

Data Visualization for Non-oppression *and* Liberation: A Feminist Approach

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Observatorio de Datos y Estadísticas de Género e Interseccionalidades

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In this article, we address data visualization as a political artifact in light of the work of the Observatory of Data and Statistics on Gender and Intersectionalities (ODEGI). We show how a feminist approach explores political dimensions in data and turns data visualization into a tool of subversion and resistance against the systems of oppression, in an unequal society like the Chilean. The reflections in this article seek to create dialogue around the question of how data visualization can be transformed into a tool of non-oppression and liberation, from a feminist approach. In line with this, the first part of the article provides a brief contextualization of the political and ethical attributes of data visualization. Then, we reflect on a framework that allows us to understand it as a feminist tool. We will finally delve into the ODEGI case and our use of data visualization to contribute to the fight against patriarchy and other systems of oppression, giving concrete examples of the categories of analysis we use in our design and decision processes.

Keywords

Data feminism

Data visualization

Feminist design

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Intersectional designs

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Data Visualization for Non-oppression and Liberation: A Feminist Approach

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DATA VISUALIZATION: A RESULT OF A PROCESS THAT REPRODUCES SOCIAL BIASES AND INEQUALITIES

We live in a data-driven society, where the use of data for decision-making, substantiating proposals, or representing realities through data visualization is becoming increasingly common. This phenomenon was accelerated with the COVID-19 pandemic and the use of data in daily government and media reports. However, little attention has been paid to working and visualizing data's political and ethical nature (Boehnert, 2016, D'Ignazio & Klein, 2015). Data visualization is a discipline that emerges from the intersection between statistics and design, which has been permeated by the apparent neutrality and objectivity attributed to data, and by the inertia of design to represent and reproduce existing structures (D'Ignazio & Klein, 2020; Furter, 2018) uncritically. The lack of a critical perspective on it can reproduce the existing systems of inequality, making them invisible, and prevent us from exploring its potential as a tool to generate social transformations.

Data visualization is part of a statistical production process that appears to be neutral and objective. Statistical production has emerged as a science of objective and absolute appearance, and has become a new regime of power and knowledge for making decisions (Leurs, 2017). This notion has rendered invisible that its production is generated in a particular context, with determined characteristics, inequalities, and biases that permeate its construction. Thus, it is essential to understand statistical production in the framework of current structures of oppression: sexism in a patriarchal system, classism in a capitalist and unequal society, and racism, among others (D'Ignazio & Klein, 2020; Leurs, 2017), since each one of these structures permeates through biases or intentions behind the

decisions to produce a piece of data. The above becomes evident if we consider who generates the data, and what frames of representation and reference predominate in decisions.

Moreover, Donna Haraway (1988) mentions the 'god trick', which refers to seeing everything from nowhere, from omnipresence. That is, we believe we see everything and capture a unique reality without bias, thus conferring the virtues of neutrality and objectivity in data visualization. These virtues have been celebrated and identified today as part of graphic excellence by many professionals dedicated to data visualization. For example, Edward Tufte (2001) considers that the best graphic in the history of humanity is the map of Napoleon's Invasion of Russia, attributed to Charles Joseph Minard. It represents the visual minimalism Tufte advocates: the ink is used only to transmit data. However, D'Ignazio and Klein (2020) argue that the option of using ink only to transmit data under a minimalist appearance is not exempt from giving the visualization a political character, since it would seek, for example, not to bring out any feeling about an event that is surrounded by deaths and injustice, nor to show the emotions that arise from the political nature of an invasion.

On the other hand, men from affluent classes are generally behind decisions in data production, which can mean biases in its construction, as is the case of Chile, where the access to higher education is highly stratified by socioeconomic level (Ministerio de Desarrollo Social y Familia, 2018), and STEM areas among those who enter university and work at them are highly masculinized. In numbers, women represent 17 percent of first-year enrollments in technology careers (ODEGI, 2021). The authors of *Data Feminism* refer to the 'risk of privilege' to talk about the difficulty or limitations that people in positions of power have in recognizing situations and experiences of people in positions of oppression in the same social structure within a society. Moreover, in the current patriarchal system, men predominate in decision-making positions, and shape the representation of the world from their point of view, misinterpreting it with absolute truth (Beauvoir, 1987). In fact, Caroline Criado, in her book *Invisible Women* (2020), shows how this affects public decisions and policies, which have a male bias because they are designed by men, a phenomenon that extends to design in general. For example, musical instruments are larger than the average size for women, or air conditioning is set at lower temperatures than required for the female basal metabolism.

