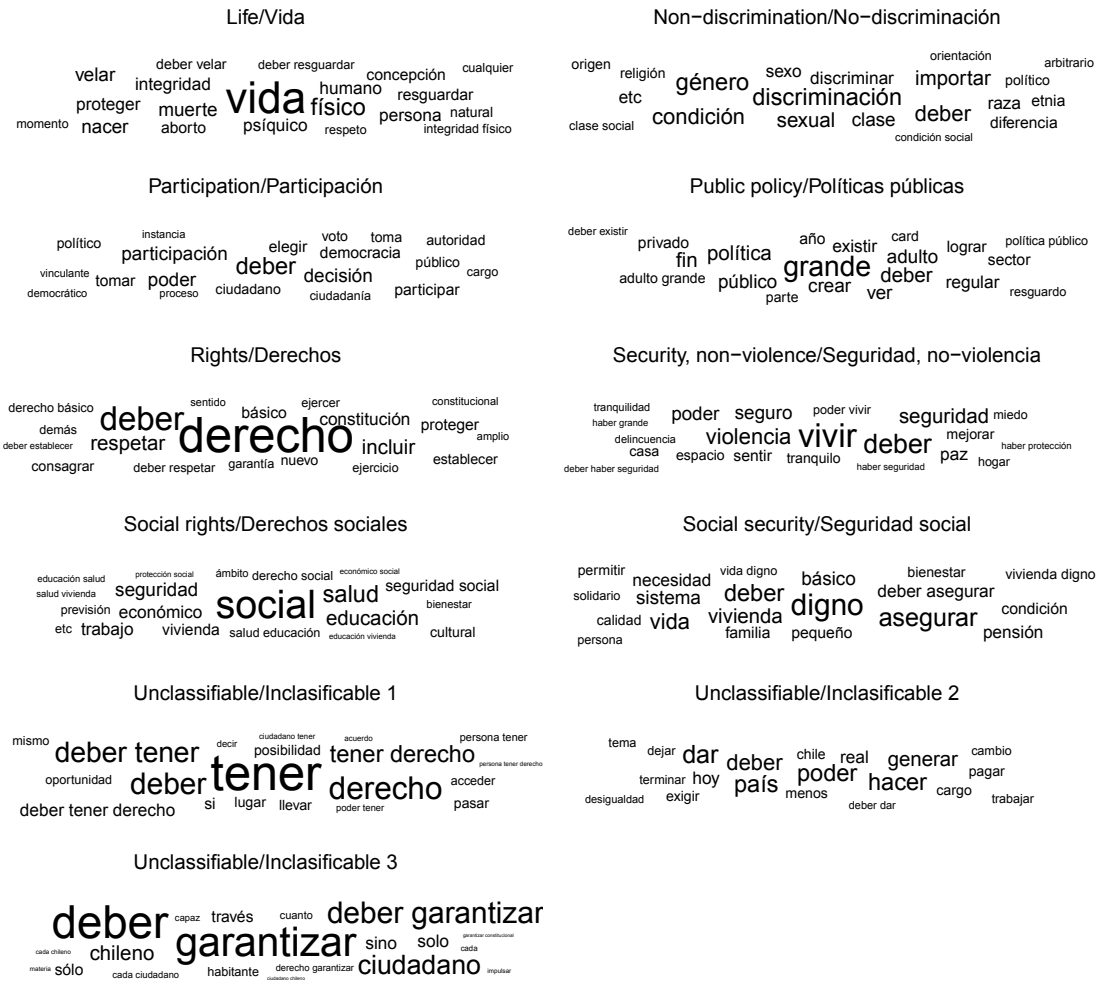


Figure 2.7: Word Cloud display of highest probability words, for all topics.



Word Cloud display of highest probability words, for all topics (continuation of Fig. 2.7).

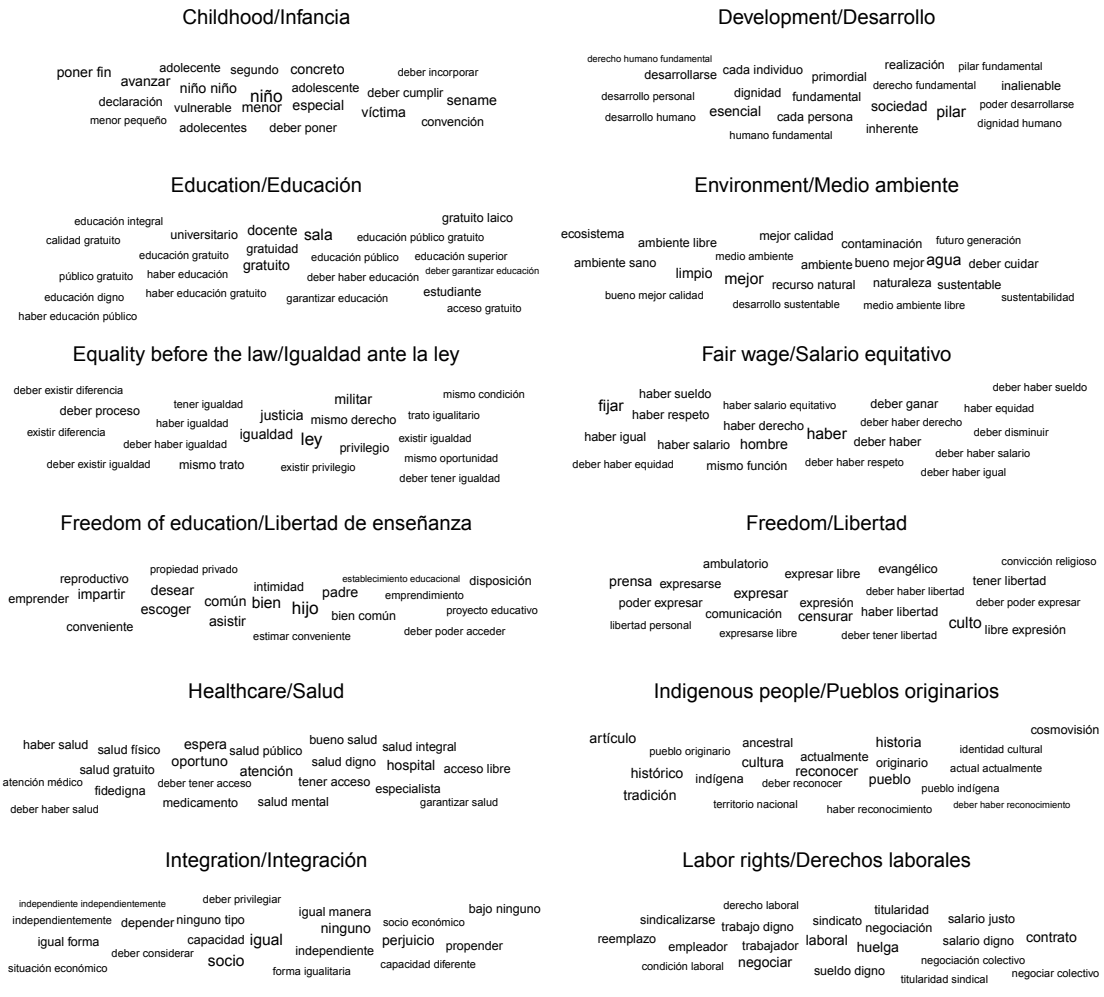
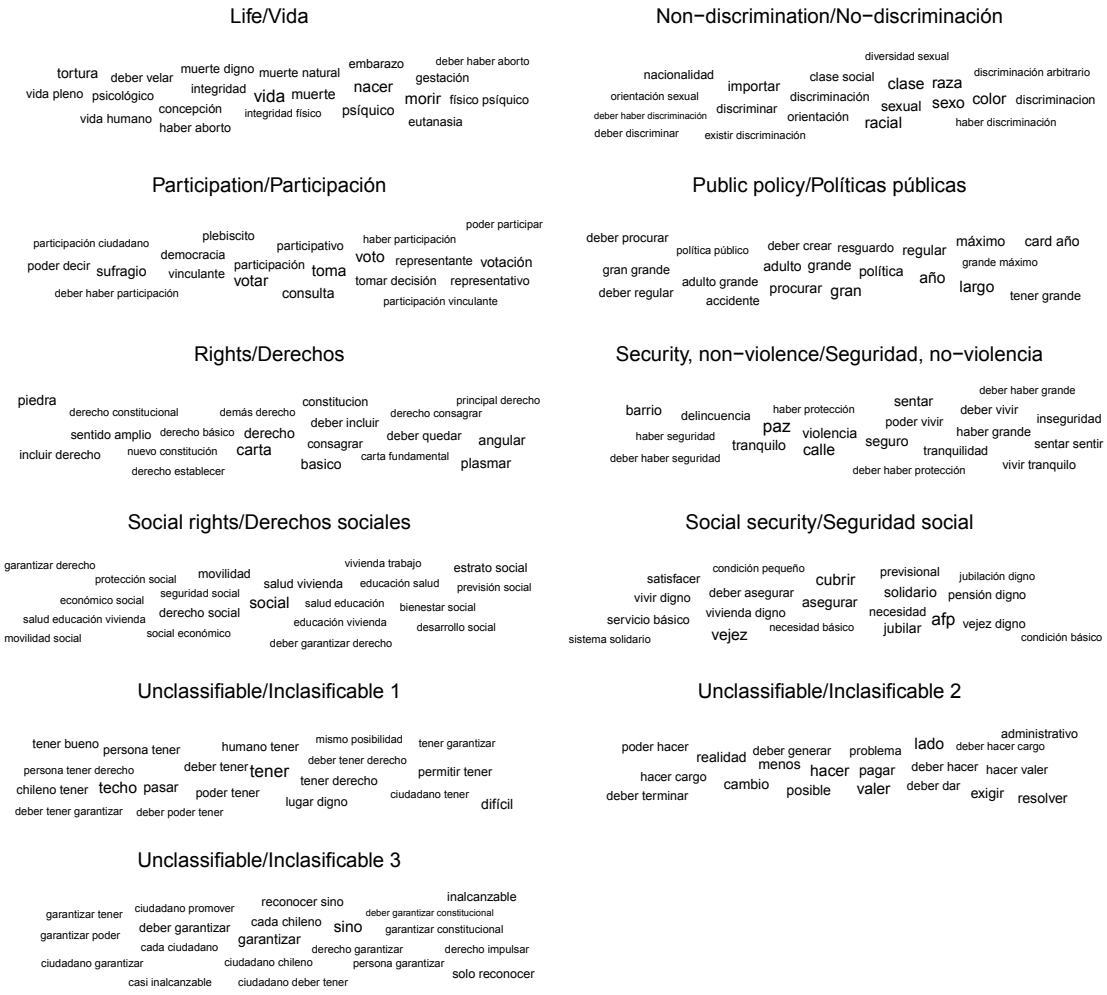


Figure 2.8: Word Cloud display of frequent/exclusive words, for all topics.



Word Cloud display of frequent/exclusive words, for all topics (continuation of Fig. 2.8).

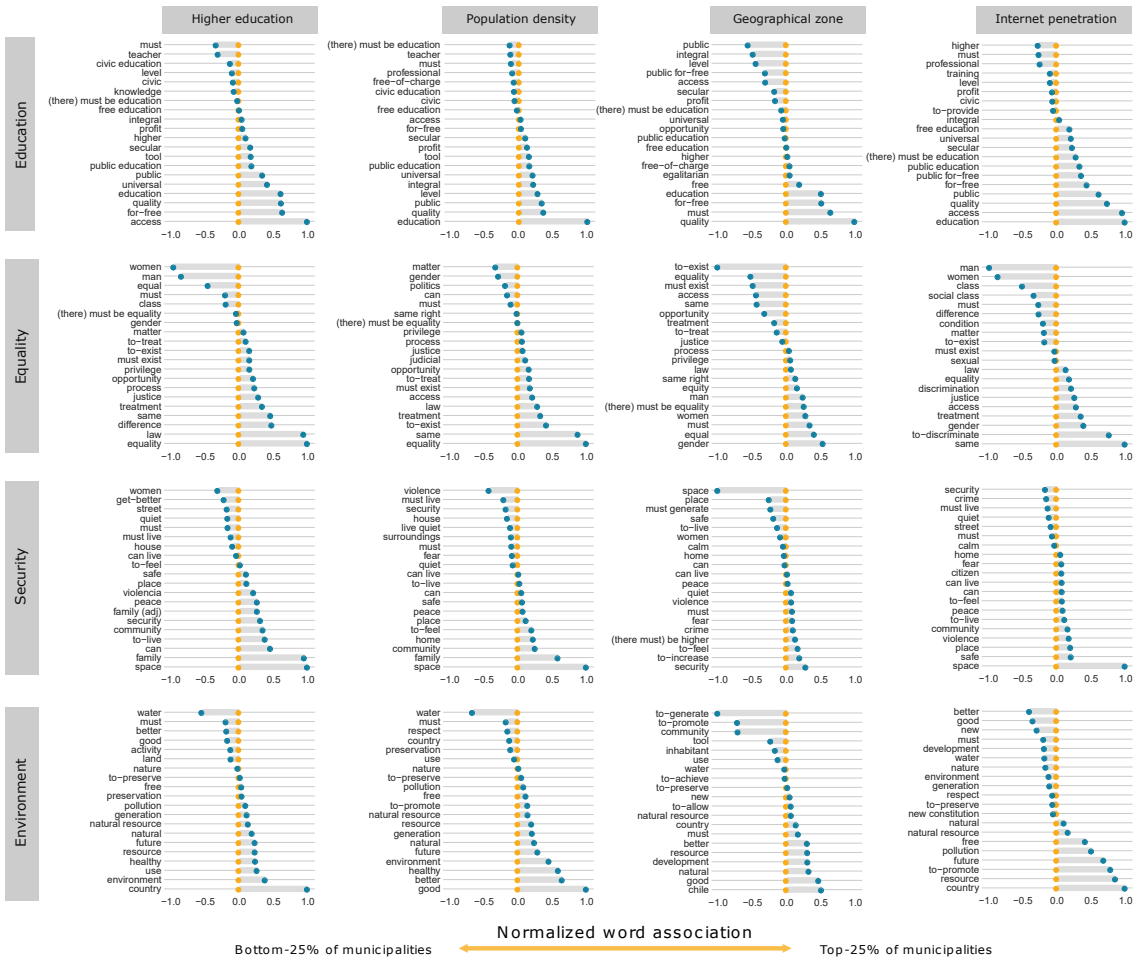


Figure 2.9: A word comparison of the constitutional rights debate, at the municipality level. We show the emergent topics: Education, Equality, Security, and Environment for four different citizen participation determinants. Words are oriented along the X-axis based on how much they are associated to the inspected determinant. We note that for the topic Equality, the word “process” comes from “due process” and “treatment” refers to “behaviour towards”. Likewise, for the topic Security, “door” comes from “revolving door”, which refers to inmate release and recidivism.

Table 2.19: Topic: Environment

Determinant	Quartile	Topic Words	City	Text
Votes	Bottom 25	recurso, medio ambiente, futuro, contaminación, sano, país, natural, libre, generación, recurso natural, uso, naturaleza, respeto.	Concón	Debe poder incentivar la creación de empresas entregando empleo y generando desarrollo.
			Vitacura	Debe haber derecho a la vida en un medio ambiente libre de contaminación.
			Lo Barnechea	Es fundamental para lograr tener una buena calidad de vida lo cual se logra a través del respeto de a la naturaleza y medio ambiente siendo labor de todos cuidarlo
	Top 25	construir, deber, empresa, cuidar, mejor, bueno, agua.	Canela	Tenemos derecho a disfrutar y tener acceso a los recursos naturales y cuidarlo para las futuras generaciones.
			Puyehue	Debe asegurar recursos como son el agua aire tierra suelo y sub suelo.
			La Pintana	Debemos mantenernos en equilibrio con la naturaleza para que las nuevas generaciones tenga un hábitat mejor pues se ha demostrado que gran parte de las enfermdades y catástrofes son responsabilidad de nosotros y las grandes empresas.
Higher education	Bottom 25	agua, deber, mejor, bueno, actividad, tierra, naturaleza.	Combarbabá	Debe nacionalizar y distribuir el agua equitativamente regresando al estado y no siguiendo en manos de los privados que lucran sin medida con ella ya que sin agua no hay vida.
			Placilla	Debe dejar un mejor país a los hijos y nietos educando a los habitantes para que protejan la naturaleza.
			Collipulli	Debe tener un plan de contignecia ante las sequias que son comunes en nuestra región y localidad en específico habiendo derecho al agua para su consumo producción y sus animales.
	Top 25	cuidar, libre, cuidado, contaminación, generación, recurso natural, natural, futuro, recurso, sano, uso, medio ambiente, país.	Valdivia	Debe asegurar el respeto y cuidado por el medio ambiente en este derecho descansa el cuidado de nuestros recursos naturales.
			Valparaíso	Debe cuidar medio ambiente ya que la naturaleza forma parte de nuestras vidas responsables
			Antofagasta	Debemos conservar nuestro planeta sano.
Pop. density	Bottom 25	agua, deber, respeto, país, cuidado, uso.	Chile Chico	Debe garantizar el respeto y protección del medio ambiente y la naturaleza.
			Tierra Amarilla	Debe cuidar aguas dulces sin contaminarlas.
			Pozo Almonte	Debe haber respeto a todo lo que hace posible la vida en el planeta y a las condiciones para que pueda seguir existiendo la vida humana.
	Top 25	naturaleza, cuidar, contaminación, libre, fomentar, recurso natural, recurso, generación, natural, futuro, medio ambiente, sano, mejor, bueno.	Viña del Mar	Debe haber cuidado de la naturaleza preservando lo que existe y legislando para mejorar la protección del medio ambiente.
			Puente Alto	Debemos mantener el medio ambiente para las generaciones futuras.
			Talcahuano	Debe tener derecho a vivir en ambiente sano y un medio ambiente limpio.
SEDI	Bottom 25	ambiente, naturaleza, agua, cuidar, mejor, natural, deber ,tierra.	Monte Patria	Debe tener ambiente mejor y más limpio para el futuro.
			Chanco	Debe cuidar de nuestros bienes naturales en la medida que no son renovables y cautelar la sobreexplotación.
			San Nicolás	Debe cuidar el medio ambiente pero de verdad con leyes que protejan la naturaleza sin distinción.
	Top 25	bueno, actividad, uso, recurso natural, habitante, fomentar, recurso, lograr, comunidad, manera, desarrollar, país.	Calama	Deben ser usados administrados y explotados para el provecho de las comunidades en que se encuentran y del país como nación.
			Las Condes	Debe haber derecho a un medio ambiente sano y al desarrollo sustentable en donde se protejan los recursos naturales con una mejor regulación

