

Cartographic imaginaries of the COVID-19 crisis in Mexico – a typology of disease maps

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Since the beginning of the COVID-19 pandemic, the news reports on it have been accompanied by maps. Similarly to weather maps, they became part of our daily news feed. The newspapers' maps reporting on the COVID-19 pandemic often use the same or similar data to depict the current state of the spread within a national territory. However, the designs of the maps vary between different news outlets. These differences were analysed using the documentary method introduced by sociologist Ralf Bohnsack, using the case study of six COVID-19 maps published in Mexican national newspapers. The analysis resulted in a typology of maps, which proposed different readings of the infographic itself when it comes to the aspects of (1) the cognitive process it supposedly triggers, (2) the kind of information it contains, (3) the usefulness for the viewer/reader, and (4) whether the author or the reader has the authority over the reading/learning process.

Key Words: *critical cartography, disease maps, visual discourse, Mexico, documentary method, qualitative research.*

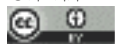
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Cartographic negotiations during the COVID-19 pandemic

As of the beginning of 2022, an immense number of maps are an integral part of many daily news blogs on the COVID-19 pandemic. Therefore, it is not an exaggeration to say that the public debate about this global crisis is strongly characterised by cartographic imagery. Kent (2021:187) suggests calling it a new cartocracy, stating that “maps of the present pandemic are everywhere”. These maps inform our collective memory of this historic event as we consume them on an almost daily basis, being part of the so-called infodemic of the pandemic with an overwhelming amount of information spread in the news and elsewhere (Cohen & Duggan, 2021). Even mapping archives have seen a substantial rise in new acquisitions since the pandemic began (Bliss, 2020).

The inclusion of maps depicting the current spread of the new coronavirus in news reporting was also supported by institutions such as Johns Hopkins University, by making available a daily actualized map through an online platform. Their interactive map panel allows access to a worldwide map, visualising the most current data on COVID-19 (Johns Hopkins University & Medicine, 2022) and presenting it in a very techno-futuristic manner (Kent, 2021). The design of the panel was provided by the firm ESRI, a provider of Geographic Information Science applications. The black background of the map, with the red dots representing the number of cases in each country, might be a familiar sight to regular news consumers, as these maps have often been used without changes by different news outlets (Figure 1 and Figure 2).

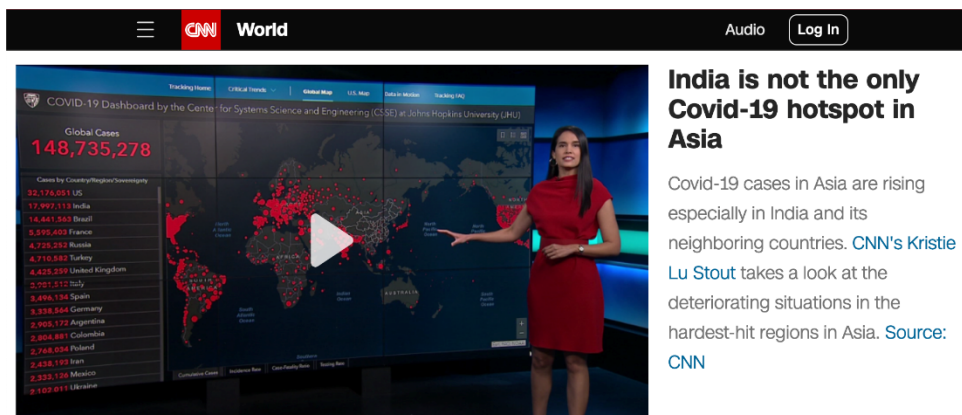


Figure 1. Screenshot of CNN news segment, using the map panel provided by Johns Hopkins University
Source: CNN, 2021



Figure 2. Screenshot of the Mexican newspaper La Jornada
Source: La Jornada, 2020

Epidemiological maps are a specific form of thematic maps which present spatial data as something accumulated by experts (Edler & Kühne, 2022). Using maps suggest that the spatial distribution of the phenomenon is relevant (Moenic et al., 2020). Disease maps date back to at least the 17th century, when they were used to understand plague outbreaks and to manage quarantine measures (Klein, 2016). Pandemic maps are a map genre in which the spatial distribution of a negative phenomenon such as a disease is visualised, a virus spreading over time from physically co-present persons.