Furthermore, these representation biases are enhanced because data production has concentrated in the private sector and state institutions in Latin America. Therefore, data is being mainly produced for economic interest, and from their acritical social paradigms and biases: under a punitive society where data is used for control; a sexist society without adequate representation of gender and territories (D'Ignazio & Klein, 2020). Thus, biases resulting from

contextual inequalities, in turn, impact statistical production, analysis, and visualization. The absence of a critical perspective makes inequalities invisible, thus reproducing and perpetuating them. Therefore, who are we representing? Who are we not representing? Or how are we representing them? These are crucial questions to become aware of those invisible realities, and to start transforming data visualization. In this case, gender becomes a critical knot in the statistical process, which has not been given sufficient attention. Although there has been significant progress in generating disaggregation by sex, gender diversity is still not visible. Above all, this does not imply that these inequalities are considered in the entire data production process. Moreover, the scenario is even more deficient if we consider other intersectional inequities such as race, gender identity, and immigration, among others.

PROPOSALS FOR DATA VISUALIZATION THROUGH DESIGN AND A FEMINIST APPROACH

We consider that data visualization and its intersection with design give us the possibility of reflecting on the specific components that grant, or not, a rational, absolute, and objective character to data. Design can transform social and cultural reality, shaping human experience, subjectivity, and the environment. It not only materializes various human needs, but also embodies our values while synthesizing new cultural, moral, and social ones (Tlostanova, 2017). This design characteristic can be understood as a form of controlling and disciplining our perception and interpretation of the world, and of other human and non-human beings, according to certain legitimized principles. Furter (2018) stresses that design is a position of power because we can create representations as designers. The critical analysis of representations made by design must involve the recognition and evaluation of what is constructed and communicated. It is relevant to rethink the power relations that exist in design ecosystems. Data visualization could have severe biases in its construction, which arise from its design. A non-critical design process in data visualization can reproduce the social inequalities of its context, making them invisible. Furthermore, it is necessary to decolonize the knowledge that regulates aesthetics and subjectivities controlled by hierarchies of power.

Data activist alternatives make use of this diagnosis and take it over through proposals intended to make data production and visualization a tool to transform the status quo. One example is 'data feminism', a concept coined by authors D'Ignazio and Klein. This political position regarding data science suggests thinking about data, its use, limitations, and possibilities, from a critical perspective that focuses on applying it for structural transformation and justice. Given that we live in a society with multiple intersecting power structures, besides sex and gender, data feminism is not just about women and sex-gender diversities,

but also about the distribution of power in society. Thus, an intersectional perspective is basis for understanding feminism and the struggle for change.

Intersectionality draws attention to the invisibility in feminism and the frameworks of social representation (Troncoso Pérez et al., 2019). This perspective allows to recognize the experience of people who face multiple and interrelated forms of structural discrimination (Bouteldja, 2014), which are often due to the exclusion of their representation of the world, or by controlling the way it will be represented. Intersectional feminism, as an expansion of feminist theory, has been used to break down systems of oppression that cannot be reduced to a single structure or source. Feminism is not just a women's issue, nor does the feminist theory solely help inform gender issues. Thus, the feminist theory of intersectionality proposes understanding social relations of domination from a matrix where they are articulated and co-constructed with different power systems, in a dynamic and contradictory way (Cubillos Almendra, 2015). Then, intersectionality is positioned as a useful conceptual and analytical tool for research, which allows understanding and attending to the way gender is imbricated with other axes of exclusion in different contexts, levels, and spheres. The potentiality of intersectionality in design could be a valuable method for understanding design's contribution on reproducing such categories of identity, hegemonic power, and forms of oppression (Cubillos Almendra, 2015).