Table 2.20: Topic: Education

Determinant	Quartile	Topic Words	City	Text
Votes	Bottom 25	universal, acceso, público, oportunidad, laico, lucro, gratuito, integral, herramiento, educación pública, educación gratuita, calidad, educación.	Concón	Debe garantizar una educación gratuita y de calidad para el desarrollo integral de las personas sin exclusión.
			Vitacura	Debe ser obligatoria gratuita y de calidad distinguiendo lucro de abuso.
			Lo Barnechea	Debe ser gratuita de excelencia e inclusiva un derecho social desde la primera infancia para lograr una igualdad de oportunidades en el futuro.
	Top 25	superior, nivel, deber, educación cívica, deber haber educación, educación, gratis.	Canela	Debe haber educación pública gratuita y de calidad para todos y en todos los niveles de educación.
			Puyehue	Debe ser gratis y de buena calidad para todos/as especialmente los primeros 10 años.
			La Pintana	Debe haber acceso a la educación en todos sus niveles: básica media institutos profesionales universitaria laica democrática multicultural no quedando ningún chileno sin educación por falta de recursos.
Higher education	Bottom 25	deber, docente, educación, educación cívica, nivel, cívica, conocimiento, deber haber educación.	Combarbabá	Debe ser de libre acceso y de calidad en todos sus niveles y para todos.
			Placilla	Debe encargar el Estado que los ciudadanos estén informados respecto de como funciona la sociedad en que vivimos debiendo considerar la educación cívica durante toda la vida para que sean los ciudadanos participantes de lo que se realice en su país.
			Collipulli	Debe haber educación de calidad y gratuita para todas y todos.
	Top 25	educación gratuita, integral, lucro, superior, laico, educación pública, público, universal, educación, calidad, gratuito, acceso.	Valdivia	Debe entregar una educación sin lucro laica gratuita de calidad asegurando el acceso a la cultura.
			Valparaíso	Debe ser completa integral y mas profunda sin limitarse sólo a la educación formal.
			Antofagasta	Debe haber educación abierta e igualitaria de calidad con acceso garantizado a todos los chilenos y chilenas.
Pop. density	Bottom 25	deber haber educación, profesor, deber, profesional, gratuidad, educación cívica, cívico, educación gratuita.	Chile Chico	Debe garantizar el acceso a una educación gratuita y de calidad con carácter público.
			Tierra Amarilla	Debe haber educación gratuita y no salir endeudados..
			Pozo Almonte	Debe ser ser gratuita y de calidad con profesores con vocación y bien remunerados.
	Top 25	acceso, gratuito, laico, lucro, herramienta, educación pública, universal, integral, nivel, público, calidad, educación.	Viña del Mar	Debe garantizar acceso a la educación de calidad en todos sus niveles.
			Puente Alto	Debe haber acceso equitativo gratuito y de calidad a la educación fortaleciendo a la educación pública y sus profesores.
			Talcahuano	Debe ser gratuita universal permitiendo que cada persona se eduque hasta donde sus capacidades lo otorguen.
SEDI	Bottom 25	deber, sistema, docente, deber haber educación, educación cívico, educación digno, cívico, educación gratuito.	Monte Patria	Debe corregir abuso de alumnos frente al docente a los profesores se les han quitado atribuciones dentro del aula.
			Chanco	Es una buena educación de calidad para que las nuevas generaciones hagan de la nación un lugar mejor.
			San Nicolás	Debe existir una educación digna y de calidad para todos sin importar la calse social o ingresos económicos de las personas.
	Top 25	educación público, nivel, herramienta, integral, lucro, laico, educación, calidad, público, gratuito, universal, acceso.	Calama	Debe otorgar acceso a una educación pública gratuita laica y de calidad que alcance hasta la educación universitaria.
			Las Condes	Debe haber educación de calidad desde la enseñanza parvularia hasta la universidad o educación superior y que sea sin lucro para las

Table 2.21: Topic: Security

Determinant	Quartile	Topic Words	City	Text
Votes	Bottom 25	familia, espacio, vivir, poder, comunidad, lugar, seguro, entorno, paz, familiar, violencia, tranquilo.	Concón	Debe cumplir requsitos básicos ya que es lugar donde se desarrolla la vida familiar que es el núcleo de nuestra sociedad.
			Vitacura	Debe consagrar la dignidad de las personas y el respeto asegurando en ellas el derecho a convivir en paz y tranquilidad.
			Lo Barnechea	Es agradable para todos los ciudadanos vivir en un estado seguro que permita a todos vivir tranquilos.
	Top 25	poder vivir, mujer, sentir, deber, hogar, casa, seguridad, mejorar.	Canela	Debemos vivir en paz conociendo y respetando los derechos y deberes; educando mejorando la comunicación en casa y a todo nivel cambiando los formatos de tv no más violencias; sino programas culturales educativos.
			Puyehue	Debe buscar seguridad de la familia como fin.
			La Pintana	Debe existir más vigilancia en las calles unión de vecinos y luminaria evitar violencia contra las mujeres y publicidad sexista.
Higher education	Bottom 25	mujer, mejorar, calle, tranquilo, deber, deber vivir, casa, poder vivir.	Combarbabá	Merecemos tener un lugar donde vivir y criar a nuestros hijos un hogar digno y seguro.
			Placilla	Debe dar seguridad inclusión e integración a la sociedad respetando la dignidad del ser humano.
			Collipulli	Debe ser derecho para todos el vivir tranquilamente y que nadie pase a llevar nuestra integridad física o psíquica.
	Top 25	sentir, seguro, lugar, violencia, paz, familiar, seguridad, comunidad, vivir, poder, familia, espacio.	Valdivia	Es vivir una vida sin violencia y que el estado garantice la seguridad de nuestros derechos.
			Valparaíso	Debe haber seguridad ciudadana dado que es importante para poder vivir y desarrollarnos en paz.
			Antofagasta	Debe sentir seguridad en el lugar en que uno este.
Pop. density	Bottom 25	violencia, deber vivir, seguridad, casa, vivir tranquilo, entorno, deber, miedo, tranquilo.	Chile Chico	Debe garantizar la seguridad entendiéndola como un derecho social.
			Tierra Amarilla	Debe penalizar a quienes agredan a personas física o psícamente pues nadie puede irrespetar la integridad física y psíquica de los ciudadanos.
			Pozo Almonte	Debe proteger y resguardar a la mujer ya que hoy esta en desigualdad en muchos ámbitos como la violencia física salario.
	Top 25	poder vivir, vivir, poder, seguro, paz, lugar, sentir, hogar, comunidad, familia, espacio.	Viña del Mar	Debe poder vivir tranquilos en nuestro barrio y casa sintiendonos protegidos por la justicia y derechos.
			Puente Alto	Debe poder disfrutar de cada espacio público de manera segura garantizando vivir en un país sin violencia.
			Talcahuano	Debe procurar a todos los habitantes un medio seguro y una vida pacifica que asegure el desarrollo optimo de la comunidad y la persona.
SEDI	Bottom 25	tranquilo, casa, poder vivir, poder, mejorar, calle, deber vivir, deber.	Monte Patria	Debe haber seguridad porque todos merecemos respeto y ya no podemos vivir tranquilos.
			Chanco	Debe contar con políticas de seguridad para evitar maltratos y robos.
			San Nicolás	Debe resguardar el derecho de seguridad permitiendo que las personas se desarrollen completamente aportando instancias en la sociedad.
	Top 25	miedo, sentir, paz, vivir, seguro, comunidad, familiar, violencia, lugar, seguridad, familia, espacio.	Calama	Necesitamos una vida sin violencia y tranquilidad disfrutando en todo ámbito con espacios de seguridad.
			Las Condes	Debe estar seguro en espacios públicos y privados.
			Providencia	Debe erradicar el miedo estando libre de violencia de autoridades con paz y tranquilidad.

Table 2.22: Topic: Equality

Determinant	Quartile	Topic Words	City	Text
Votes	Bottom 25	igualdad, ley, acceso, género, tratar, privilegio, proceso, deber, condición, diferencia, igual, oportunidad, deber haber igualdad.	Concón	Debe haber igualdad en el acceso las oportunidades meritocracia y no “pitutos” y ante la ley.
			Vitacura	Somos iguales ante la ley al acceso a la justicia y al debido proceso.
			Lo Barnechea	Es ser todos iguales ante la ley nadie puede ser tratado de manera diferente.
	Top 25	trato, justicia, clase social, clase, mujer, mismo, hombre.	Canela	Debe tener la posibilidad de defensa y trato de la misma forma ante la ley sin importar si tenemos o no plata.
			Puyehue	Hay brecha de sueldos entre hombres y mujeres además la competencia beneficia a profesores y técnicos y no a obreros habiendo nula posibilidad laboral de transexuales.
			La Pintana	Deben ser tratados igual sin importar la clase social.
Higher education	Bottom 25	mujer, hombre, igual, deber, clase, deber haber igualdad, género.	Combarbabá	No debe ser un obstaculo para el mundo laboral ya que el sexo femenino tiene las mismas capacidades laboras que el masculino.
			Placilla	Debe cumplir este derecho de igual manera ante la ley independiente de la clase socio-económica o cargo.
			Collipulli	Debe haber igualdad de género en la comunicación en el trato el respeto el trabajo y sueldo pues existe mayor valoración del hombre.
	Top 25	importar, tratar, existir, deber existir, privilegio, oportunidad, proceso, justicia, trato, mismo, diferencia, ley, igualdad.	Valdivia	No deben existir diferencias ni privilegios pues somos todos iguales.
			Valparaíso	Entiende como un todo incluyendo la igualdad ante la ley de acceso a la justicia y al debido proceso ante las cargas públicas y proporcionalidad ante los tributos.
			Antofagasta	Debemos ser juzgados de igual manera con justicia imparcial.
Pop. density	Bottom 25	importar, género, político, poder, deber, mismo derecho.	Chile Chico	Debe ser un salario sin distinción de género.
			Tierra Amarilla	Debe haber igualdad para sentirnos todos con los mismos derechos y oportunidades.
			Pozo Almonte	Debe impulsar fuentes de trabajo eliminando el fuero político.
	Top 25	privilegio, proceso, justicia, judicial, oportunidad, tratar, deber existir, acceso, ley, trato, existir, mismo, igualdad.	Viña del Mar	Debe haber igualdad ante género ante la ley acceso a la justicia y un debido proceso a desempeñar un cargo público etc siendo fundamentalmente al trato con igualdad y sin discriminación en su más amplio sentido.
			Puente Alto	Debe haber un mismo trato ante la ley poseyendo todos la misma condición.
			Talcahuano	Deben tener acceso a un proceso judicial que corresponda.
SEDI	Bottom 25	género, deber, discriminación, existir, deber existir, existir igualdad, mismo oportunidad, juzgar, mismo derecho.	Monte Patria	Debemos ser individuos con las mismas oportunidades.
			Chanco	Debe dar oportunidades por igual a todas las personas sin discriminacion ni privilegios.
			San Nicolás	Debe garantizar la igualdad de género siendo necesario terminar con los abusos ya que hoy podemos afirmar con gran determinación que no existen diferencias entre distintos géneros.
	Top 25	deber haber igualdad, proceso, mismo, trato, privilegio, tratar, justicia, acceso, oportunidad, ley, igualdad.	Calama	Debe contemplar las mismas normas o leyes para todas las personas sin que existan privilegios ni titulos nobiliarios.
			Las Condes	Debe haber igualdad ante la ley acceso a la justicia y el debido proceso igualdad frente a tributos y cargas públicas.
			Providencia	Debe tratar como igualdad de madios contemplando el concepto de equidad por el que no debe darse a todos lo mismo necesariamente.

Table 2.23: Sentiment analysis for two variables of topic “Security”.

word	value	sentiment
socioeconomic development		
tranquilo	98.68 %	Positive
casa	0.00 %	Neutral
poder vivir	96.71 %	Positive
poder	0.00 %	Neutral
mejorar	98.24 %	Positive
calle	0.00 %	Neutral
deber vivir	91.35 %	Positive
deber	0.00 %	Neutral
miedo	-94.96 %	Negative
sentir	96.94 %	Positive
paz	98.24 %	Positive
vivir	96.08 %	Positive
seguro	97.81 %	Positive
comunidad	0.00 %	Neutral
familiar	96.94 %	Positive
violencia	-98.14 %	Negative
lugar	0.00 %	Neutral
seguridad	97.81 %	Positive
familia	91.91 %	Positive
espacio	0.00 %	Neutral
Primary Economic Activity		
establecer	0.00 %	Neutral
seguridad social	98.26 %	Positive
deber establecer	0.00 %	Neutral
ciudadano	0.00 %	Neutral
hogar	0.00 %	Neutral
paz	98.24 %	Positive
seguridad	97.81 %	Positive
sentir	96.94 %	Positive
seguro	97.81 %	Positive
poder vivir	96.71 %	Positive
violencia	-98.14 %	Negative
deber haber grande	90.43 %	Positive
deber vivir	91.35 %	Positive
puerta	0.00 %	Neutral
delincuencia	0.00 %	Neutral
poder	0.00 %	Neutral
lugar	0.00 %	Neutral
vivir	96.08 %	Positive

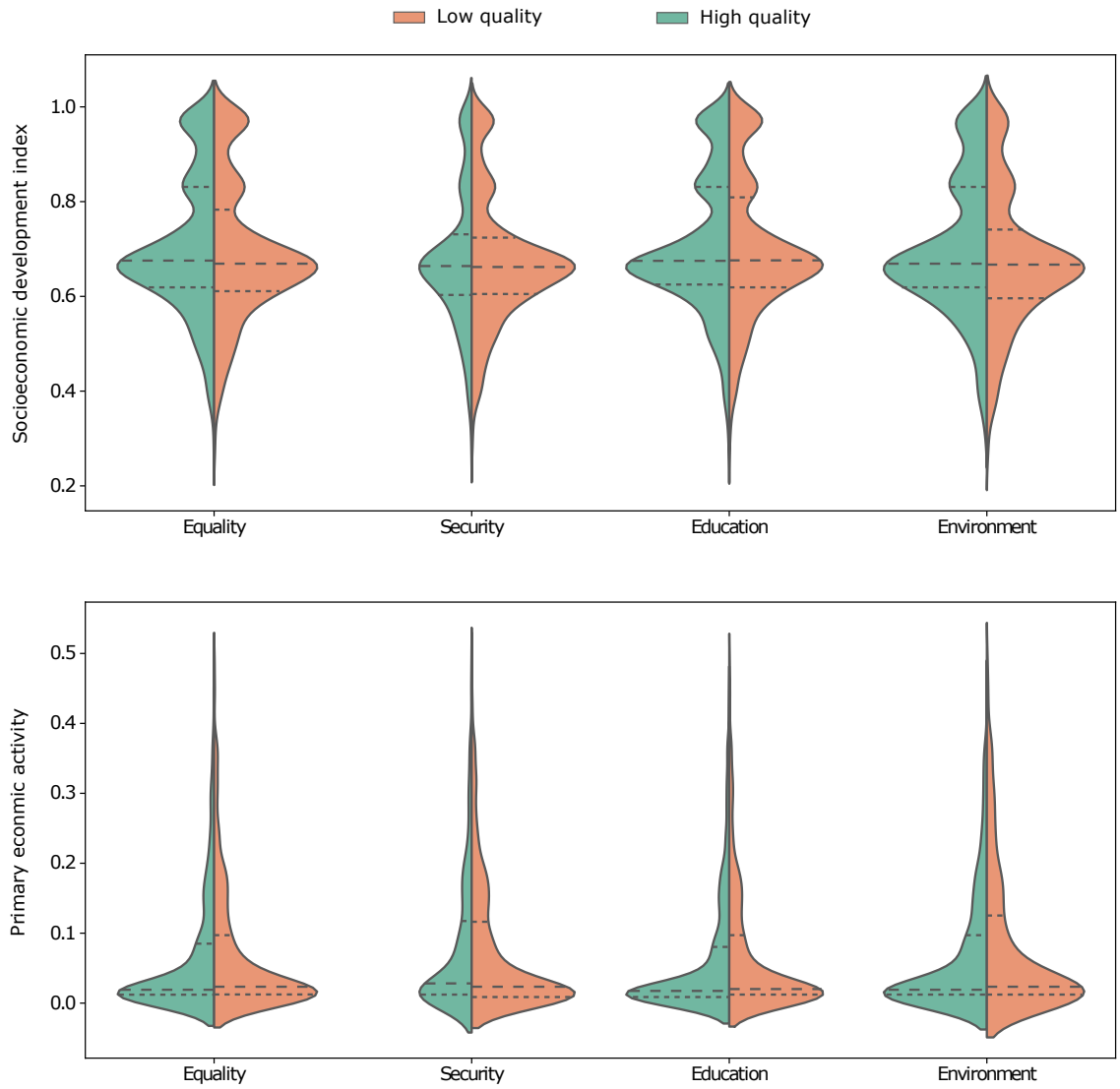


Figure 2.10: Distribution of quality argument for topics Equality, Security, Education and Environment, and two variables: socioeconomic development index (top panel) and share of primary economic activity (bottom panel). Dashed lines represent quartiles.

3. Mapping the complexity of political ideology using emergent networks: The Chilean case

Abstract [1]

We propose a method to characterize political ideology using network theory. Our analysis is based on the 2015-16 Chilean constituent process, where self-convened meetings were held throughout the country to discuss which Values, Rights, Duties, and Institutions should be included in the new constitution. Using this unique data set, co-occurrence networks were constructed by considering the concepts selected in different meetings. The nodes are the concepts, and a link between two nodes represents the association between them. Political ideology is thus analyzed as an emergent network, and we can identify the main ideological communities in Chile and describe their characteristics. Beyond the local results, the proposed methodology enables representing the diversity of a community's political orientations in a realistic ecological context.

3.1 Introduction

The study of networks is increasingly influential in political science; topics of interest in the literature range from political participation, the study of electoral campaigns and the organization of public protests, to the processes of political coalition formation, the relationships between Congressmen, and the co-sponsorship of bills in Congress (for some general reviews in this area, see Brito et al., 2020; Faustino et al., 2019; Huckfeldt, 2009; Siegel, 2011; Ward et al., 2011). Nevertheless, these methods still offer new possibilities. In this paper we are interested in the study of political ideology based on network analysis methodologies.

While most network-based political analyses are based on survey-data, where the nodes correspond to individuals or political parties, that is not the only way to examine these issues. The Chilean constituent process of 2015–16 offers an

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extraordinary source of information for examining the political positioning of citizens in four dimensions: Values, Rights, Duties, and Institutions (MINSEGPRES (2018)). This process had different levels of citizen participation, including an individual consultation and different levels of group participation. The first group-stage consisted in self-convened local meetings (ELAs, for its Spanish acronym), and this is the level we will focus on here. Focusing on the concepts chosen by citizens/voters in each of the aforementioned dimensions, we can build a network based on the links between concepts, which allows us to detect specific communities, and examine the centrality of some concepts and the associations between them. In this way we can offer an illuminating overview of the structure of ideology in the country, where we view ideology as the mental models that allow agents to interpret the world around them; the preferences agents have over values, rights and duties clearly fit into this framework.