Data feminism, as explained by Catherine D'Ignazio and Lauren Klein, is recreated from seven principles that involve the critical use of data to visualize minority populations, women, and sex-generic diversities.¹ In the principle 'Rethink Hierarchies and Binarism,' they expose that the classification criteria that divide people into men and women have left many people without visibility (D'Ignazio & Klein, 2020). According to the authors, these structures have been created by people who belong to a particular place, at a particular time, and who were influenced by the world around them. This idea also permeates data visualization. Thus, the authors argue that a feminist approach to data visualization should emphasize representation strategies based on multiplicity rather than binaries, and recognize the limits of any binary viewpoint. Not to mention that it is not only a challenge for the visualization phase. Rethinking gender representation and accounting for a range of multiple and fluid categories, among other binary categories, are challenges that impact the processes associated with data collection and classification, and their visual presentation. The importance of intersectional feminism allows attending to diverse histories of communities that have been oppressed and violated in their rights, and building a multidimensional and transdisciplinary approach to apprehend the complexity of power relations, inequalities, and social differentiation in a holistic manner (Troncoso Pérez et al., 2019).

1 The seven principles are: (1) Examine Power; (2) Challenge Power; (3) Elevate Emotion and Embodiment; (4) Rethink Binaries and Hierarchies; (5) Embrace Pluralism; (6) Consider Context; and (7) Make Labor Visible (D'Ignazio & Klein, 2020).

On the other hand, the role of emotions in data visualization is another principle that permeates data feminism, and is considered a pillar that contributes to the stories' narrative. However, authors such as Cairo (2019) question whether a visualization should be designed to evoke emotions. The position of Amare and Manning (2016) adds to this questioning. They posit that the simple style used in data visualization in general is aimed at a neutral field of emotions, where people are freer to choose their response to the information. However, persuasion, followed by implied subjectivity, is everywhere. Data visualizations exert an enormous amount of rhetorical power, even when we rationally know that data visualizations do not represent 'everyone'. From feminism, it is posited that knowledge is socially situated, and that the perspectives of oppressed groups, including women, minoritized communities, and others, are systematically excluded from mainstream knowledge. The rhetorical question matters because it is present in every design, including visualizations that have no deliberate intent to persuade, and those that appear neutral (Hullman & Diakopoulos, 2011). Therefore, the argument about developing feminist objectivity explains that all forms of knowledge are situated and correspond to people in specific cultural, political, geographic, and social contexts.

ODEGI: A FEMINIST APPROACH TO DATA VISUALIZATION

ODEGI (Spanish initials for Observatory of Data and Statistics on Gender and Intersectionalities) was born from this diagnosis in August 2020. In an adverse context with a global pandemic, the 2019 social revolt in Chile, and the 'feminist May', it became necessary for us to contribute to the democratization of information based on a critical viewpoint, to support the historical context. We are 13 volunteers from different disciplines such as communications, social sciences, design, and computing, working to make data a transformative tool that can contribute to end every form of oppression. We base our work on three pillars: (1) Training and Interventions; (2) Studies and Public Policy; and (3) Community and Advocacy. We carry out our work through each pillar with a clear vision of using design methodologies as a fundamental tool in each of our projects' approach. The following are examples of our exploratory work and categories of analysis, when visualizing data from an intersectional feminist perspective, through concepts outlined by authors Catherine D'Ignazio and Lauren F. Klein (2020).

ODEGI proposes to work on data visualization from an intersectional feminist perspective, to promote transformation in the design and visualization of data, in order to construct a liberating discipline and, consequently, a liberating society. We postulate that statistics are not neutral, and respond to the created context and culture. Moreover, the biases of the groups who produce statistics (mainly men) are the result of social inequalities, which means that

the production, analysis, and visualization of statistics are not carried out from a critical perspective.

At ODEGI, we recognize gender as a critical node in the statistical process, to which insufficient attention has been paid; although significant progress has been made in generating disaggregations by sex. We have identified that this does not permeate all statistics yet, and the diversity of sex and gender are not considered. These differences are not considered in the entire statistical production process, even less so when representing intersectionalities. As a result, existing inequalities are reproduced, amplified, and perpetuated when decision-making is based on data, or when trying to make inequalities visible. This is even more severe when considering the exponential use of artificial intelligence, where collection and analysis are based on biased statistics. We summarize these ideas on the schema presented in Figure 1.

ODEGI'S OVERVIEW

The statistic is not neutral

The statistic reproduces and makes invisible gender inequalities

Statistical production, analysis, and visualization do not consider gender representation as a fundamental element

These consequences are exacerbated when trying to make their intersectionalities visible.

Figure 4: ODEGI's Overview. These four steps summarize ODEGI's perspective and our starting diagnosis. Source: www.odegi.cl

ODEGI'S PROCESS

Throughout our short life span, our way of working has mutated quite a bit. In the beginning, our work was mainly focused on the dissemination of data from a gender perspective, and the discussion that was generated from it. Then, our work became more reflective, allowing us to discuss our visualization practices. Currently, the work is done in pairs, containing a person from the area of social sciences and a designer. In pairs, we discuss and choose the topic and the data that often responds to the contingency of the moment. We search in different data sources, such as official and secondary sources, and even consultations: we are always very transparent regarding the origin of data.

This process is often complicated due to the lack of data in our country and the lack of representation of, for example, gender diversity. Then each pair makes a proposal to all the volunteers, who can give their opinion and modify

it. Once a proposal is chosen, both the designer and the social scientist generate a narrative, which responds to how we want to tell this data, what will be emphasized, and what our position towards the data will be. At this point, we are aware that data are not neutral, and we place ourselves decidedly to tell the story of the data from our political perspective. We also want the narrative to be attractive and capable of stirring something inside the reader, to generate empathy with it. Then, the designer uses programs such as Flourish or Rawgraphs to plot the visualization, and then modifies it in Illustrator, choosing typography and colors in accordance with our visual identity. We also add images or other elements that help contextualize the information.

In most cases, we use conventional graphics such as bars or captions, and in others, we try to experiment with shapes, always making sure that the data is read correctly. At the same time, the social scientist creates the text that will accompany the data, which facilitates its interpretation, and follows the narrative line present in the image. Finally, the image and the text are shared with all the colleagues, they are modified based on their suggestions, and a journalist adapts the text to make it as understandable and attractive as possible. This process has been possible thanks to several iterations and learnings that we have experienced along the way at ODEGI. There is still little information on feminist data visualization, which has made us constantly question our practices. We share some of these below.

Is an Image Worth a Thousand Words? Representation of Women Through Iconography and Images

At ODEGI, we are convinced that the iconography used to identify men and women through a binary approach, which has become widespread in different public spaces, reduces complexity and does not allow a diversity of people to be represented through data visualization. This iconography could reinforce the normalization of stereotyped human bodies and experiences, highlighting binarism, a concept that, as told before, is invited to be rethought in the book *Data Feminism* (2020). In the observatory, we use different strategies that have led us to attempt fighting binarism through images, such as the use of photographs (Figures 2 and 3). Photography has helped us represent diverse women. However, we recognize that photographs are not exempt from problems. For example, the lack of representation of women with Latin American features in open image banks. Moreover, the consent of individuals to appear on images from the Internet is an unresolved issue that determines the choice of faceless images. Therefore, we are still searching for different strategies that allow visual communication that accounts for diversity.

Figure 2: Domestic violence. This visualization explains that four out of ten women have experienced domestic violence in Chile. This image exemplifies the use of photographs to provide information, while representing women's diversity at the same time. Source: ODEGI, 2021, based on data from the 'IV Encuesta de Violencia contra la Mujer en el Ámbito de Violencia Intrafamiliar y en Otros Espacios', Ministerio del Interior y Seguridad Pública de Chile, 2020.



Figure 3: Political sexual violence during the 2019 social revolt in Chile. This visualization explains that 3 out of 10 complaints filed by women during the *revuelta social* were filed by women who would have suffered sexual political violence. This image exemplifies the use of photographs of women in our visualizations. Source: ODEGI, 2021, based on data from INDH Chile, 2020.



How Far do we Elevate Emotion?