Our work complements the literature on political ideology in Chile in two respects: from the point of view of the methodology used and in terms of the data considered. In the Chilean (and Latin American comparative) literature, we find different types of studies, mainly based on surveys or public opinion research. They include descriptive analyses, focused on political parties (Alcántara and Rivas, 2007; Colomer and Escatel, 2005), studies with a focus on sociodemographic differences between voters (Maureira, 2008), and works based on latent preference models (Bonilla and Silva, 2008; Lindh et al., 2019).[2] These studies allow us to delve into different attributes of political ideology in Chile, but without exploring its fundamental organization and, when they do, they impose a specific structure on the data. The method we propose does not impose such structure, and instead lets the ideological communities emerge from the asso-

[2]Studies based on political manifestos and programs, like those of Gamboa et al. (2013) and Madariaga and Kaltwasser Rovira (2020) are somewhat different, but could also be relevant here.

ciation of concepts. Given the complexity of the study of political ideology, the possibility of studying (and visualizing) an emergent network is an important result. Another advantage of the methodology we use is that our networks do not directly consider the popularity of the concepts, but the relative frequency of co-occurrence between them. This enables the identification of underrepresented groups that organized to participate. That said, the structure of the network will depend on the specific characteristics of the constituent process we consider. The way in which preference revelation processes are framed play an important role in the result that emerges from them (see, for example Riker, 1982; Shepsle, 2018). Regarding the data, although previous works on political ideology in Chile allow us to examine trends over time, they do not have the level of information available in the data collected from the constituent process, particularly in terms of the dimensions considered (MINSEGPRES, 2018). At this point it is important to recall the context of citizen participation in the Chilean constituent process —to gather material for drafting a new constitution—, and the potential participation bias in this process, which has been examined by Raveau et al. (2020). The constituent process was marked by an important degree of ambiguity regarding the ultimate purpose of the work being carried out (Fuentes, 2016), but to the extent that there were incentives for a truthful revelation of preferences, a network methodology allows us to identify the main ideological communities existing in Chile. Moreover, our analysis allows us to identify some groups that organized themselves to participate in this process, which is a topic which has been examined in previous studies (Fuentes, 2016). Uncovering the “structural complexity” of political ideology is not a simple task, and it is important to make the analysis manageable. In this sense, we study the networks for Values, Rights, and Duties, separately. Regarding the dimension of Institutions, political ideology is mixed with other factors,

including citizens' knowledge of different public institutions; we have therefore decided to leave this issue aside. In any case, and before continuing, it is important to explain that this is not a work on political psychology, nor do we analyze the determinants of ideology. We leave the exploration of the psychological characteristics of the communities we identify as an open question for further research.

3.2 Estimating Ideology

Inquiring into the structure of political ideology in Chile presupposes accepting that such ideology can be "structured" or that it presents a certain organization. The methods used in political science since the middle of the last century have sought to unveil this structure, and so far, have done so either by assuming that there is a single predominant dimension (e.g., a left-right or liberal-conservative axis) or by suggesting a two-dimensional structure. The first known work to propose a two-dimensional system for political ideology is that of Eysenck, in his 1954 book, *The Psychology of Politics*. In it, he seeks to extend the work by Adorno et al. on the factors behind fascism by proposing a two-dimensional structure for the existence of authoritarian and democratic systems on the right and left, respectively. In this way, social attitudes are organized along two axes, one in terms of left/right (radical/conservative) and the other of authoritarianism/democracy (tough-mindedness/tendermindedness). Along the same lines as Eysenck, Rokeach (1973) proposed a model that explained the four major ideologies of the 20th century —socialism, communism, fascism, and capitalism— in the two dimensions of freedom and equality.

Although the previous works may no longer be relevant today, it is important to note that both propose a system of two independent (orthogonal) dimensions based on an explanatory theory. After estimating these models one can evalu-

ate whether the dimensions found are independent and whether they explain the observed variability in ideology. Later, along with the emergence of the spatial theory of voting (Enelow and Hinich, 1984), which is widely used in analytical political science, dimensional reduction methods appeared. These techniques seek to express the joint variability of multiple variables in a smaller number of unobserved variables.

The best-known methods in this line include the work by Poole (1998) on the basic space method, and the Cahoon-Hinich methodology (Cahoon et al., 1978). In the Cahoon-Hinich model, the voter-candidate closeness is represented as a Euclidean distance between the ideal points of voters and candidates in a multidimensional space. This method assumes that the latent variables being searched are uncorrelated, which ultimately leads to the fact that the variance-covariance matrix of the utility can be decomposed using the singular value decomposition.[3] In contrast, Poole's basic space method directly analyzes any data matrix with missing values to estimate latent variables from observed variables. Although it is inspired by positive political theory, it is a technique that can be used in any setting, as long as the matrix contains real numbers.[4] In this sense, although both methods use the same type of data, they represent two different approaches to ideology estimation.

On the other hand, even though both methods ensure orthogonal latent variables (unlike Eysenck and Rokeach), in the Cahoon-Hinich and Poole methods the reduced variables do not have a direct meaning or interpretation; thus, these must be searched for later. Bonilla and Silva (2008) used the Cahoon-Hinich methodology with data from the 2003 Chilean presidential candidates. In this

[3] For elaborations of this model, see Hinich and Munger, 1996.

[4] In its political application, this method assumes that people have a set of beliefs that explain their political opinions, and that respondents evaluate a political actor/issue based on how close they feel to them. Thus, a respondent's evaluation of a political actor/issue is a linear combination of their ideology and stochastic error.

case, the first two dimensions explained 90% of the variance, where the first dimension corresponded to the left/right axis while the second was interpreted as the candidate's ability to change the status-quo. In an analogous study of candidates in 2008, the first dimension explained 82% of the variance; the second dimension was unintelligible (Bonilla et al., 2011).

Methods based on the spatial theory of voting have also been used for the ideological positioning of members of Congress through their votes in legislative projects ("roll call"). Perhaps the best-known work in this field is that of Poole and Rosenthal (1985), with the NOMINATE method (for nominal three-step estimation) and its subsequent variations D-NOMINATE, W-NOMINATE, and DW-NOMINATE. Other relevant works are those of Heckman and Snyder (1997), Clinton et al. (2004) and Londregan (1999). Even though they share a similar methodology, nominal voting models are not our main interest in this study, and therefore we will not delve into this topic.

The aforementioned methods have been the standard in multidimensional political ideology estimation, mainly because of their ability to explain much of the variance in a few dimensions. However, they impose strong requirements by requiring, by construction, the orthogonality of the latent variables. On the other hand, the evaluation of political figures may not adequately represent the diversity of political ideology at a given time, especially if such diversity is not sufficiently represented in Congress or in political actors.

As we will see, the method we use in this study differs in several respects from previous methods for estimating ideology. We use the prioritization of concepts in the ELAs as an indicator of ideological positioning. Unlike factor analysis, we do not impose a restriction on the orthogonality of the dimensions, but organize ideology into ideological communities, which emerge from the concept associa-

tion network. Like the factorial methods, these communities must be interpreted, but this is something we do directly from the texts accompanying the selected concepts. Also, using concepts instead of political actors allows for the greater diversity of ideas needed to map the political spectrum.

In general, studies of political positioning and political psychology work under at least two problematic assumptions. The first is that of the perfection or transparency of the subjects' cognitive processes in the identification of their preferred alternative or even when answering a question in a given survey. In the tradition of bounded rationality we find enough literature to question the operational assumptions with which many studies of political positioning work (Elster, 1989; Gigerenzer and Selten, 2002; Kahneman, 2003; Simon, 1990).[5] This limitation is inherent in any human exercise. However, extracting knowledge from statements in a realistic ecological context —such as spontaneous deliberative dialogues— avoids the framing effect, whereby the person's decision is affected by the way the question is asked or the options are presented.

The second problematic assumption is whether the operational categories of political identification effectively represent what the subjects think of them. Studies that base political positioning on a right-left scale or on the evaluation of political figures work with a concept of political ideology that constitutes, in itself, a multiplicity of political attitudes related to democracy, social change, and trust in institutions, among others. In the ELAs, participants had a broad set of concepts to choose from, so we can expect less variation in the mental representations of these concepts. When working with a broad set of diverse and limited concepts,

[5]We can point out the following cognitive principles (Rosati, 2000) (i) mental representations organized in a cognitive structure of beliefs, (ii) selective memory focused on the big picture and not on details, (iii) selective attention and perception, (iv) causal inferences based on one's beliefs, and (v) cognitive stability or having a stable set of beliefs over time, once formed. An example of how this can affect political positioning is the "projection hypothesis". According to this hypothesis, when an individual is exposed to new information about a candidate, selective attention leads the person to pay attention to those aspects that reinforce their favorite view of the candidate.

as in our case, there are more possibilities for combining these concepts, and this combination is what represents the ideological positioning. [6] Furthermore, studies based on ideological scales may show a high level of centrist respondents (Visconti, 2021).

3.3 Context and data

On October 13, 2015, the President of Chile, Michelle Bachelet started a constituent process, which incorporated public discussion on constitutional issues (MINSEGPRES, 2018). The first stage of the process was the participatory stage, which took place between April 23 and August 6, 2016. In it, "citizens, social organizations, political movements and parties, academia, business and culture were invited to deliberate on constitutional issues" (Jordán et al., 2016). This stage considered four levels of participation: an individual online consultation and three instances of group participation (local, provincial, and regional). In this work we have focused on the local group level, the self-convoked encounters (ELAs).[7] This methodological definition involves a trade-off between the quantity of data available and the information we have. While the number of ELAs is much lower than the number of participants in the individual consultations, in the case of the ELAs the participants had to write down a short argument to explain their concept choices, which help us to interpret the meaning of certain concepts.[8]

The self-convoked encounters (ELAs) were composed of between 10 and 30 citizens, Chileans or foreign residents, over the age of 14. The purpose of the

[6] Another way of approaching this issue is with the distinction between the "symbolic" and "operational" aspects of political ideology (Jost et al., 2009). In this terminology, self-identification on a right-left scale is part of the symbolic aspect, since "right" and "left" are abstract and general categories. The operational aspect refers to more specific and concrete issues. Evidence suggests that the two forms of ideology do not always coincide (Stimson, 2015).

[7] The data is publicly available and can be found at `http://constitucionabierta.cl/`

[8] From a preference aggregation perspective, the individual consultation data-set should yield more consistent results. However, given the self-convoked nature of the encounters, it is to be expected that these groups (the ELAs) were relatively homogeneous, which makes the structure of the network emerge as we see it.

ELAs was to deliberate on four dimensions: Values, Rights, Duties, and Institutions. To answer the questions that motivated the meetings, the organization of the ELAs prepared a reference list of constitutional concepts which was made available to each participant. This list was based on a comparative review of 16 international constitutions, elaborated by the government. Individually, each participant had to choose the most relevant concepts for each of the four questions, or propose other concepts. The discussion then began, and a record was made of the seven most mentioned concepts, for each question. Finally, the group classified each of the seven concepts of the four questions in the categories of agreement, partial agreement, or disagreement, also adding a brief rationale text in each case (MINSEGPRES, 2016).

A total of 8,113 ELAs were conducted throughout the country, with more than 100,000 participants. While there may have been a participation bias, this process was described as successful by the OECD (2017).[9] Here we have, then, a valuable source of information on the dimensions of Chilean political ideology that has not been sufficiently explored (Raveau et al., 2020).

Before continuing, let us note that the database we are working with was processed by Fuentes-Bravo and Martinez (2018). Among other things, these authors classified the new concepts that appeared in the encounters, which they called open concept arguments. Of the 22,015 such arguments, 10,263 were classified into one of the 114 original concepts, 3,001 were considered “unclassifiable”, and the remaining 8,751 were grouped into 47 new concepts.

Given our interest in the structure of the ideology itself, here we focus on only three of the four dimensions of the discussion: Values, Rights, and Duties. Below (Tables 3.1-3.3) we show the ELA instructions and the original list of concepts,

[9] Although it has been criticized for its limited impact in the country, see, for example, Heiss (2018).

together with the concepts added by the participants (after their classification), for each dimension. As can be seen, the proportion of new concepts is stable, although it grows as the number of original concepts is lower. In particular, there are 37 original concepts and 15 new ones in Values, 44 original concepts and 14 new ones in Rights, and 12 original concepts and 7 new ones in Duties. The low number of concepts proposed and classified in the dimension of Duties will limit in some ways the network analysis that we propose, and therefore the analysis regarding this point will necessarily be shorter.

Table 3.1: What should be the main VALUES and PRINCIPLES that inspire and support the Constitution? Choose up to seven topics among the list below or suggest others.

Original concepts:		
Civic friendship	Secular state	Autonomy/freedom
Multiculturalism	Common good/community	Participation
Citizenship	Patriotism	Democracy
Development	Pluralism	Decentralisation
Multinationalism	Dignity	Probity
Diversity	Republic	Free entrepreneurship
Respect	Gender equity	Responsibility
Security	Rule of law	Sovereignty
Cultural identity	Solidarity	Equality
Subsidiarity	Inclusion	Tolerance
Innovation/creativity	Transparency/publicity	Integration
Environmental respect/protection		Unity
Peace/peaceful cohabitation		Justice
Others, specify:		
New concepts:		
Guarantor state	Social security	Private property
Freedom of conscience	Freedom of worship	Freedom of speech
Freedom	Social justice	Participatory democracy
Human rights	Integral development	Family
Heterosexual married families		Equity
Sustainable development		

Table 3.2: What should be the fundamental and universal RIGHTS contained in the Constitution? Choose up to seven topics among the list below or suggest others.

Original concepts:		
Suffrage/vote	Honour/reputation	Nationality
Right of association	Election to public office	Peaceful assembly
Participation	Life	Freedom to work
Security/non-violence	Right to Work	Equality
Fair wage	Non-discrimination	Decent housing
Equality before the law	Healthcare	Freedom of Education
Freedom of conscience	Personal freedom	Property
Freedom of movement	Freedom of expression	Education
Gender equity	Right to strike	Social security
Privacy and intimacy	Access to culture	Cultural identity
Right to information	Indigenous people	Tax equality
Request before the authorities	Right to organize and to collective bargaining	Equality in relation to public burdens
Mental and physical integrity	Access to justice/due process	Children and teenager's rights
Integration of disabled people	Environmental respect/protection	Judicial protection of individual rights
Free economic initiative/free enterprise	Access to public information	Others, specify
New concepts:		
Standard of living	Freedom of worship	Right to water
Human Rights	Social Rights	Animal rights
Cultural identity of indigenous people	Right to quality public health care	Respect life from conception
Right to make one's own decisions about one's life	Freedom	Right to work and a decent wage
Freedom of information and speech	Conservation of cultural and historical heritage	

Table 3.3: What universal DUTIES and RESPONSIBILITIES should be established in the Constitution? Choose up to seven topics among the list below or suggest others.

Original concepts:	
Protection and conservation of cultural and historical heritage	
Compliance with treaties and international commitments	
Protection, promotion and respect of human and fundamental rights	
Respect for the Constitution	Responsibility
Respect for others 'rights	Tax compliance
Lawful exercise of rights	Community service
Fulfil public charges	Compliance with laws
Conservation and natural-protection duties	Others, specify
New concepts:	
Protection of private property	Suffrage / vote
Probity and transparency	Citizen participation
Respect and non-discrimination	National unity
Social and civic responsibility	

3.4 Methodology

As we previously explained, each ELA resulted in a set of 7 concepts (at most) for each dimension, with a short argument or rationale text (and an agreement category) associated to each concept. The data-set we used to build the networks consists only in the selected concepts, the texts have been used only for interpretation purposes. Since the concepts were chosen from a bigger pool, the process of selection in effect reflects a prioritization of values, rights or duties, respectively.

3.4.1 Networks creation

For each of the four dimensions, we represent the concept map using a co-occurrence network. Each concept is a node of the network, and the links between pairs of nodes symbolize the association between the respective concepts. This association is estimated by first calculating the coefficient ϕ, a variation of Pearson's correlation coefficient for binary variables. This coefficient was designed to compare dichotomous distributions, which in this case respond to the choice or not of a concept in the ELAs. For example, for the pair of values *Democracy* and

Justice, the ϕ coefficient is obtained from the following table (Read and Vidakovic, 2006):

	Democracy	
Justice	Yes	No
Yes	a	b
No	c	d

where a, b, c, d are the frequencies of observation; that is, a is the number of ELAs that chose both concepts, b is the number of ELAs that chose *Justice*, but not *Democracy* and so on. Then, for a pair of concepts i and j, the ϕ_{ij} coefficient is calculated as:

$$\phi_{ij} = \frac{ad - bc}{\sqrt{(a+b)(c+d)(a+c)(b+d)}} \tag{3.1}$$

Once the ϕ_{ij} coefficient has been calculated, its significance can be tested with a χ^2 test:

$$\chi^2_{ij} = N\phi^2_{ij}$$

where $N = a + b + c + d$. Finally, the weight of the link between the nodes (concepts) is obtained by calculating the distance $d_{ij} = \sqrt{1 - \phi_{ij}}$. If ϕ_{ij} is positive and significant at the 95% confidence level, a link between concepts i and j is constructed, with weight $1 - d_{ij}$. It should be noted that the coefficient ϕ_{ij} is a metric that adjusts for the relative abundance of concepts. That is, two concepts may have been chosen infrequently, but if they were chosen together, they will present a high and significant coefficient ϕ_{ij}. This is particularly important for us, as we do not seek to quantify the popularity of the concepts, but rather the strength of the association between them.

3.4.2 Network analysis

First, it is convenient to clarify that we will work with weighted networks, where each link takes a continuous value between 0 and 1, that represents the strength of the association between pairs of concepts. This association arises from the co-occurrence of concepts in the same ELA. On the other hand, they are undirected networks, that is, the association between a pair of concepts is not directional. Finally, for the following analyses, the giant component of the network will be used; that is, isolated nodes (concepts that have no link to any other concept) are excluded from the network.

Diameter The diameter of the network is the maximum distance found between all possible pairs of nodes (Wasserman and Faust, 1994); it quantifies how far apart the farthest nodes in the network are. In social networks, the interpretation of the distance between nodes and the network diameter is straightforward. For example, in a weightless communication network, the geodesic distance—the shortest path from one node to another—will represent the number of intermediaries a message has to go through to get from one actor in the network to another. In our network, the interpretation is not as straightforward. Each link represents the association between two concepts, which arises from the co-occurrence of those concepts in the preferences of a group of people (the participants in the ELAs). Thus, nodes that are farther apart represent concepts that are less likely to be found in the set of people's preferences; at the extreme end, we have the diameter of the network, which would represent opposite ideological poles.

Community detection A community (or cluster) is a group of nodes where the probability of being connected to each other is greater than the probability of being connected to nodes outside the community. Community detection is a widely dis-

cussed problem in network theory, and there are no universal definitions of what constitutes a community or when one method is better than another (Fortunato and Hric, 2016). One of the most popular techniques for community detection is based on the concept of modularity. This metric was designed to quantify the strength of the division of a network into modules and measures the density of links within the community with respect to the links between communities. Thus, algorithms based on this concept seek to maximize the modularity of the partition. Among these, one of the most widely used is Louvain's method, named after the university where it was developed. Louvain's method consists of a hierarchical algorithm in which each node is initially its own community. At each iteration, each node moves to the community where it contributes most to the modularity of the partition. This process is repeated until the modularity cannot be increased anymore, and then the first phase ends (Blondel et al., 2008). In the second phase, a new network is constructed where the nodes are the communities found during this phase, and the links are calculated by summing the link weights of the nodes of the corresponding community. Then, the first phase is applied to this new network, and the process continues until maximum modularity is reached.