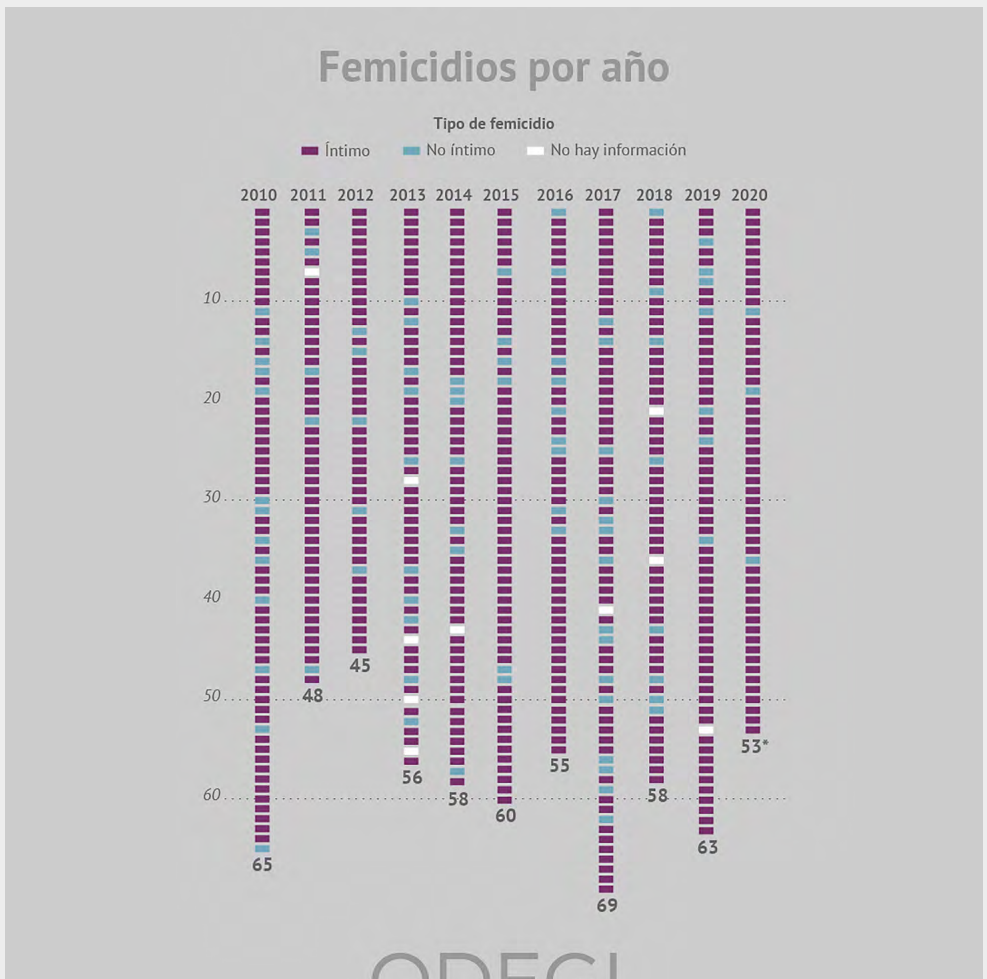
Representation of Gender-Based Violence

A feminist perspective accounts for emotions as fertile ground for expression in design, specifically in data visualization, and is considered by D'Ignazio and Klein in their third principle: 'Elevate Emotion and Embodiment' We firmly believe that data visualization is a representation of human experiences flooded with emotion, and that its use as a vehicle for raising awareness and generating empathy enables transformation. One of the relevant topics to exemplify the work with data visualization and emotions is the struggle within feminism to eradicate violence against women, particularly femicides. On November 25th, the International Day for the Elimination of Violence against Women, we made visualizations on the number

of femicides that take place per year in Chile, and what to do in case of facing violence. However, multiple ethical questions arise: How do we represent violence without re-victimizing women; how do we elevate emotion, generate empathy in users, and at the same time assume the responsibility that this implies?

Violence is a complex issue, and no definitive answers have been found yet regarding what to do or not to do to represent it. We propose to not homogenize cases, respecting each woman and her history. As shown in Figure 4, every woman is represented by a square, which allows us to distinguish them. In addition to this, we do not use re-victimizing images such as weapons, which raises another dilemma: How can we achieve empathy without falling into sensationalism? Can we shock people and raise emotions toward this outrageous reality, while maintaining respect for the victims? How can data contribute to transformation without causing outrage? These questions are constantly part of our daily work, and each case we face finds its own answers. What is crucial is the reflection behind each decision, where these doubts allow us to reach collective answers.

Figure 4: Femicides in Chile. This visualization represents femicides committed per year in Chile, from 2010 to 2020. Each square represents one woman, and the color represents the type of femicide. This form of representation tries not to homogenize the cases. Source: ODEGI, 2021, based on data from Red Chilena Contra la Violencia, 2020.



Contextualization of Data (Situated Knowledge)

At ODEGI, we are interested in providing relevant information for public debate, whilst showing that any issue can be addressed from a feminist perspective. Like all design products, data visualizations inhabit a social and cultural context, and strongly permeate social structures. Thus, in 2021, when five elections took place in Chile, we generated visualizations (e.g., Figure 5) around this topic to capture the value of parity in politics, and the participation of women in public spaces. This exercise revealed the importance of making data visualizations respond to the context of what is happening, and of delivering data and information in a contextualized way. It is an essential means to convert data into a tool for transformation and subversion.