As a robustness check, we compared our results using Louvain algorithm, with other methods such as Fast Greedy and Leading Eigenvector (Clauset et al., 2004; Newman, 2006). Louvain consistently reached the highest modularity score. For Values, Louvain and Fast Greedy tie in modularity, and return the exact same clusters, while for Duties the Louvain algorithm beats the other two. In the case of Rights, the three algorithms tie in modularity, and overall, five nodes change community membership. These changes do not significantly alter our main interpretations and conclusions.

Centrality measures Centrality measures in networks were originally intended to study how small groups communicate and organize themselves to solve problems. Many centrality measures have been proposed, but among the most common ones are (Freeman, 1978): (i) node i's degree centrality (degree) is the number of nodes that are in direct contact with i; (ii) betweenness centrality of node i represents the frequency with which node i is on the shortest path between pairs of nodes; (iii) closeness centrality of node i measures the number of steps required (i.e., the number of nodes to go through) to go from i to any other node in the network. These centrality measures were used in their *igraph* implementation for R (Csardi and Nepusz, 2006). The specific algorithms for each metric can also be found at `https://igraph.org/r/`.

These measures of centrality provide different information, and it is convenient to review their interpretation in the context of our concept networks. In this case, the degree tells how connected or associated a concept is with the other concepts in the network. Thus, a concept will have a high degree if it was frequently chosen together with other concepts, that is, it has links to many other concepts. On the other hand, the centrality of intermediation shows how key concepts connect different communities within the network. Next, a concept will have high betweenness centrality if it was frequently chosen by one ideological group as well as by another. Finally, closeness centrality tells us how central a given concept is within the network.

3.5 Results

3.5.1 Community detection

A particularly interesting result that emerges from our analysis concerns the distinct ideological clusters within the networks. To reiterate, these clusters represent communities of concepts, in the sense that they significantly co-occur across the ELAs. Starting with the dimension of Rights, an issue of great popularity in Chile today, Table 3.4 shows the three clusters identified by the Louvain algorithm. In cluster D we see first-generation rights, that is, negative rights that emphasize political and civil liberties.[10] Among them, we find the right to *Life* and *Security/non-violence*, *Equality before the law*, the *Right of association*, the right to *Suffrage/vote*, and the freedoms of movement, expression, worship, work, education, entrepreneurship, conscience, and personal liberty. Therefore, we associate cluster D with a right-wing ideology. In cluster C we have mainly second-generation rights, which are positive rights that promote equality and advocate the state's active participation to this end. Here, we find social and economic rights, such as the right to *Education*, *Healthcare*, *Decent housing*, and *Social security*. Also, but to a lesser extent, we find some third-generation rights, such as the rights of *Indigenous people*. This is why we associate cluster C with the traditional left. Finally, in cluster A we find second-generation rights, such as *Social rights*, *Equality*, *Standard of living*, and *Right to quality public health care*, but also most of the third-generation rights, such as *Conservation of cultural and historical her-*

[10] We owe the classification of rights into three generations to Vasak (1977). Although the first- and second-generation rights are included in the Declaration of Human Rights of 1948, it is in the International Covenant on Civil and Political Rights (ICCPR) and the International Covenant on Economic, Social and Cultural Rights (ICESCR) of the United Nations (1996) where they are instantiated (Domaradzki et al., 2019). The main difference between these two types of rights deals with the action of the state. In the first-generation rights, the state "undertakes to respect and to ensure" those rights, while in the second-generation rights it "undertakes to take steps . . . to the maximum of its available resources . . ." to achieve them. Finally, third-generation rights are more recent and have been called collective (Domaradzki et al., 2019) or solidarity rights (Vasak, 1977). They are mentioned in the declarations of Stockholm (1972) and Rio (1992) at the United Nations General Assembly. They include the (positive) rights to self-determination, development, a clean environment, and participation in cultural heritage.

itage, *Environmental respect/protection*, and *Animal rights*. For this reason, we associate cluster A with an orientation that is also left-wing, but progressive.

First-generation rights have been catalogued as negative and individual, while second-generation rights are also individual, but positive and third-generation rights are collective and positive (Vasak, 1977). In this framework, we see that the difference between clusters D and C is given in the negative/positive nature of rights, that is, in the action of the state. While cluster D emphasizes freedom and the role of the state in ensuring non-interference in the use of these freedoms, cluster C demands that the state play an active as the guarantor of social rights. On the other hand, the difference between clusters A and C does not have to do with the role of the state, as both are inclined to positive rights, but with the individual/collective character.

Table 3.4: Communities by dimension. Non-original concepts are shown in italic font.

Values	
Cluster A	*Freedom*, Participation, Cultural identity, Decentralisation, Inclusion, Multiculturalism, Gender equity, Environmental respect/protection, Common good/community, Secular state, *Participatory democracy*, Diversity, *Equity*, *Guarantor state*, *Human rights*, *Social justice*, *Social security*, *Sustainable development*, Pluralism, Multinationalism, Innovation/creativity
Cluster B	*Heterosexual married families*, *Freedom of conscience*, *Freedom of worship*, *Freedom of speech*, Citizenship, Civic friendship
Cluster C	Security, Tolerance, Responsibility, Justice, Transparency/publicity, Respect, Equality, Integration, Democracy
Cluster D	Dignity, Autonomy/freedom, Rule of Law, Probity, Sovereignty, Development, Subsidiarity, Free entrepreneurship, *Family*, Republic, Unity, Patriotism, *Integral development*, Peace/peaceful cohabitation, *Private property*
Rights	
Cluster A	*Standard of living*, *Right to make one's own decisions about one's life*, *Freedom*, Honour/reputation, Cultural identity, *Cultural identity of indigenous people*, Right to information, Mental and physical integrity, Participation, *Conservation of cultural and historical heritage*, *Right to work and a decent wage*, *Right to quality public health care*, Access to public information, Access to culture, *Right to water*, Request before the authorities, *Human Rights*, *Animal rights*, Equality, *Freedom of information and speech*, Judicial protection of individual rights, Environmental respect/protection, *Social Rights*
Cluster C	Right to strike, Education, Integration of disabled people, Healthcare, Social security, Decent housing, Right to organise and to collective bargaining, Fair wage, Right to Work, Indigenous people, Children and teenager's rights, Tax equality, Gender equity, Non-discrimination
Cluster D	Nationality, Security/non-violence, Life, *Respect life from conception*, Suffrage/vote, Property, Right of association, Equality before the law, Equality in relation to public burdens, Access to justice/due process, Freedom of movement, Freedom of conscience, *Freedom of worship*, Freedom of Education, Freedom of expression, Freedom to work, Personal freedom, Free economic initiative/free enterprise, Privacy and intimacy, Peaceful assembly, Election to public office
Duties	
Cluster A	Tax compliance, Compliance with treaties and international commitments, Protection and conservation of cultural and historical heritage, Conservation and natural-protection duties, Protection, promotion and respect of human and fundamental rights, Community service
Cluster N	*Citizen participation*, *Respect and non-discrimination*, *Social and civic responsibility*, *National unity*, *Probity and transparency*, Fulfil public charges, *Suffrage / vote*
Cluster D	Compliance with laws, *Protection of private property*, Lawful exercise of rights, Respect for others 'rights, Respect for the Constitution, Responsibility

This classification is consistent with what we see in the dimension of Values, where we can also identify the same clusters A, C, and D. The concepts that allow us to classify cluster D as right-wing have to do with the importance assigned to *Autonomy/Freedom*, *Private Property*, *Rule of Law*, *Development*, *Subsidiarity*, and also *Sovereignty*, *Family*, *Patriotism*, *Solidarity*, and *Dignity*. Regarding Cluster A, the concepts of *Freedom*, *Participation*, *Cultural Identity*, *Gender Equity*, *Environmental Protection*, *Participatory Democracy*, *Equity*, and *Human Rights* allow us to identify it as a progressive cluster. Finally, in Cluster C we see the leftist concepts that have to do with the ideas of *Tolerance*, *Justice*, and *Equality*.

The distinction between clusters A and C can also be related to their age differences. According to Inglehart and Abramson (1994), societies shift from materialistic concerns —such as physical and economic security— to post-materialistic values —such as freedom of expression and standard of living—, once the material needs are taken care of. To test this idea, we performed mean difference tests to compare the average age of/in different clusters. For both Values and Rights, cluster A is younger than cluster C (age difference = 6.5 years), which in turn is younger than cluster D (age difference = 8.03 years).[11]

Cluster B, which appears only in the Values dimension, is a special case. Let us note that the concepts within this cluster promote a very clear vision of society: the idea of *Heterosexual marriage families* is eloquent in this sense. Since these concepts are mostly added by participants, and with almost identical text across different ELAs, this suggests a special level of organization. The references to *Freedom of Worship* and *Freedom of Conscience* are consistent with anecdotal evidence about the organization of the evangelical protestant community's participation in the constituent process; thus, we have identified this cluster as "evangel-

[11] The average cluster age was estimated by selecting all concepts belonging to the cluster, identifying the ELAs that select those concepts, and taking the average age of their participants. These differences are significant at a 0.01 significance level.

ical".[12] The fact that this cluster appears only in the Values dimension suggests that its selection of concepts does not differ much from those of other clusters in the other dimensions. For example, in the dimension of Rights, in cluster D (political right) we find a blend of concepts that could be called "conservative" (such as *Life* and *Respecting Life from Conception*) with others of a nationalist nature (*Nationality*) and those of a "liberal" type (such as *Freedom of Work*, *Property*, and *Free economic initiative/free enterprise*). Therefore, we can assume that when cluster B is not differentiated, it is cluster D that absorbs its share.

In the dimension of Duties, the network does not show the same disposition as in Values and Rights, perhaps because as there were fewer concepts to choose from, each concept had greater probability of being chosen by different people. Still, we can identify a progressive cluster A and a cluster that seems to be right-wing (D). The remaining cluster (called N in Table 3.4) does not have a clear socio-political interpretation.[13]

Throughout this work, we have used a 95% confidence level for links creation. At the 99% level, the communities remain the same for the Duties network, and only one node changes community membership in the Rights network. The biggest change is shown in the Values network, where the progressive cluster cluster splits into two groups, one with original concepts and the other composed almost exclusively by open concepts. However, both sub-graphs consist of pro-

[12] As noted, this may not have been the only group that organized to participate in the constituent process. During that time, there were several groups —political, economic, and social—that declared an interest in organizing to confront this process. The idea was, presumably, to put on the agenda issues that otherwise would have been absent. But since the work of Olson (1965) we know that the existence of benefits associated with organizing collectively are not a sufficient reason to explain a capacity to organize. In the case of evangelical churches, that capacity to organize can be explained in the already existing organization at the local level, in each church with its pastor, and in the churches among themselves. Here, the motivation to organize seems to respond to a need to establish protection of life from conception and of the family as fundamental values of society.

[13] This cluster is composed almost exclusively of open concepts, except for *Satisfying Public Burdens*, which serves as a link to the progressive cluster. However, when we look at the argument texts, we find that certain open concepts refer to different things and even present conflicting positions. For example, regarding *Citizen Participation*, there are phrases in favor of participatory democracy and phrases in favor of compulsory voting, positions that in the Chilean context do not necessarily go together. Therefore, this cluster groups together open concepts, but does not represent a single ideological community. This is probably an artifact of the method used, whose goodness depends on the sufficient availability of concepts of defined valence.

gressive concepts. On the other hand, another community appears, formed by *Citizenship*, *Civic Friendship* and *Integration*, the first two previously belonging to the evangelical clusters, and on the network periphery. Even when both concepts are now in a different cluster, they are still connected to conservatives concepts such as *Freedom of worship* and *Patriotism*. Overall, the cluster splitting is to be expected given the fewer number of links in the network.

One way to study the "ideological" closeness between communities is through the intercluster distance, which we estimate by calculating the average geodesic distance between all pairs of nodes belonging to two different clusters. Doing this for Values, we find that cluster B (evangelical) is closest to D (right), then to C (left), and then to A (progressive). This result is quite intuitive. However, the shortest intercluster distance is between clusters C and D. This indicates that for the Values dimension, the traditional left is ideologically closer to the political right than to the progressive left.[14] While this may seem counter-intuitive, we see that for the Rights network, this relationship is reversed, and cluster C is closer to cluster A than to cluster D. All of the above indicates that traditional left's closeness to the political right is mediated by values and to the progressive left by rights. One explanation for this is that most of the traditional left and right tend to be conservatives in this dimension. However, when it comes to rights, the political right promotes freedom, while the left and progressivism share the vision regarding the positive role of the state as the guarantor of social rights

3.5.2 Network analysis

Values Starting at the top left of the network (Figure 3.1), we can see one extreme of the diameter made up of the progressive concepts *Cultural Identity* and *Gender*

[14] Intercluster distances for dimension Values: B-D: 0.055; B-C:0.057; B-A:0.071, A-D:0.06; A-C:0.068, C-D:0.054. Intercluster distances for Rights: A-C: 0.035; A-D:0.04; C-D:0.041

Equity. Then we see *Secular State* and *Republic*, both referring to the separation of powers, with the former serving as a link between progressive concepts and more centrist concepts that are less ideologically charged. We then move on to *Patriotism*, with a nationalist slant, to finish with *Citizenship* and *Civic Friendship*. In the previous section, both concepts were identified as part of the evangelical cluster. In the case of *Civic Friendship*, this concept absorbed many of the concepts added by the participants during the ELAs, work that was done by the data systematization team. On the other hand, it is interesting to note that *Citizenship* is connected both to *Patriotism* —by virtue of belonging to a nation— and to *Integration*, alluding to the integration of Chileans, migrants, and native peoples. In sum, we have progressivism on one side of the diameter and concepts that fall into the evangelical community on the other side. If we visually divide the network based on this axis, on one side we have the political-right, where the concepts of an economic nature are further away on the network, and on the other side we have the left, where concepts such as *Social Security* and *Social Justice* also tend to lie on the network periphery.

Regarding the network's centrality measures, the three concepts with the highest betweenness centrality are *Secular State*, *Freedom*, and *Family* (see the second panel of Table 3.5). As we have already noted, the first serves as a link between progressivism and what can be labeled the political center. On the other hand, *Family* is connected to several concepts within the right-wing cluster (that is why it has high degree centrality) and also serves as a link with the evangelical cluster through its connection with *Freedom of Worship* and *Freedom of Conscience*. Finally, *Freedom* does not exhibit a great degree centrality, but it does show a high betweenness centrality, since it connects diverse lines of thought. Thus, while progressives think about the freedom to decide about their own body,

the right is thinking about the freedom to undertake and personal autonomy. The fact that *Freedom* does not have such high degree centrality may be due to the fact that there are other concepts that are more specific with respect to freedom, such as *Freedom of expression*, *Freedom of worship*, and *Free entrepreneurship*, which “compete” when they are used.

Since values are deeply embedded in culture, we would expect a stronger effect of participant age on concept selection in this dimension. The concept associated with the oldest average age is *Sovereign* (46.2 years), followed by *Solidarity* and *Rule of Law*, all three from cluster D, the right-wing cluster. As we would expect, the “youngest” concepts belong to cluster A, the progressive cluster, with *Equity* as the concept with the youngest average age. Finally, within cluster A *Human Rights* (43 years) and *Social Security* (42.5 years) are the “oldest” concepts, with suggest that there is an older segment within progressivism that adheres to the discourse of the traditional left.

Table 3.5: Network descriptors

	Values	Rights	Duties
Nodes	51	58	19
Links	145	319	53
Link density	0.11	0.19	0.31
Diameter	0.12	0.08	0.10
Mean distance	2.80	2.05	2.01
Mean Degree	5.58	11.00	5.58
Centrality measured for the top 5 ranked nodes by betweenness centrality.			
	Degree	Closeness	Betweenness
Values			
Secular state	13.00	0.45	214.11
Family	13.00	0.47	197.15
Freedom	6.00	0.46	152.82
Subsidiarity	13.00	0.45	151.77
Sustainable development	10.00	0.40	110.71
Rights			
Social rights	25.00	0.62	199.92
Education	25.00	0.61	192.16
Life	21.00	0.58	116.47
Participation	20.00	0.58	61.99
Equality before the law	17.00	0.55	56.88
Duties			
Protection, promotion and respect of human and fundamental rights	10.00	0.60	26.37
National unity	6.00	0.55	24.13
Responsibility	6.00	0.53	18.90
Suffrage / vote	4.00	0.44	14.58
Respect for the Constitution	8.00	0.60	13.84

Rights Figure 3.2 shows the concepts within the network's diameter. These are: *Human Rights*, which is embedded in the progressive cluster; then comes *Freedom*, which, as we saw earlier, refers to various objects of freedom and is in turn connected to *Life*. This concept plays the role that *Family* played in the Values network, that is, it has great centrality in the network, particularly among the right-wing and evangelical concepts. It precisely makes the link with the other end of the diameter, which is *Peaceful Assembly*. This concept is strongly connected to other evangelical nodes, such as *Freedom of Worship*, *Freedom of Conscience*, and *Respect Life from Conception*, and it was probably added by the evangel-

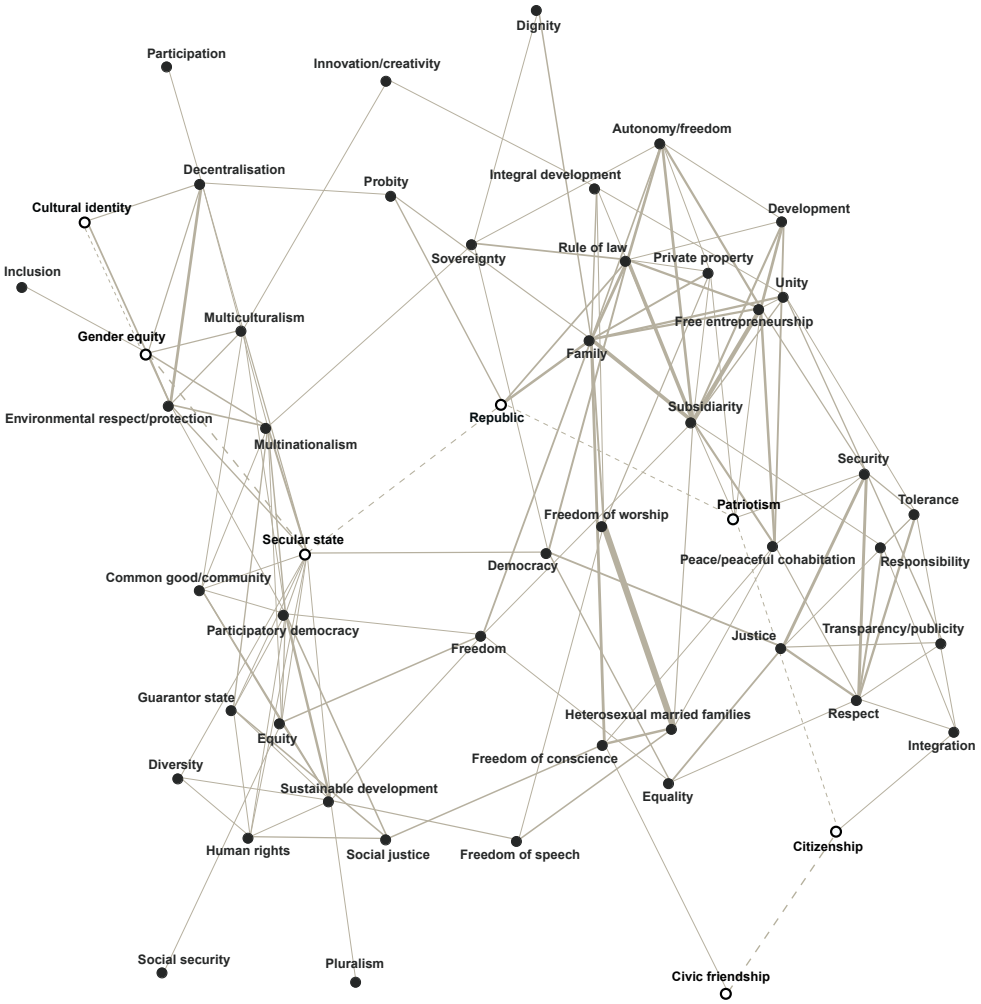

Figure 3.1: Co-occurrence network for Values. The node size is proportional to the node degree. Nodes and links in blue are part of the network diameter: *Civic friendship*, *Citizenship*, *Patriotism*, *Republic*, *Secular state*, *Gender equity*, *Cultural identity*.

ical group thinking about congregating freely in public spaces, as can be seen in this phrase: “there should be the right to gather in public places, *Plaza de Armas*, without previous authorization for preaching, authorized artistic-musical activities”. As happened in the Values dimension, the diameter of the network shows a progressive-religious axis, while the traditional right and left move away in other and opposite directions. Thus, on one side of the axis-diameter, we have the *Right to Strike*, *Healthcare*, and *Decent Housing*, and on the other side we

Figure 3.2: Co-occurrence network for Rights. The node size is proportional to the node degree. Nodes and links in blue are part of the network diameter: *Human Rights*, *Freedom*, *Life*, *Peaceful assembly*.

have *Property* and *Freedom to Work*.

Continuing with the centrality measures (Table 3.5), the three most central nodes are *Social Rights*, *Education*, and *Life*. The first two far surpass the third in betweenness centrality, which suggests that the provision of education and social rights are more widely held among the participants; not so for the right to *Life*, which has high degree centrality because it is very present in the right and evan-

gelicals, but lower betweenness centrality because it is not as connected with the concepts of the other groups. Regarding *Social Rights*, note that this concept was not in the original set of rights that the ELA organization proposed, so it is likely that different things were grouped under the label of "social rights". If we look at the texts, we see many phrases that refer to constitutional guarantees already established in the current constitution, such as the right to vote, organize, be elected to public office, and other phrases that postulate that article 19 should not be altered, thus keeping the provision of rights constant. Other phrases seek to expand the current provision of rights, such as the right to housing and transportation.

It is also worth noting that *Human Rights* is deeply embodied in the progressive cluster, although this concept has been usually associated to the traditional left. There are two factors that may explain this. The first is that *Human Rights* was not in the original set proposed for this dimension, probably because it was not a specific constitutional guarantee. Therefore, it was a concept added by the participants, and in general, these do not appear in the traditional left's cluster. It should be noted, however, that *Human Rights* did appear in the original list of Duties, as the duty of *Protection, promotion and respect of human and fundamental rights*. On the other hand, if we look at the age ranges associated with each concept in the progressive cluster, we see that *Human Rights* is one of the least chosen by young people. This suggests that within progressivism, there could be an older age group, perhaps serving as a bridge between progressivism and the traditional left.

Duties As previously mentioned, the initial set of proposed concepts here is smaller; there are only 12, which become 19 after the open concepts systematization. As can be seen in the second panel of Table 3.5, in general, these concepts have low centralities. Regarding the diameter of the network (see Figure 3.3), we have the

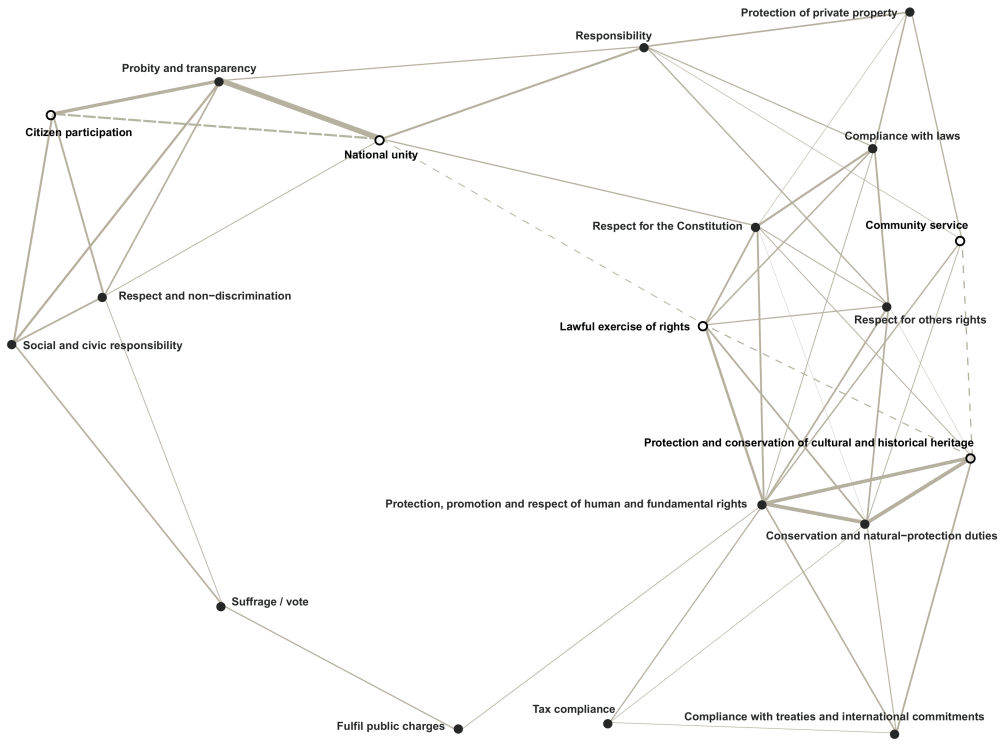

Figure 3.3: Co-occurrence network for Duties. The node size is proportional to the node degree. Nodes and links in blue are part of the network diameter: *Citizen participation*, *National unity*, *Lawful exercise of rights*, *Protection and conservation of cultural and historical heritage*, *Community service*.

concepts *Citizen Participation*, *National Unity*, *Lawful exercise of rights*, *Protection and conservation of cultural and historical heritage*, and *Community Service*. The first of these, *Citizen Participation*, is far from other progressive concepts. Continuing with the diameter, we then have *National Unity*, a nationalist concept, and *Lawful exercise of rights* to finally arrive to progressive concepts such as *Protection and conservation of cultural and historical heritage* and *Community Service*, which, although it is not exclusively progressive, is connected to the progressive triad of *Conservation and natural-protection duties*, *Protection, promotion and respect of human and fundamental rights*, and *Protection and conservation of cultural and historical heritage*. The progressive-religious axis is not seen in this

network.

In order to test the robustness of our method, a null model was created by assuming a random selection of concepts. We use the final set of concepts by dimension, i.e. the original concepts plus those added by the participants. Then, for each ELA we simulated a random selection of the same number of concepts they originally chose, and applied the aforesaid network creation procedure. Over 100 randomized networks, the average number of links was 0.33 for Values, 1.01 for Rights and 0 for Duties. At the 90% confidence level for the chi-square test, these figures increase up to 0.65 for Values, 1.62 for Rights and 0 for Duties. This result shows that a random selection of concepts does not generate a meaningful network.

3.6 Conclusions

This study has shown how political ideology can be analyzed as an emergent network. This way of examining ideology is a relevant methodological contribution that, applied to Chilean data, enlightens us about the characteristics of different ideological communities. Beyond the theoretical advantages that the network methodology offers, its performance does depend on the initial pool of concepts considered. Given a sufficiently broad set of concepts and a process of concept selection, the resulting network should adequately map the ideology of a group of the participants.

Our network methodology has allowed us to capture the differences between the traditional left and the progressive left in Chile, both for Values and Rights. Within the right-wing cluster, even when the networks contain liberal, nationalist and conservatives concepts, they do not seem to form separate clusters, besides the organized evangelical one in the network for Values. On the other hand, al-

though our analysis of the network of Duties is less conclusive, we believe that it is important to consider this dimension to offer a more complete picture of political ideology.

Our political maps have also showed that it is possible to recognize the evolution of the concept of Rights in Chile. Along with the inter-cluster distances, the emergence of news rights allow us to be more specific into the right/left distinction. Thus, clusters A and C (progressive and traditional left, respectively) are the closest in the Rights dimension, and prioritize the selection of second-generation rights, i.e., they advocate for an active role of state. But in Values, the traditional left is closer to the right than to the progressive left. This may be linked to what first and second generation of rights have in common: their individual nature. In addition, the right-wing cluster and the traditional left are older than the progressive cluster. The evolution of political ideology has a generational component, examined by Putnam (2000), which may be interesting to explore further in the Chilean context.

Leaving aside the communities, through the networks diameter we have identified a progressive- right wing pole in the ideology map. The network visualization also displays the economic aspects of ideology in a different direction. These directions are not “axis”, strictly speaking, for they are not orthogonal nor do they represent coordinates. However, since the network visualization[15] is designed to avoid crossing edges and make edge lengths uniform, the “directions” displayed in the resulting graph still hold their meaning. On the other hand, the centrality measures can inform us about the relative importance of certain nodes. In this way, we have identified concepts that link different groups, such as *Secular State*, which is highly connected to progressive concepts, but also to *Republic* and *Democracy*.

[15]Specifically, the Fruchterman-Reingold layout algorithm (Fruchterman and Reingold, 1991).

Concepts with high closeness and high degree —like the right to *Education*— can be understood as widely held concerns in Chile, for they are closer to all other nodes and frequently mentioned.

The results we have resented, based on data prior to the social outburst of October 2019, shows results consistent with the characteristics of different emerging groups in Chile and their priorities and "agendas" in terms of Values, Rights, and Duties. Since 2016 new conservative voices arose, and we have also seen the consolidation of new progressive movements in the country.

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4. Internal factors and political ideology in Chile: Evidence from the 2016 constituent process

Abstract

In the past few decades political psychology has challenged models on political orientation concerned with social structural variables. In this framework, the adherence to a political ideology is explained by internal factors - such as psychological traits, values or attitudes - and mediated by socio-demographic circumstances. Most studies in this field relate some internal factor with the political positioning of individuals in one or more dimensions. In this work we seek to study the internal factors of different political typologies, using network theory and natural language processing techniques. Using the dataset from the participatory phase of the 2015-16 Chilean constituent process, co-occurrence networks of concepts were constructed. By detecting highly connected groups of nodes, we identified clusters of concepts within the network, which represent ideological communities. As each concept is associated with a set of texts written by the participants, we extracted psycho-linguistic features from them. Next, we set up a discrete choice model to study the effect of those features in cluster membership. We find that the progressive-left cluster shows a more propositive and non-agentic attitude when referring to values, as opposed to the traditional left. Regarding the dimension of rights, the right-wing cluster displays a more valorative attitude, suggesting that first-generation rights may also play the role of values.

4.1 Introduction

In October 2015, the government of Chile started a constitution-making process, which allowed citizen participation. The process started with a phase of civic education, followed by a participatory phase. This phase had four stages: the first one was an online individual questionnaire; the second, local self-convoked encoun-

ters (ELAs, according to its initials in Spanish) of 10 to 30 people over the age of 14 (Jordán et al., 2016). The third and fourth levels also consisted in citizen dialogues which took place at the provincial and regional capital cities. In each stage, the participants were asked to debate on four topics: constitutional principles and values, rights, duties, and institutions. For each topic, the organizers proposed a question and provided a list of concepts, from which the participants had to select seven, although they could also add new concepts. For each chosen or provided concept, they had to write down a short argument explaining why this concept should be included in the new constitution. Throughout the participatory phase, participants were nor asked to provide any personal information about income, education, or political inclination, but their age and gender.

The goal of this work is to explore the political ideology underlying the concepts that people chose (or added) during the process. We built co-occurrence networks of concepts by testing the pair-wise frequencies of all pairs of concepts. A significant correlation between two concepts will generate a link between them in the network. Then, we identify communities within the network, i.e., highly connected groups of concepts inside them. Assuming that the concept selection reflects a prioritization, the communities within the network will hold a political interpretation/identification. From a political psychology perspective, if these groups represent political communities, we can relate community membership to psycholinguistic features we can extract from their argument texts, and therefore from the group of people who wrote those arguments. These features are “internal factors”, for they respond to the intrinsic psychological, emotional, attitudinal or cognitive state of the subject. Internal factors are mediated by social and economic circumstances – such as the unemployment, GDP, education level - , and also by the life course.

Our previous analyses have shown that Values and Rights are the dimensions that best represent political ideology. Therefore, our analysis will focus on these two networks. For each one, we set up a discrete choice model of community membership based on lexical and semantic variables we extracted from the arguments. Our results show that the progressive-left cluster shows, in general, a more deontic and non-agentic attitude. In contrast, the traditional left displays a valorative attitude on values, recognizing the society as the beneficiary and responsible for acting on those values. While the right-wing community usually exhibits a more factual attitude for Values, the attitude becomes valorative when referring to Rights.

4.1.1 Internal factors and political ideology

Since the pioneering works by Adorno $etal$ (1950) and Eysenk (1954), research on political psychology has turned into a two dimensional structure of social and economic attitudes. A widely used personality instrument in political ideology research is the Schwartz value theory (1992) (Schwartz, 1992). It identifies 10 broad personal values, which organizes into the following groups: (i) Openness to change: self direction, stimulation, and hedonism; (ii) Self- Trascendence: universalism, benevolence; (iii) Conservation: tradition, conformity, security; (iv) Self-Enhancement: hedonism, achievement and power. These values in turn represent two-dimensions: (i) openness to change versus conservation and (ii) self-transcendence versus self-enhancement. Schwartz (1994) notes that these two dimensions correspond to two dimensions of ideology (Schwartz, 1994): the former is closely related to classical liberalism, while the latter is linked to economic egalitarianism.

Other social-attitude scales that have been related to political ideology are

the *Rigth-Wing Authoritarianism* (RWA) and *Social Dominance Orientation* (SDO) scales. The right-wing authoritarians believe strongly in submission to established authorities, and in aggression towards whomever these authorities target (Altemeyer, 1998). On the other hand, SDO measures the "extent to which one desires that one's ingroup dominate and be superior to outgroups" (Pratto et al., 1994). A review of research by Duckitt (2001) showed that sociopolitical attitudes appear to be organized around two relatively orthogonal dimensions: RWA associated to authoritarianism, social conservatism or traditionalism, and SDO related to economic conservatism, power, or belief in hierarchy or inequality. Later, Duckitt et al. (2002) proposed a causal model of the impact of personality and social worldview beliefs on both dimensions, and their impact on socio-political attitudes.

Other works have assumed that political orientation can be represented with a single liberal/conservative dimension. Among them, the Five-Factor Model (also known as the Big5 model) has been widely used in political science (Carney et al., 2008; Cooper et al., 2013; Hiel and Mervielde, 2004; Jost et al., 2009; Van Hiel et al., 2000). The Big 5 theory suggests that personality can be summarized along five distinct factors: extraversion (enthusiasm and assertiveness), agreeableness (politeness and compassion), conscientiousness (industriousness and orderliness), neuroticism (volatility and withdrawal), and openness to experience (intellect and openness) (Goldberg, 1990). A meta-analysis of 73 studies focusing specifically on the relationships between each of the Big-Five personality and political orientation shows negative and significant correlation between Openness to Experience and political conservatism (Sibley et al., 2012a). Neuroticism is also negatively correlated with political conservatism, but the effect was trivial. Conscientiousness and political conservatism has a positive correlation, but the effect is weak. Finally, Extraversion and Agreeableness were uncorrelated with political

orientation.

Recent works have also used cognitive scales, such as the *Need for Closure* and *Need for Cognition* scales to explain political conservatism. The need for closure has been described as “the desire for a definite answer on some topic, any answer as opposed to confusion and ambiguity” (Kruglanski, 1989, 14) . The *Need for Closure* scale (NFCS) was later introduced Kruglanski et al. (1993); Webster and Kruglanski (1994) and has been linked to political conservatism: increasing need for closure was significantly associated with increased social conservatism (Feldman and Johnston, 2014). A study examining the interaction of political conservatism and the need for cognitive closure, showed that only among participants who identify themselves as conservative, the need for closure was positively and significantly related to preference for aggressive actions against the outgroup (De Zavala et al., 2010). On the other hand, the need for cognition is the tendency for an individual to engage in and enjoy thinking (Cacioppo and Petty, 1982). The latent variable model analysis performed by Feldman and Johnston (2014) shows a negative correlation between the *Need for Cognition Scale* and social conservatism, but no significant effect at all on economic ideology.

Locus of control refers to the idea of what forces drive one’s life. A person is said to display “internal” control if he perceives events as being a consequence of his own actions and, and “external” control if he thinks that the events are unrelated to his own efforts (Rotter, 1966). Locus of control is often measured using a 13-item series that presents two statements from which respondents are asked to pick the one they most identified with (Rotter, 1966). For example: (a) The average citizen can have an influence in government decisions, vs (b) This world is run by the few people in power, and there is not much the little guy can do about it. A recent work by Sweetser (2014) studies the differences in the personality profile

for self-described Democrats and Republicans. Regarding the locus of control, Democrats displayed a greater external locus of control than Republicans.

A more recent approach that has been used in political psychology is called the Moral Foundation Theory (MFT). This theory searches for a link between anthropological and evolutionary accounts of morality, assuming that moral intuitions should derive from innate psychological mechanisms that co-evolved with cultural institutions and practices (Haidt and Joseph, 2004). The 5 moral foundations are: (Haidt et al., 2009) (i) Harm/care: basic concerns for the suffering of others, including virtues of caring and compassion; (ii) Fairness/reciprocity: concerns about unfair treatment, inequality, and justice; (iii) Ingroup/loyalty: concerns related to obligations of group membership, such as loyalty and self-sacrifice; (iv) Authority/respect: concerns related to social order and the obligations of hierarchical relationships; (v) Purity/sanctity: concerns about physical and spiritual contagion, including virtues of chastity and control of desires. MFT has been used to study the moral differences across the political spectrum within the US (Graham et al., 2009). It was found that political liberals construct their moral system upon the two individualizing foundations: Harm/Care and Fairness/Reciprocity, whereas political conservative showed a more even distribution of values, including the previous two, plus the three binding foundations (Ingroup/loyalty, Authority/respect, Purity/sanctity).

In Chile, political ideology research has been limited to latent variable modeling. The work by Lindh et al. (2019) uses data from the Public Opinion Survey of the CEP (Centro de Estudios Públicos, Chile), to indirectly estimate the ideology of the individuals and measure the change in political polarization (Lindh et al., 2019). On the other hand, Bonilla et al. (2008) built a 2d spatial map of political candidates, based on the relative closeness between the voter and the

candidate (Bonilla et al., 2008). Their results support the previous finding in literature: a first dimension which corresponds to the right-left axis, and a second one which is thought to represent the possibility of changing the status quo. However, Bonilla et al. (2011) showed that this second dimension may indicate a notion of a democratic/authoritarian cleavage in Chile (Bonilla et al., 2011). Their work also suggests that the political cleavage born of the military regime continues to dominate the party system, at least until 2008.