On the other hand, it seems fundamental for us to disclose a political stance on the issues we visualize (e.g., Figure 6). Data feminism invites us to reveal the bodies present in statistical production, and also to understand knowledge as something that is situated. The text gives context to data visualization, revealing the interpretation we are giving to the data, and the ways we can use this information to make a change.

Figure 5: Chilean women in Congress. A visualization that exemplifies how we respond to the context: we use data visualization to explain the lack of women in Congress seats. Source: www.odegi.cl, based on data from Comunidad Mujer, 2022.

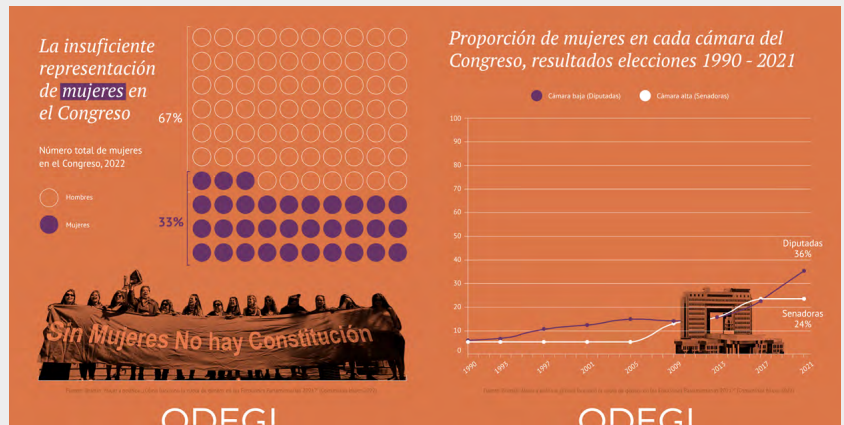


Figure 6: Parity in the Chilean Constitutional Convention. This visualization celebrates the results of the Constitutional Convention elections through its title: "We reached gender parity in the constituent assembly!" We did not have the same success on elections without gender parity: of 345 mayorships, only 62 were for women; of 29 governorships, only 6 were for women. Source: www.odegi.cl, based on data from SERVEL, 2021.



CONCLUSIONS

This article shows that the virtues of impartiality and rationality have been historically attributed to data visualization. This has hidden a multiplicity of biases, with the risk of making social inequalities invisible, and reproducing them. Deconstructing and approaching its production and bases —data science and design— from a critical and feminist perspective, allows us to discover data visualization as a political artifact. Also, it enables us to explore its potential to make the unequal distribution of power visible, represent everyone's voices, question marginalized realities, and contribute to social transformations.

At ODEGI, we set ourselves the challenge of contributing to dismantle structural oppressions of patriarchal society through feminist data, which results in our design decisions following this objective. Through our creative and organic work process, we not only seek to make information on the inequities of patriarchy visible, but we also question the way we work on data visualization as a tool for non-oppression. What data do we use to represent people? How do we visualize each issue? What ideological position do we define to argue and contextualize each figure? How do we encourage the production of representative information? How do we organize ourselves internally to make all the work visible and value it?

These questions guide our daily work and the decisions we make, also based on a constant questioning of how we apply data feminism and its principles to our national and regional context in Latin America. This way, from an intersectional feminist approach, we work towards co-creating data visualization for non-oppression and liberation.

We seek to generate feminist and critical proposals to make information visible, specifically throughout our work in data visualization. This way, our graphics seek to visually represent people by combating the traditional stereotypes and binaries of patriarchy. We have daily discussions about the challenge of raising emotions and generating empathy through design, without falling into ethical faults. The latter is especially important in issues such as gender-based violence and femicides.

How to 'de-neutralize' the data without disrespecting the survivors, victims, and their families, and without falling into sensationalism? Part of our proposal as an observatory is to answer these and other questions, by giving context to the information from a critical and political perspective. We are not only describing reality, but we seek to fight for transformations through this evidence.

The path of understanding data visualization as a political artifact, and creating proposals from feminist and critical perspectives, is a long one. Multiple questions emerge from it, regarding how to reverse the classical principles that render inequalities invisible, reproducing them through traditional

methods; and to what extent new questions can be opened to generate transformations. Furthermore, we realize that the answers to these and other questions are far from being settled. **D**

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