4.1.2 The role of socio-demographic factors in political ideology

Political sociologists have traditionally viewed social structural variables - like occupation, levels of income and education and particularly the social class - as the main determinant of political orientation. This view held that voters tend to choose parties that promote their class interests (Evans, 2000; Lipset et al., 1967). However, as politics has grown increasingly concerned with issues that cut across classes, such as the environment, gender and minority rights, the idea of class voting has been challenged (Clark, 2017; Franklin, 1992). This effect exhibits a generational effect: younger voters show more independence from group loyalties and have more instrumental and individual orientations toward politics (Franklin, 1992).

Nowadays, most of the research conducted in political ideology focuses on personal traits, and uses socio-demographic as control variables. [1] However, the mechanism through which they act remains unclear. One of the first theories was postulated by Inglehart and Abramson (1994). He argued that value priorities in advanced industrial societies tend to shift away from materialistic concerns

[1] A notable exception is the work by Piurko et al. (2011). This study examines the role of Schwartz personal values, and of socio-demographic variables - such as age, gender, education, religiosity and perceived adequacy of household income - in left-right political orientation, in 20 European countries. The work by Egri and Ralston (2004) is another example of a cross-cultural study about the change of political values due to external factors.

(economic and physical security) to postmaterialist values, such as freedom, self-expression and quality of life. He distinguished two source of change: the *socialization hypothesis*, which postulates that "to a large extent, one's basic values reflect the conditions that prevailed during one's preadult years" (Inglehart, 1985) (ii) the *scarcity hypothesis*, which states that and individual's priorities reflect one's socioeconomic environment, like inflation or unemployment. In sum, the past and present socioeconomic environment would change the value priorities that shape political ideology.

A more recent theory is known as Threat-Constraint Model (TCM) (Sibley et al., 2012b). TCM recognizes that, though it is clear that some measures of personality consistently predict political orientation, there is reason to believe that this relation will be moderated by the situation. In particular, the theory posits that situational threats directly challenge the beliefs of those who are high on Openness to Experience, whereas they merely confirm the worldviews of people who are low on Openness to Experience. This should result in larger conservative shifts among liberals (relative to conservatives) under threatening situations, thereby attenuating the relationship between Openness to Experience and political conservatism (Sibley et al., 2012b). TCM has been recently applied to prejudice research, comparing various predispositions among different social context (Navarro et al., 2019; Van Assche et al., 2021).

4.1.3 Internal factors and language

A fundamental assumption behind this work is that language can reflect psychological features. User traits prediction from text has been applied to emotion prediction (Alm et al., 2005; Nasir et al., 2020), sentiment analysis (Pang et al., 2002; Wilson et al., 2005), personality (Schwartz et al., 2013; Tausczik and Pen-

nebaker, 2010), academic success (Pennebaker et al., 2014) and political preferences (Laver et al., 2003; Slapin and Proksch, 2008), among others.

Previous research have explored the differences in language use between ideological groups using automatized techniques. These works usually classify text entries in binary labels (liberal/democrat versus conservative/republican), although it is possible to find more granular classifications (Preoţiuc-Pietro et al., 2017). Most of these works have use word frequencies as predictors of political positioning Klemmensen et al. (2007); Laver et al. (2003); Slapin and Proksch (2008), but may also include pre-defined categories - for example, from LIWC - and non-supervised word clustering based on word-embedding models (Preoţiuc-Pietro et al., 2017), or sociolinguistics-inspired features (Rao et al., 2010).

However, even when automatize text-analysis have prove useful for political positioning prediction, it is unclear what are the psychological mechanism behind such positions. What we propose, i.e., to derive a set of linguistic and syntactic markers that represent internal factors, aims to contribute to fill the gap between automatized text-analysis and political psychology. To be best of our knowledge, there has been not many attempts to use psycho-linguistics and natural language processing to predict political positioning.

From a theoretical perspective, we must justify the relation between linguistic features and mental states. Thinking of language - or the use of language - as a behavior, the reasoned action approach (RAA), is one of the most influential approaches to predicting and understanding intentional behavior (Fishbein and Ajzen, 2011). This theory recognize multiple levels of influence on a particular behaviour. The closest to behaviour is intention, which reflects the extent to which an individual is likely to pursue the behavior; and in turn, intention is a function

of (i) attitudes (positive or negative evaluations towards the behavior), (ii) the perception of subjective norms, and (iii) the perceived behavioral control. Finally, all of these factors are influenced by underlying beliefs about behaviour, norms and control, which obey to several background factors. On the other hand, the actual control a person has - which is determined by his personal skills and the environment - modulates the Intention-Behavior relationship. When the perception of control closely reflect the actual control, and both are high, it is more likely for an individual to act on their intentions.

4.2 Data

As many political process nowadays, the 2016 Chilean constituent process incorporated a citizen participation phase. This stage considered four levels of participation: an individual online consultation and three instances of group participation (local, provincial, and regional). In this work we have used the data gathered from the local encounters (ELAs).[2]. Each ELA was composed of between 10 and 30 Chileans or foreign residents, over the age of 14. The purpose of the encounter was to discuss over the Values, Rights, Duties, and Institutions that should be included in the new constitution. To do so, participants were provided with a reference list of concepts, prepared by the government. After a time of individual reflection, each encounter had to choose a maximum of seven concepts for each of the four questions (or propose new ones), adding a brief rationale text for concept. Finally, an additional variable was included to measure the degree of group agreement on each selected concept (gui, 2016). A total of 8,113 ELAs were conducted throughout the country, with more than 100,000 participants, representatively distributed in terms of age and gender.

[2]The data is publicly available and can be found at `http://constitucionabierta.cl/`

The data includes: (i) the age and number of participants for each encounter, (ii) the concepts that were chosen in the encounter, and for each concept, (iii) a brief rationale text explaining why this concept should be included in the new constitution and (iv) a categorical agreement variable with three levels: agreement, partial agreement, or disagreement. In a previous work we have analyzed the emergent network for each dimension, finding that only two of the four dimensions - Values and Rights - form communities with a clear political interpretation. Therefore, and given our interest in the structure of the ideology itself, here we focus only on those two dimensions.

The ELAs dataset was processed by specialized committee, who classified the new concepts that emerged during the encounters (the open concepts)[3]. Thus, from the 22.015 arguments with an open concept, 10.263 were classified as one of the 114 original concepts, 3,001 were considered as unclassifiable and the remaining 8,751 were clustered to form 47 new constitutional concepts. In particular, there are 37 original concepts and 15 new ones in Values, 44 original concepts and 14 new ones in Rights. Both the original and new concepts can be found in the Supplementary material, for the two dimensions in study (Tables 4.7 and 4.8).

As we are using this dataset to extract political positioning and internal factors, it is worthwhile to recall that both the concept selection and rationale texts came from a preference aggregation process. Therefore, we are not working at the individual level, but with small groups of people. However, given the self-convoked nature of the encounters, it is to be expected that these groups (the ELAs) were relatively homogeneous. We can test this assumption by looking at the categorical agreement variable. In general, there is a majority proportion of agreement in the

[3]The details of the data systematization can be found in the executive report: http://archivospresidenciales.archivonacional.cl/index.php/informe-ejecutivo-sistematizacion-de-la-etapa-participativa-del-proceso-constituyente-abierto-la-ciudadania

database. For Values, the agreement goes up to 90.6%, where the “disagreement” barely reaches 0.5% (the remaining 8.9% corresponds to the intermediate category of “partial agreement”). The figures are similar for the dimension of Rights (92.1% agreement, 7.4% partial agreement, 0.5% disagreement).

4.3 Methodology

The first part of the methodology cover the networks creation, and the subsequent communities detection within each network. The second part describe the creation of lexical and syntactic markers from the rationale texts. In the last stage we introduce the discrete choice model, which will allow us to relate the linguistic features with cluster membership.

4.3.1 Networks creation and clustering

The first step consist on the creation of the co-occurrence networks of concepts. Let M be the number of ELAs and N the number of concepts for a given dimension, Rights or Values. The incidence matrix is an $M \times N$ matrix $A = a(i, j)$, where:

$$a(i,j) = \left\{ \begin{array}{ll} 1, & \text{if ELA } i \text{ chose concept } j \\ 0, & \text{otherwise} \end{array} \right\} \tag{4.1}$$

From the incidence matrix, we can build a $N \times N$ matrix $\Phi = \phi(i, j)$, where ϕ_{ij} is the phi-correlation coefficient for the pair of concepts i and j (Read and Vidakovic, 2006). Then, the distance between them is obtained as $d = \sqrt{1 - \phi_{ij}}$. Given that the phi-correlation coefficient is distributed χ^2 (with one degree of freedom), we can test the significance of the association (Read and Vidakovic, 2006). If ϕ_{ij} is significant at the 95 confidence level, it adds a link between concepts i and j with weight $1 - d$.

Then, we aim to discover the structure of the ideology by identifying highly connected groups of concepts - or communities - inside these networks. In network theory, community detection refers to the procedure of identifying groups of nodes in a network depending upon their structural properties. A key concept in community detection is modularity, a measure designed to quantify the strength of division of a network into modules. Modularity quantifies the quality of an assignment of nodes to communities, comparing the fraction of edges that fall within communities with the expected value of the same quantity, if edges fall at random, in a graph with the same degrees sequence. The Louvain method for community detection is an hierarchial algorithm for detecting communities in networks, by maximizing a modularity score for each community.

4.3.2 Feature extraction and text analysis

All the text-based features were derived from the original texts in Spanish. Therefore, this methodology relies on the availability of Spanish models and dictionaries. Regarding the lexical variables, the LIWC dictionary has been already translated and validated into Spanish. For the syntactic variables, we have used the Stanford Core NLP packages for Python, which includes Spanish models for Part of Speech Tagging and Dependency Parser. When a Spanish dictionary has not been available, we have web-scrapped English-Spanish online dictionaries, and manually corrected the outputs.

Lexical variables

An important distinction when using lexical variables is between content (or open class) words and function (or closed class) words. While the former provide the content and included nouns, adjectives and regular verbs, the latter connect and organize the content. Function words comprise pronouns, articles, auxiliary verbs,

conjunctions, negations, adverbs and prepositions. Multiples studies have shown than function words are better markers of psychological states that content words (Jurafsky et al., 2009; Pennebaker, 2013; Pennebaker and King, 1999; Robinson et al., 2013). In particular, scholarly aptitude is better reflected in the ways people use function words. Using the computerized text analysis program LIWC (Linguistic Inquiry and Word Count, (Pennebaker et al., 2015)), Pennebaker et al. (2014) analyzed over 50,000 college admissions essays. Using a Principal Component Analysis over function words counting, he found that a single factor explained for 35% on the variance. He called this factor the "Categorical-Dynamic Index" (Pennebaker et al., 2014), and proposed a simple additive formula that was highly correlated with this factor:

$$CDI = 30 + \text{article} + \text{preposition} - \text{pronoun} - \text{auxiliary verb} - \text{conjunction} - \text{adverb} - \text{negation} \tag{4.2}$$

where each variable in Equation 4.2 correspond to the percentage of total words accounted for by each category.[4]. The constant value 30 is added so that the resulting score was typically positive.

The CDI can be understood as a bipolar scale, with higher scores indicating a "Categorical" use of language. This style is characterized by a higher use of article and preposition, which is positively related to abstract thinking and cognitive complexity. Higher categorical language was associated with better academic performance. A lower CDI - or "Dynamic" use of language - indicate a greater use of auxiliary verbs, adverbs, pronouns, negations and conjunctions. In particular,

[4]The original equation (Pennebaker et al., 2014) consist of eighth terms. Instead of *pronoun*, they used *personal pronoun* and *impersonal pronoun*, but the Spanish version of LIWC does not incorporate such distinction (Ramírez-Esparza et al., 2007). Since both categories - personal and impersonal pronouns - have a negative loading, we decided to use *pronoun* as a single category.

auxiliary verbs and pronouns have been associated with more narrative language style.

Semiotic analysis

Recently, Goñi and Fuentes-Bravo (2020) produced a set of analytic categories to evaluate democratic imaginations about the future, expanding the work by Zittoun and Gillespie's (2018) on sociocultural models of imagination (Zittoun and Gillespie, 2018). Social imaginations about the future are called "We-futures", which must be understood as "relational activities in which a narrative and meaningful experience is produced through cultural mediation and social interactions" (Goñi and Fuentes-Bravo, 2020).

Agency/Determinism. This metric reflects whether the imagination implies individual/collective participation (agentic imagination), or if the future is driven by external forces, outside of human control (deterministic imagination). Therefore, the categories are determined by the agent performing the action: (i) low agency: use of passive voice or passive grammatical constructions. This would indicate that events occur outside of collective action; (ii) medium agency: sentences expressed in an active voice by a third-person agent, such as the government, universities, hospitals, etc; (iii) high agency: sentences expressed in an active voice by a first person agent, singular or plural. The level of agency/determinism can be identified through the subject, or the verbal construction of the sentence. For example, if the subject is a noun, we can infer the use of active voice by a third-person. Likewise, the use of active voice by a first person agent can be deduced by the verb-ending (in Spanish, "o" for singular and "os" for plural first person). This analysis was authomatized using the Stanford CoreNLP packages, in particular the POS Tagger and the Dependency Parser tools (Chen and Manning,

2014; Manning et al., 2014; Toutanova et al., 2003). In the RAA model we have previously introduced, agency can be related to the perceived behavioral control, for it reflects the control or responsibility the subject puts into the action.

Multidimensionality: This category reflects the degree to which a proposition incorporates multiple social dimensions, such as cultural, technological, economical, environmental or psychological elements. While unidimensional statements focus mostly on one dimension, multidimensional ones will display narrative elements in different dimensions. This variable is derived from the predicative complement, which is directly extracted from the syntagmatic decomposition provided in our database. A binary indicator was created, which takes the value 0 if the predicative complement is unidimensional, and 1 if it is multimensional. The syntactic markers we associated with multidimensional predicative complements are: (i) repeated gerunds, for they indicate different actions that has to be taken; (ii) a set of adverbs that suggest multidimensionality, such as 'but', 'however', 'although'. (iii) the use of listing commas or coordinating conjunction. To identify the latter cases, we identified the cases where the syntactic function after and before the comma o coordinating conjunctions is the same. These markers were inductively derived from our corpus.

Systemic functional analysis

In a systemic functional approach, we can distinguish three meta-functions of language: textual, interpersonal and experiential (Halliday and Matthiessen, 2004). The first one deals with the actual information contained in a message, while the second represents the mood in a clause serving as an exchange. The last one - the experiential metafunction - describes the type of process that the clause - as an experience, construes.

Modal attitude: this variables aims to describe the speaker's intention regarding the content of the proposition (and thus, we can relate this variable with the Intention in the RAA framework). We distinguish three categories: (i) factual attitudes, which are identified through the use of descriptive or factive verbs (e.g. "is", "will be", "was"); (ii) evaluative attitudes, which state the speaker's opinion or judgment towards an object. It is identified through the use of evaluative constructions in the predicate; (iii) propositive attitudes, which are identified through normative modal verbs (e.g. "should", "would", "could" or "must"). These categories were inductively inferred from the corpus, and are consistent with the three types of debate propositions - facts, values, and policies - from the classic debate theory (Freeley and Steinberg, 2013)(Chapter 3). This variable was originally constructed by manual annotation and incorporated to the database. Therefore, in this work it is directly extracted from there.

Experiential meta-function: types of process. This theory starts with the most basic distinction, between inner and outer experiences. The former encompasses the process of consciousness - responding to the act of sensing - while the latter refers to the processes of the external word and construe figures of doing/happening. In this framework, inner and outer experiences are represented by the grammatical categories of *mental* and *material* processes, respectively. In addition, this theory include a third type of process, that of identifying and classifying, which respond to the act of being. This last one is called the *relational* process.

Mental material and relational are the three main types of process, but we also find secondary categories located at the three boundaries. Between the material and mental categories are the *behavioural* processes, which represents the outer manifestation inner process. Then, the *verbal* process represents the construc-

tions of human consciousness enacted in the form of language, and lies between the mental and relational categories. Finally, between the relational and material we find the *existential* category, by which events of all kinds are recognized to exist. In order to use this classification in the discrete choice model, we rearranged the aforementioned categories to prevent highly unbalanced classes.

4.3.3 Model

Once we identify political clusters from networks, and extracted lexical and syntactic features from the rationale texts, there is one more step. A discrete choice model was estimated to determine significant text attributes that are likely to influence cluster membership. In particular, we are interested in characterizing the probability of a text comes from a particular cluster conditioned to its lexical and syntactic characteristics, as defined in Section 4.3.2. Multinomial Probit and Logit models were estimated to determine the best model specification. A summary of independent variables is presented in Table 4.1.

As the coefficients from a multinomial logit/probit regression entails little interpretation, we report here the relative risk ratios (RRR). This measure capture the change in the probability that the outcome falls in the comparison/reference group, with the variable in question. An RRR $>$ 1 indicates that, as the variable increases, the risk of the outcome falling in the comparison group increases as well. An RRR $<$ 1 would indicate that, under the same circumstance, this risk decreases. Therefore, the outcome is more likely to be in the reference group.

Concept selection is very heterogeneous. There are highly preferred concepts - such as the Right of Education, selected in more than 4000 ELAs, - and other less demanded. To make sure that the cluster is not determined by a few highly popular concepts, we performed a bootstrapping analysis through 100 random

samples. In each one, we sampled 100 observations by concept, unless there were less 100 texts. In that case we used all the observations available.

Table 4.1: List of independent variables at the sentence-level

Statistic	Metric	Type of var.	Range
Mean Age	control	continuous	14 - 79
CDI	control	continuous	29 - 30.6
Text length	control	continuous	1 - 104
Agency	semantic	categorical	low-medium-high
Dimensionality	semantic	categorical	single-multi
Modal attitude	semantic	categorical	factual-valorative-propositive
Type of process	semantic	categorical	material-relational-existential

4.4 Results

4.4.1 Network creation and community detection

Figures 4.1 and 4.2 show the co-occurrence networks for Values and Right, respectively. Table 4.2 shows the clusters identified by the Louvain algorithm, for both networks.

Cluster D contain mainly first-generation rights, that is, negative rights that emphasize political and civil liberties. Among them, we find the right to *Life* and *Security/non-violence*, *Equality before the law*, the *Right of association*, the right to *Suffrage/vote*, and the freedoms of movement, expression, worship, work, education, entrepreneurship, conscience, and personal liberty. In Values, this cluster selects concepts such as *Autonomy/Freedom*, *Private Property*, *Rule of Law*, *Development*, *Subsidiarity*, and also *Sovereignty*, *Family*, and *Patriotism*. Therefore, we associate cluster D with a right-wing ideology.

In cluster C we find second-generation rights, i.e., positive rights that promote equality through an state's active participation. These include social and economic

rights, such as the right to *Education*, *Healthcare*, *Decent housing*, and *Social security*. Also, but to a lesser extent, we find some third-generation rights, such as the rights of *Indigenous people*. Regarding the Values dimension, here we see concepts such as *Tolerance*, *Justice*, and *Equality*. This is why we associate cluster C with the traditional left.

Finally, in cluster A we also find second-generation rights, such as *Social rights*, *Equality*, *Standard of living*, and *Right to quality public health care*, but also most of third-generation rights, such as *Conservation of cultural and historical heritage*, *Environmental respect/protection*, and *Animal rights*. Cluster A also selected values like *Freedom*, *Participation*, *Cultural Identity*, *Gender Equity*, *Environmental Protection*, *Participatory Democracy*, *Equity*, and *Human Rights*. For this reason, we associate cluster A with left-wing, progressive orientation.

Cluster B appears only in the Values dimension and the concepts within it, such as *Heterosexual marriage families*, promote a clearly conservative vision of society. Given the almost identical text across different ELAs, the anecdotal evidence about the organization of the evangelical protestant community's, and the reference to the evangelical people in texts of *Freedom of Worship* and *Freedom of Conscience*, we have called this community the evangelical cluster. While cluster B does not appear in the Right network, the most conservatives concepts in this dimension - such as *Life* and *Respecting Life from Conception* - are part of cluster D. This lead us to assume that the evangelical group were probably absorbed by the right-wing cluster.

Clusters A, C and D are consistent to political conglomerates we observed in Chile in 2016. On the one hand, we have a traditional left-wing conglomerate (Cluster C), which ruled Chile for 20 years (1990-2010) under the name of

Concertación de Partidos por la Democracia and then *Nueva Mayoría*. Then, we observe a Right-wing cluster (cluster D), which was political opposition during that time, and it still active (*Chile Vamos*). Cluster A represent a new progressive-left conglomerate, the *Frente Amplio*. Even when this conglomerate was officially founded on 2017, its leaders ran as independents in the 2014 Chilean general elections, with great success. Finally, cluster B appears as a small but highly organized conservative group. This cluster may have been the preamble to the recently formed Republican party which, even though it is not properly evangelical, assume conservative positions.

To assess the consistence between clusters and political conglomerates, we tested the cluster distribution between certain communes and the rest of the country. In order to narrow down the task, we focused on the Metropolitan Region, the one with the highest population in Chile. For cluster A, we chose the top 3 communes where participation in the *Frente Amplio* 2017 primary election was maximum. These communes belong to District 10, and they are Providencia, Nuñoa and La Reina [5]. Thus, we compared the number of observations belonging to clusters A, C and D within these three communes, and in the rest of the region. Both for Values and Rights, the two distributions were statistically different, at a significance level of 0.001. The proportion of observations in cluster A raised from 0.40 to 0.49 for Values, and from 0.20 to 0.28 for Rights.

For Cluster D we followed the same procedure, and choose the top 3 communes where participation in the *Chile Vamos* 2017 primary election was the highest. These communes belong to District 11, and they are Vitacura, Las Condes and Lo Barnechea [6]. Again, we compared the cluster distribution between these

[5]Source: https://www.latercera.com/noticia/donde-estan-los-votantes-del-frente-amplio/, accessed on January 27, 2022

[6]Source: https://www.latercera.com/noticia/mapa-del-votante-chile/, accessed on January 27,

three communes and the rest of the region, and they were statistically different, at a significance level of 0.001, for Values and Rights. The proportion of observations in cluster A raised from 0.22 to 0.31 for Values, and from 0.26 to 0.49 for Rights.

There were no presidential primaries of the traditional left-wing conglomerate for the 2017 presidential election. Therefore, to test cluster C we used the first round results. Since District 13 has traditionally supported left-wing candidates, we chose the top 3 communes where the voting difference between the *Nueva Mayoría* and *Frente Amplio* where maximum: El Bosque, Pedro Aguirre Cerda and San Ramón [7]. The cluster distributions between these three communes and the rest of the region were statistically different, at a significance level of 0.001 The proportion of observations in cluster C raised from 0.34 to 0.42 for Values, and from 0.49 to 0.60 for Rights.

The networks showed in Figures 4.1 and 4.2 were built using categorical association between concepts. Specifically, a positive association created a link when it pass a chi-squared test at a 95% confidence level. At the 99% level, we would expect a fewer number of links in the network, and therefore, a cluster splitting. We tested this case (see Table 4.12), and the biggest change occurred in the Values network, where the progressive cluster cluster splits into two groups, both consisting of progressive concepts. Besides, a small community appears on the network periphery, formed by *Citizenship*, *Civic Friendship* and *Integration*. The first two were originally belonging to the evangelical cluster, and they are still connected to conservatives concepts such as *Freedom of worship* and *Patriotism*. In the Rights dimension, only one node changes community membership.

2022

[7] Source: https://www.emol.com/especiales/2017/actualidad/nacional/elecciones/resultados.asp, accessed on January 27, 2022

Since the community detection is a core element of the model, we compare the Louvain algorithm with other modularity-based-methods, such as Fast Greedy and Leading Eigenvector Clauset et al. (2004); Newman (2006). For Values, Louvain and Fast Greedy tie in modularity, and return the exact same clusters. In the case of Rights, the three algorithms tie in modularity, and overall, five nodes change community membership (see Tables 4.9 and 4.11). These changes do not significantly alter our main interpretations and conclusions.

In order to test the robustness of our method, we simulate a null model with a random selection of concepts. From the total pool of concepts (including original and open concepts), we made each ELA to randomly choose the same number of concepts they originally chose, by dimension. Also, the probability of choosing a concept was weighted by the number of times that the concept was actually selected across all ELAs. Thus, the randomized incidence matrix preserve its column-wise and row-wise sums. We generated 1000 randomized incidence matrix, and calculate the corresponding $N \times N$ Φ matrix. Then, for each ϕ_{ij} in Φ we ask whether the observed value lies within the distribution of 1000 simulated values, and test it with a one sample t-test. For both Values and Rights dimensions, only 1% of the observed ϕ_{ij} lies within the distribution. This result shows that a random selection of concepts can not replicate the observed associations among concepts.

Table 4.2: Communities by dimension. Louvain algorithm. Non-original concepts are shown in italic font.

Values, modularity: 0.56	
Cluster A	*Freedom*, Participation, Cultural identity, Decentralisation, Inclusion, Multiculturalism, Gender equity, Environmental respect/protection, Common good/community, Secular state, *Participatory democracy*, Diversity, *Equity*, *Guarantor state*, *Human rights*, *Social justice*, *Social security*, *Sustainable development*, Pluralism, Multinationalism, Innovation/creativity
Cluster B	*Heterosexual married families*, *Freedom of conscience*, *Freedom of worship*, *Freedom of speech*, Citizenship, Civic friendship
Cluster C	Security, Tolerance, Responsibility, Justice, Transparency/publicity, Respect, Equality, Integration, Democracy
Cluster D	Dignity, Autonomy/freedom, Rule of Law, Probity, Sovereignty, Development, Subsidiarity, Free entrepreneurship, *Family*, Republic, Unity, Patriotism, *Integral development*, Peace/peaceful cohabitation, *Private property*
Rights, modularity: 0.44	
Cluster A	*Standard of living*, *Right to make one's own decisions about one's life*, *Freedom*, Honour/reputation, Cultural identity, *Cultural identity of indigenous people*, Right to information, Mental and physical integrity, Participation, *Conservation of cultural and historical heritage*, *Right to work and a decent wage*, *Right to quality public health care*, Access to public information, Access to culture, *Right to water*, Request before the authorities, *Human Rights*, *Animal rights*, Equality, *Freedom of information and speech*, Judicial protection of individual rights, Environmental respect/protection, *Social Rights*
Cluster C	Right to strike, Education, Integration of disabled people, Healthcare, Social security, Decent housing, Right to organise and to collective bargaining, Fair wage, Right to Work, Indigenous people, Children and teenager's rights, Tax equality, Gender equity, Non-discrimination
Cluster D	Nationality, Security/non-violence, Life, *Respect life from conception*, Suffrage/vote, Property, Right of association, Equality before the law, Equality in relation to public burdens, Access to justice/due process, Freedom of movement, Freedom of conscience, *Freedom of worship*, Freedom of Education, Freedom of expression, Freedom to work, Personal freedom, Free economic initiative/free enterprise, Privacy and intimacy, Peaceful assembly, Election to public office

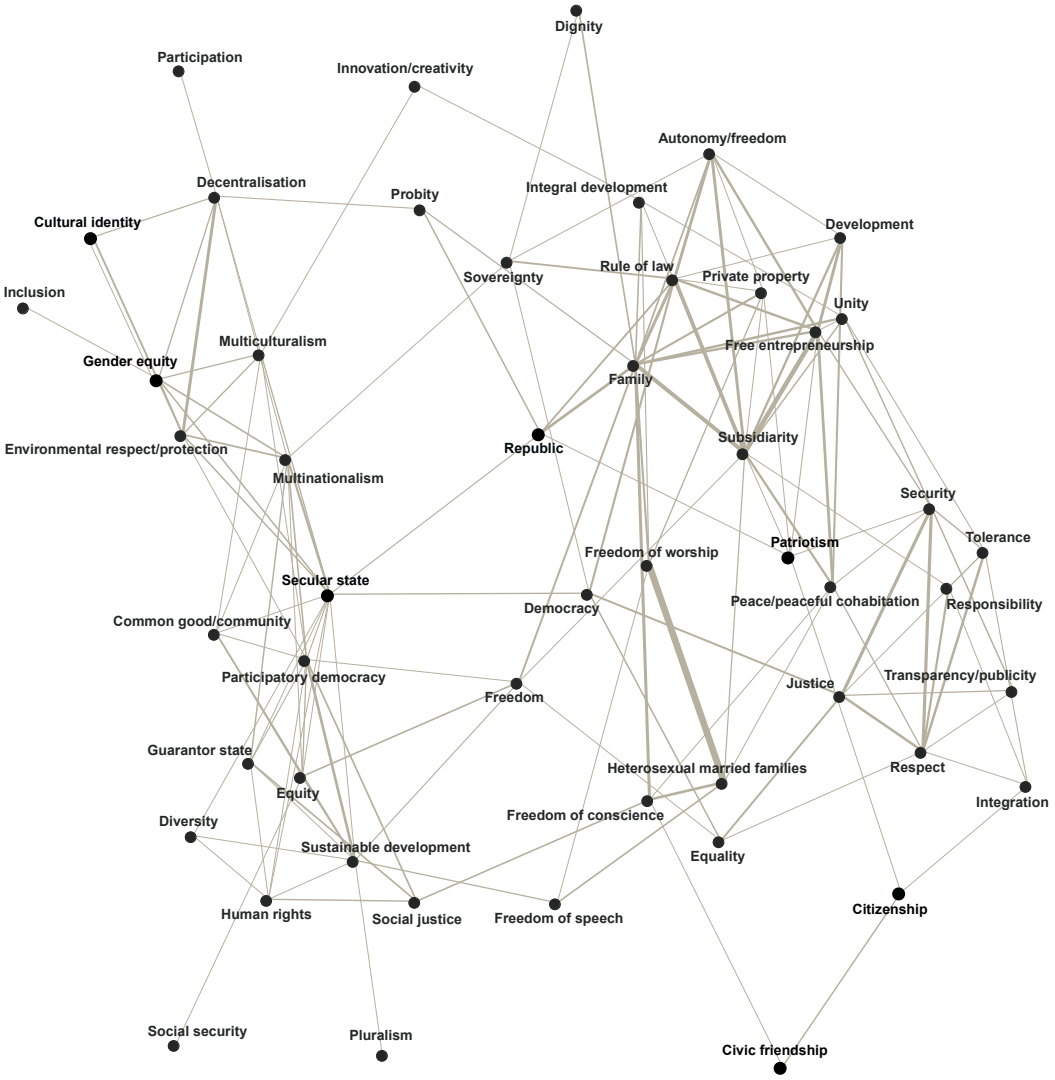

Figure 4.1: Co-occurrence network for Values.

Figure 4.2: Co-occurrence network for Rights.

4.4.2 Model

Due to the small amount of available texts, cluster B was excluded from the analysis. This community is detected only in the network of Values, and therefore it is not possible to exclude it also from the network of Rights. However, in the order to preserve the consistency of the analysis, we remove three rights that are highly associated with the evangelical community in this dataset: *Respect life from conception*, *Freedom of worship* and *Peaceful assembly*. The first two were open concepts, added by the participants, and the third one was consistently selected by the Evangelical community in order to preach in public places.

Table 4.3: Relative Risk Ratios, Logit model, Values network.

	C/A	D/A	D/C
Intercept	20346100**	35275*	0.002
	(1.34e8)	(1.97e5)	(0.012)
Text length	0.986***	0.992***	1.006
	(0.004)	(0.003)	(0.004)
CDI	0.557***	0.681**	1.223
	(0.122)	(0.127)	(0.276)
Type of process (existential)	1.232**	1.231***	1.000
	(0.125)	(0.098)	(0.103)
Type of process (material)	0.814**	1.126	1.383***
	(0.067)	(0.084)	(0.130)
Modal attitude (factual)	1.314***	1.341***	1.021
	(0.131)	(0.099)	(0.107)
Modal attitude (valorative)	2.031***	1.461**	0.719**
	(0.331)	(0.219)	(0.117)
Agency (high)	2.163***	1.188	0.550***
	(0.481)	(0.220)	(0.103)
Agency (medium)	0.981	1.371***	1.398***
	(0.098)	(0.099)	(0.141)
Dimens. (multi)	0.874	0.982	1.062
	(0.0091)	(0.058)	(0.115)
Mean Age	1.007**	1.017***	1.009***
	(0.003)	(0.002)	(0.003)

Note: *p<0.1; **p<0.05; ***p<0.01
References categories : Type of process(relational), Modal attitude (propositive), Agency (low), Dimensionality (single).

Table 4.4: Relative Risk Ratios, Logit model, Rights network.

	C/A	D/A	D/C
Intercept	40057856***	78372337***	1.956
	(2.14e8)	(3.54e8)	(10489)
Text length	0.987***	0.987***	1
	(0.003)	(0.003)	(0.003)
CDI	0.551***	0.539***	0.978
	(0.099)	(0.081)	(0.175)
Type of process (existential)	1.006	0.935	0.929
	(0.102)	(0.073)	(0.092)
Type of process (material)	1.079	1.135*	1.052
	(0.082)	(0.077)	(0.077)
Modal attitude (factual)	0.734***	1.478***	2.013***
	(0.062)	(0.109)	(0.167)
Modal attitude (valorative)	0.869	1.556***	1.791***
	(0.149)	(0.229)	(0.309)
Agency (high)	1.068	1.470**	1.376
	(0.211)	(0.255)	(0.340)
Agency (medium)	1.518***	1.163**	0.766***
	(0.125)	(0.085)	(0.071)
Dimens. (multi)	0.955	0.730***	0.765***
	(0.070)	(0.052)	(0.072)
Mean Age	1.005*	1.010***	1.005**
	(0.003)	(0.002)	(0.003)

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$
References categories : Type of process(relational), Modal attitude (propositive), Agency (low), Dimensionality (single).

Tables 4.3 to 4.6 show the Relative Risk Ratios (RRR) for the multinomial Logit and Probits models, for the dimensions of Values and Rights. As we would expect, the mean age of participants has an impact on the probability of cluster membership. Our results indicate that the progressive cluster is the youngest, which is consistent with Inglehart's theory about the shift on value priorities from materialistic to post-materialistic values. Looking a the RRR for clusters C and D relative to A, it seems that the right-wing cluster is the oldest one. The Categorical-Dynamic Index, which is included as a proxy for education, also show significant and consistent results in both dimensions: the probability of belonging to cluster A increases with CDI. So for now, we can say that the progressive cluster is younger and more

Table 4.5: Relative Risk Ratios, Probit model, Values network.

	C/A	D/A	D/C
Intercept	5779.081***	581.145**	0.082
	(18042.29)	(1472.04)	(0.163)
Text length	0.993***	0.995***	1.002*
	(0.002)	(0.001)	(0.001)
CDI	0.741***	0.803***	1.09
	(0.077)	(0.067)	(0.072)
Type of process (existential)	1.13**	1.112***	0.984
	(0.055)	(0.043)	(0.029)
Type of process (material)	0.944	1.016	1.091***
	(0.042)	(0.033)	(0.034)
Modal attitude (factual)	1.17***	1.155***	0.988
	(0.054)	(0.042)	(0.030)
Modal attitude (valorative)	1.412***	1.265***	0.885**
	(0.114)	(0.092)	(0.045)
Agency (high)	1.441***	1.207**	0.817***
	(0.167)	(0.112)	(0.056)
Agency (medium)	1.049	1.119***	1.081**
	(0.053)	(0.038)	(0.037)
Dimens. (multi)	0.936	0.955	1.023
	(0.043)	(0.029)	(0.034)
Mean Age	1.006***	1.007***	1.002*
	(0.001)	(0.001)	(0.001)

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$
References categories : Type of process(relational), Modal attitude (propositive), Agency (low), Dimensionality (single).

Table 4.6: Relative Risk Ratios, Probit model, Rights network.

	C/A	D/A	D/C
Intercept	12112.58***	8630.002***	0.644
	(34145.37)	(18528.61)	(1.71304)
Text length	0.993***	0.993***	1.001
	(0.002)	(0.001)	(0.002)
CDI	0.726***	0.736***	1.018
	(0.068)	(0.052)	(0.091)
Type of process (existential)	1.002	0.971	0.969
	(0.055)	(0.036)	(0.045)
Type of process (material)	1.043	1.062*	1.018
	(0.043)	(0.034)	(0.035)
Modal attitude (factual)	0.86***	1.172***	1.373***
	(0.041)	(0.046)	(0.065)
Modal attitude (valorative)	0.934	1.206***	1.296***
	(0.083)	(0.083)	(0.104)
Agency (high)	1.054	1.198**	1.139
	(0.103)	(0.097)	(0.124)
Agency (medium)	1.255***	1.097**	0.872***
	(0.055)	(0.039)	(0.038)
Dimens. (multi)	0.969	0.868***	0.895**
	(0.039)	(0.030)	(0.039)
Mean Age	1.003*	1.005***	1.002*
	(0.001)	(0.001)	(0.001)

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$
References categories : Type of process(relational), Modal attitude (propositive), Agency (low), Dimensionality (single).

educated, but there is no clear demographic distinction between the traditional left (cluster C) and right (cluster D).

In general terms, the probability of belonging to cluster A decreases with valorative and factual modal attitudes. Since the reference category for modal attitude is propositive, cluster A is then associated with a propositive or deontic attitude. Regarding agency, cluster A is the least probable cluster in high agency (first person) for Values, and also the least probable cluster in medium agency (third person) for Rights. Therefore, in general terms we associate cluster A with a higher use of passive voice (low agency). Along with the effect of modal attitude, our results suggest that the progressive cluster shows a highly normative character, but with low responsibility.

Continuing with cluster A, let us note that the probability of belonging to it increases with text length, in both dimensions. Also, for the Rights dimension this cluster probability increases with Multidimensionality, in comparison with cluster D. This may suggest an intention to deep into details on a given topic. A similar effect has been observed in constitution making process: citizen participation may lead to more specific and detailed constitutional documents. According to Ginsburg et al. (2009), - and based on contracts literature - this may respond to a distrust of the counterpart and his strategies. We could hypothesized that the distrust is also causing more detailed justification texts in this case.

The lower agentic character displayed by cluster A may have a theoretical counterpart in the locus of control. As was previously said, an “external” locus of control means that the person thinks that the events are unrelated to his own efforts Rotter (1966). This framework has been used to study differences in personality profiles between self-described Democrats and Republicans Sweetser (2014).

Moving on to cluster C, let us note that the probability of belonging to this cluster increases with valorative modal attitudes, but only for the Values dimension. This attitude is notorious in values such as *Democracy* and *Respect* where rational text often point the fundamental character of the selected value. Regarding agency, cluster C is the most probable cluster in high agency (first person) for Values, and also the most probable cluster in medium agency (third person) for Rights. The use of first person in values usually corresponds to the plural first person, the "We". Examples of this can be found particularly in *Equality*, *Responsibility* and *Tolerance*: equality is something that apply to all of us,and all of us must be responsible and tolerant with each other. Instead, the third person use in the dimension of Rights indicated that a particular entity is identify as the sentence's subject. In this case, as the rationale texts would suggest, the subject is often the State. This is consistent with the predominance of second-generation rights within cluster C: let us recall that these rights emphasize an active role of state in its provision. In sum for cluster C, while values are up to us, society, rights are for the state to provide.

Finally, the probability of belonging to class D increases with the use of a factual modal attitude. For the Rights dimension, cluster D is also the most likely outcome when the valorative attitude increases. This represents an interesting contrast with cluster C, for which the valorative attitude is more likely in the Value dimension. Exploring rationale texts for clusters D we notice that in different concepts - such as property rights, vote, right of association, or freedom of conscience - the texts emphasize the fundamental character of these rights. This is the same behaviour exhibited by cluster C but for the Values. This leads us to think that first generation rights may play the role of values. Regarding agency, cluster D is the most probable cluster in medium agency (third person) for Values, which is consistent

with the higher use of the factual modal attitude.

4.5 Conclusion

Any work on political psychology relies on two fundamental factors: (i) the identification of political preferences, and (ii) the application of a psychological instrument to obtain some mental state information. Here we represent political ideology as emergent networks, identifying group political positioning through community detection. Using our Chilean data for the 2016 constituent process, we detect three main ideological clusters - presents in the Values and Rights dimensions - , which represent the right-wing, traditional-left and progressive left conglomerates. Beyond the community detection, the network representation allows us to explore the ideology structure in a novel way.

Traditionally, psychological instruments are designed for the specific research purposes, and consist of tests, questionnaires or scales. However, there is an increasing amount of research on text analysis and how this is related to the speaker's psychological, political or socio-demographic features. Behind this idea lies the assumption that the use of language - as any other human behavior - is related to mental states. In this framework, we derive a set of lexical and syntactic markers to describe political communities, based on the probability of cluster membership. In general terms, two features stand out, agency and modal attitude. The first one tells us about the responsible subject of the action, and the second one is related to the speaker's intention.

The progressive left cluster (cluster A) is the youngest and more educated group. In relative terms, this group exhibits a normative attitude, but fails in identifying persons or entities responsible for the action. This makes an interesting

contrast with the traditional left (cluster C). Even when both groups share the preference for second generation rights, the traditional left points out the responsible actor for guaranteeing those rights, usually the State. The contrast between both clusters increases for the dimension of Values. Thus, while the attitude towards values is still deontic for the progressive cluster, the traditional left emphasizes the fundamental nature of values, and recognizes the society as the beneficiary and responsible for acting on those values.

Another interesting contrast comes from the right-wing community, cluster D. Although one would expect valorative attitudes when referring to values - as is the case for cluster C - , cluster D displays such attitudes towards rights. This may be related to the different types of rights we see in different clusters. Let us recall that cluster D emphasizes first generation rights, and there is a fundamental distinction between first and second (or third) generation rights, that comes from the positive or negative nature of the right. Our results seem to indicate that negative rights play a role of value, as opposed to positive rights.

Overall, this work offers a new way to understand the internal factors beyond political ideology. Our approach is based on the idea that the use of language - as any other behavior - can reflect our mental states on political matters, particularly in the context of a natural experiment on political deliberation.

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Supplementary Material

Table 4.7: What should be the main VALUES and PRINCIPLES that inspire and support the Constitution? Choose up to seven topics among the list below or suggest others in the free space.

Original concepts:	
Civic friendship	Secular state
Autonomy/freedom	Multiculturalism
Common good/community	Participation
Citizenship	Patriotism
Democracy	Peace/peaceful cohabitation
Development	Pluralism
Decentralisation	Multinationalism
Dignity	Probity
Diversity	Republic
Free entrepreneurship	Respect
Gender equity	Responsibility
Environmental respect/protection	Security
Rule of law	Sovereignty
Cultural identity	Solidarity
Equality	Subsidiarity
Inclusion	Tolerance
Innovation/creativity	Transparency/publicity
Integration	Unity
Justice	None
	Others, specify:
New concepts:	
Guarantor state	Social security
Private property	Freedom of conscience
Freedom of worship	Freedom of speech
Freedom	Heterosexual married families
Social justice	Participatory democracy
Family	Sustainable development
Human rights	Integral development
Equity	

Table 4.8: What should be the fundamental and universal RIGHTS contained in the Constitution? Choose up to seven topics among the list below or suggest others in the free space.

Original concepts:	
Suffrage/vote	Honour/reputation
Nationality	Right of association
Election to public office	Peaceful assembly
Participation	Request before the authorities
Life	Freedom to work
Mental and physical integrity	Freedom of Education
Security/non-violence	Right to Work
Equality	Fair wage
Non-discrimination	Decent housing
Equality before the law	Healthcare
Access to justice/due process	Education
Equality in relation to public burdens	Social security
Tax equality	Right to organise and to collective bargaining
Gender equity	Right to strike
Children and teenager's rights	Access to culture
Integration of disabled people	Cultural identity
Personal freedom	Indigenous people
Freedom of movement	Environmental respect/protection
Freedom of conscience	Property
Freedom of expression	Judicial protection of individual rights
Right to information	Free economic initiative/free enterprise
Access to public information	None
Privacy and intimacy	Others, specify
New concepts:	
Standard of living	Cultural identity of indigenous people
Right to quality public health care	Freedom of worship
Respect life from conception	Right to water
Right to make one's own decisions about one's life	Freedom
Right to work and a decent wage	Human Rights
Social Rights	Freedom of information and speech
Animal rights	Conservation of cultural and historical heritage

Table 4.9: Communities by dimension. Fast Greedy. Non-original concepts are shown in italic font.

Values, modularity: 0.56	
Cluster A	Common good/community, Participatory democracy, Human rights, Sustainable development, Decentralisation, Diversity, Equity, Gender equity, Guarantor state, Secular state, Cultural identity, Inclusion, Innovation/creativity, Social justice, Freedom, Multiculturalism, Participation, Pluralism, Multinationalism, Environmental respect/protection, Social security
Cluster B	Civic friendship, Citizenship, Heterosexual married families, Freedom of conscience, Freedom of worship, Freedom of speech
Cluster C	Democracy, Equality, Integration, Justice, Respect, Responsibility, Security, Tolerance, Transparency/publicity
Cluster D	Autonomy/freedom, Development, Integral development, Dignity, Free entrepreneurship, Rule of law, Family, Patriotism, Peace/peaceful cohabitation, Probity, Private property, Republic, Sovereignty, Subsidiarity, Unity
Rights, modularity: 0.44	
Cluster A	Standard of living, Right to make oneś own decisions about oneś life, Freedom, Honour / reputation, Cultural identity, Cultural identity of indigenous people, Right to information, Mental and physical integrity, Participation, Conservation of cultural and historical heritage, Right to work and a decent wage, Right to quality public health care, Access to public information, Right to water, Request before the authorities, Human rights, Animal rights, Equality, Equality in relation to public burdens, Access to justice / due process, Freedom of information and speech, Judicial protection of individual rights, Social rights
Cluster C	Right to strike, Education, Integration of disabled people, Healthcare, Social security, Decent housing, Right to organise and to collective bargaining, Access to culture, Fair wage, Right to Work, Rights of indigenous people, Children and teenager's rights, Tax equality, Gender equity, Non - discrimination, Environmental respect / protection
Cluster D	Nationality, Security / non-violence, Life, Respect life from conception, Suffrage / vote, Property, Right of association, Equality before the law, Freedom of movement, Freedom of conscience, Freedom of worship, Freedom of Education, Freedom of expression, Freedom to work, Personal freedom, Free economic initiative / free enterprise, Privacy and intimacy, Peaceful assembly, Election to public office

Table 4.10: Communities by dimension. Leiden algorithm. Non-original concepts are shown in italic font.

Values, modularity: 0.48	
Cluster A	Common good/community, Participatory democracy, Human rights, Sustainable development, Decentralisation, Diversity, Equity, Gender equity, Guarantor state, Secular state, Cultural identity, Inclusion, Social justice, Freedom, Multiculturalism, Participation, Pluralism, Multinationalism, Environmental respect/protection, Social security
Cluster B	Heterosexual married families, Freedom of worship, Freedom of speech
Cluster C	Democracy, Equality, Integration, Justice, Respect, Responsibility, Security, Tolerance, Transparency/publicity
Cluster D	Civic friendship, Autonomy/freedom, Citizenship, Development, Integral development, Dignity, Free entrepreneurship, Rule of law, Family, Innovation/creativity, Freedom of conscience, Patriotism, Peace/peaceful cohabitation, Probity, Private property, Republic, Sovereignty, Subsidiarity, Unity
Rights, modularity: 0.33	
Cluster A/C	Standard of living, Right to make oneś own decisions about oneś life, Right to strike, Freedom, Education, Honour / reputation, Cultural identity, Cultural identity of indigenous people, Right to information, Integration of disabled people, Mental and physical integrity, Participation, Healthcare, Social security, Decent housing, Conservation of cultural and historical heritage, Right to organise and to collective bargaining, Right to work and a decent wage, Right to quality public health care, Access to public information, Access to culture, Right to water, Fair wage, Right to Work, Rights of indigenous people , Request before the authorities, Human rights, Animal rights, Children and teenager's rights, Equality, Tax equality, Gender equity, Freedom of information and speech, Non - discrimination, Judicial protection of individual rights, Environmental respect / protection, Social rights
Cluster D	Nationality, Security / non-violence, Life, Respect life from conception, Suffrage / vote, Property, Right of association, Equality before the law, Equality in relation to public burdens, Access to justice / due process, Freedom of movement, Freedom of conscience, Freedom of worship, Freedom of Education, Freedom of expression, Freedom to work, Personal freedom, Free economic initiative / free enterprise, Privacy and intimacy, Peaceful assembly, Election to public office

Table 4.11: Communities by dimension. Leading Eigenvector algorithm. Non-original concepts are shown in italic font.

Values, modularity: 0.48	
Cluster A1	Common good/community, Participatory democracy, Human rights, Sustainable development, Diversity, Guarantor state, Social justice, Pluralism
Cluster A2	Decentralisation, Gender equity, Cultural identity, Inclusion, Innovation/creativity, Multiculturalism, Participation, Multinationalism, Environmental respect/protection
Cluster A3	Democracy, Equity, Secular state
Cluster B	Civic friendship, Integral development, Heterosexual married families, Freedom of conscience, Freedom of worship, Freedom of speech, Private property
Cluster C1	Citizenship, Equality, Integration, Justice, Respect, Responsibility, Security, Tolerance, Transparency/publicity
Cluster C2	Social security
Cluster D	Autonomy/freedom, Development, Dignity, Free entrepreneurship, Rule of law, Family, Freedom, Patriotism, Peace/peaceful cohabitation, Probity, Republic, Sovereignty, Subsidiarity, Unity
Rights, modularity: 0.44	
Cluster A	Standard of living, Right to make oneś own decisions about oneś life, Freedom, Honour / reputation, Cultural identity, Cultural identity of indigenous people, Right to information, Mental and physical integrity, Participation, Conservation of cultural and historical heritage, Right to work and a decent wage, Right to quality public health care, Access to public information, Right to water, Request before the authorities, Human rights, Animal rights, Equality, Freedom of information and speech, Judicial protection of individual rights, Environmental respect / protection, Social rights
Cluster C	Right to strike, Education, Integration of disabled people, Healthcare, Social security, Decent housing, Right to organise and to collective bargaining, Suffrage / vote, Access to culture, Fair wage, Right to Work, Rights of indigenous people, Children and teenager's rights, Tax equality, Gender equity, Non - discrimination
Cluster D	Nationality, Security / non-violence, Life, Respect life from conception, Property, Right of association, Equality before the law, Equality in relation to public burdens, Access to justice / due process, Freedom of movement, Freedom of conscience, Freedom of worship, Freedom of Education, Freedom of expression, Freedom to work, Personal freedom, Free economic initiative / free enterprise, Privacy and intimacy, Peaceful assembly, Election to public office

Table 4.12: Communities by dimension. Louvain algorithm, link created at 1% significance. Non-original concepts are shown in italic font.

Values: modularity : 0.55	
Cluster A1	Decentralisation, Diversity, Gender equity, Secular state, Cultural identity, Multiculturalism, Multinationalism, Environmental respect/protection
Cluster A2	Common good/community, Participatory democracy, Human rights, Sustainable development, Equity, Guarantor state, Social justice, Freedom
Cluster B1	Heterosexual married families, Freedom of conscience, Freedom of worship, Freedom of speech
Cluster B2	Civic friendship, Citizenship, Integration
Cluster C	Democracy, Equality, Justice, Respect, Responsibility, Security, Tolerance, Transparency/publicity
Cluster D	Autonomy/freedom, Development, Integral development, Dignity, Free entrepreneurship, Rule of law, Family, Patriotism, Peace/peaceful cohabitation, Probity, Private property, Republic, Sovereignty, Subsidiarity, Unity
Rights: modularity: 0.46	
Cluster A	Standard of living, Right to make oneś own decisions about oneś life, Freedom, Honour / reputation, Cultural identity, Cultural identity of indigenous people, Right to information, Mental and physical integrity, Participation, Conservation of cultural and historical heritage, Right to work and a decent wage, Right to quality public health care, Access to public information, Right to water, Request before the authorities, Human rights, Animal rights, Equality, Freedom of information and speech, Judicial protection of individual rights, Environmental respect / protection, Social rights
Cluster C	Right to strike, Education, Integration of disabled people, Healthcare, Social security, Decent housing, Right to organise and to collective bargaining, Access to culture, Fair wage, Right to Work, Rights of indigenous people, Children and teenager's rights, Tax equality, Gender equity, Non - discrimination
Cluster D	Nationality, Security / non-violence, Life, Respect life from conception, Suffrage / vote, Property, Right of association, Equality before the law, Equality in relation to public burdens, Access to justice / due process, Freedom of movement, Freedom of conscience, Freedom of worship, Freedom of Education, Freedom of expression, Freedom to work, Personal freedom, Free economic initiative / free enterprise, Privacy and intimacy, Peaceful assembly, Election to public office

Table 4.13: Frequency of observations for categorical variables.

Type of process		Modal attitude		Agency		Dimensionality	
Values							
Material	14060	factual	9880	Low	17590	single	32024
Existential	9353	propositive	31165	Medium	24904	multi	12032
Relational	20643	valorative	3011	High	1562		
Rights							
Material	9424	factual	8516	Low	14984	single	35152
Existential	8356	propositive	31439	Medium	24930	multi	9368
Relational	23740	valorative	1565	High	1606		

Table 4.14: Descriptive statistics for numerical variables.

Statistic	N	Mean	St. Dev.	Min	Max
Values					
Mean Age	44,056	42.367	13.225	14	78.867
CDI	44,056	30.116	0.161	29	30.556
Text length	44,056	17.613	9.179	2	100
Rights					
Mean Age	41,520	42.345	13.266	14	78.867
CDI	41,520	30.081	0.172	29	30.571
Text length	41,520	17.542	9.785	2	104

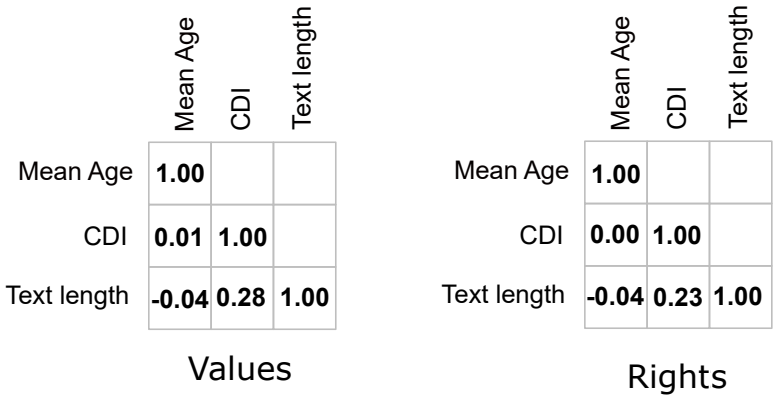

Figure 4.3: Person correlation between numerical variables.

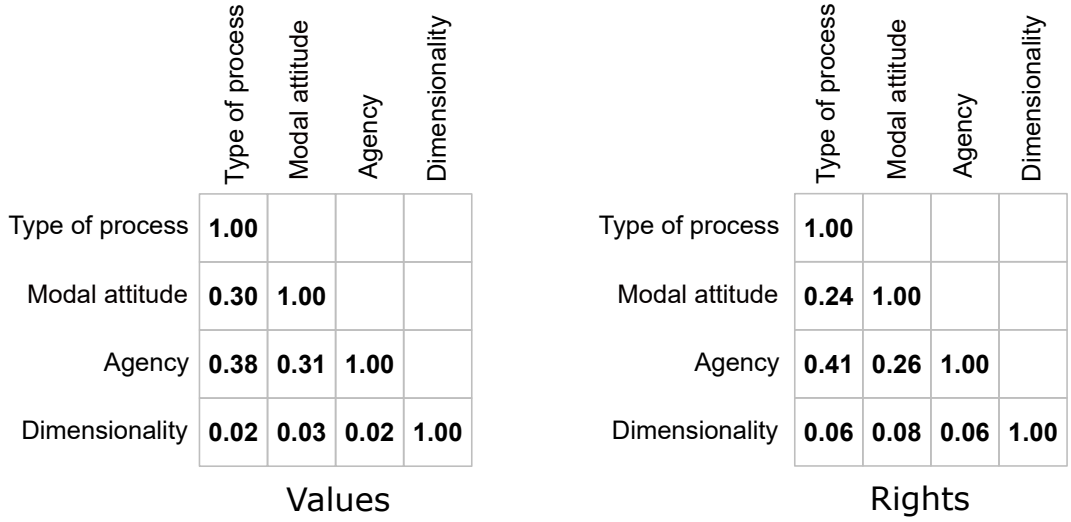

Figure 4.4: Cramer's V association between categorical variables.