The high spatio-temporal mobility of the phenomenon itself is emphasized in animated maps, which visualise the temporal development of the disease (Keefe, 2022). In these maps, the virus spreads, parting from single 'hotspots' – or retracts. While the virus is found across the country's territory, its spread happens in some spaces more quickly than in others, depending on the population density and its mobility flows (including airplane paths) but also due to different local policy measures. Texts accompanying the maps try to explain the spatially uneven developments. Maps of epidemiological diseases, therefore, help find relationships between the virus, its carriers, and spatial-ecological aspects (Koch, 2017; Sparke & Angelov, 2020). This leaves the viewer/reader with the knowledge of a specific antagonistic tension: While the physical space of a given territory is homogenized (potentially, the virus can spread evenly throughout it), there are many disparities within it on display, which might have physical, economic, or socio-political causes (Sparke & Angelov, 2020).

Visual discourses and maps enforcing the territorial nation-state

Theoretically and methodologically, this paper follows firstly a critical cartography approach which aims at a critique of mapping practices and points to their political power (Crampton & Krygier, 2006; Halder & Michel, 2018). The second foundation is the communicative constructivist perspective (Knoblauch, 2019), in which maps are understood as a cultural artefact summarizing societal knowledge about a specific field while at the same time making it available for social negotiation. Following Berger & Luckmann (1966), maps are objectivations (Knoblauch, 2013), sedimented meaning, which produce a social reality always in need of interpretation and which is always a preliminary reality never fully closed and fixed. Similar to text or language, the logic of visual media, such as maps, follows specific structures known to broad parts of a society and which are typical for their time and cultural context (Knoblauch, 2013).

This means that for maps: „the 'rules of the social order' appear to insert themselves into the smaller codes and spaces of cartographic transcription” (Harley, 1989:6). Since the European Enlightenment, maps have been used as a communicative form that follows a rational idea of science and ought to present ‘facts’: “the scientific Renaissance in Europe gave modern cartography coordinate systems, Euclid, scale maps, and accurate measurement” (Harley 1989:6). The rationalization of space also comes with a visual political power claim: “The topography as shown in maps, increasingly detailed and planimetrically accurate, has become a metaphor for a utilitarian philosophy and its will to power” (Harley 1989:10). The Euclidian space can be observed and therefore controlled. Within this positivist approach of cartography, a scientific visualisation regime was established in the 1960s that is based on the assumed evidence of vision (Michel, 2017). Thematic maps that visualise and localise topics such as population density or election results are a specific form of an infographic.

They transform abstract, mathematical knowledge into a visual form which suggests that we can see from a ‘bird’s-eye’ view what ‘really’ happens in a bounded territorial space – thanks to the positivist cartographic gaze (Pickles, 2004:80). Maps – as well as other visual forms such as graphics or tables – intend to make quantitative knowledge visually comprehensible (Pickles, 2004; Michel, 2016; Wintzer, 2019), transforming its abstract knowledge into something the viewer/reader can physically relate to, e.g., to its visual impressions or imaginaries of a given territory. The proposed aim of most maps printed in newspapers is to show what ‘really’ happens (this assumption will later be differentiated based on the empirical analysis).

This modern cartography is also deeply linked to the political project of territorial nation-states (Rossetto, 2021). On these maps, the national state is presented as a political sovereign of a physical territory, which is measurable and can be mapped in Cartesian, two-dimensional space with discrete boundaries. Branch (2011) even proposes that it became only possible to think of modern national states due to advanced cartographic technologies: “mapping was fundamental to three key characteristics of the medieval-to-modern shift: the homogenization of territorial authority, the linearization of political boundaries,

and the elimination of nonterritorial forms of organization” (Branch 2011:1). As a ‘power container’ (Vujaković, 2014), the state is presented in modern maps as a discrete object in a linear space, which also contains discrete sub-terrains. In conclusion, and seen from a discursive approach, most maps – independent from the topic they are presenting – therefore refer to the meta-dispositive of the territorial nation-state (Diaz-Bone, 2017). In most western cultures, the inhabitants of the national states are socialised into this territorial thinking, for example, via thematic maps in classic school atlases visualising the economic factors of specific countries or continents, their natural characteristics, or the spatial distribution of a specific phenomenon such as cities of different sizes, or other supposedly relevant aspects to learn in order to ‘know’ about their home country (Edler & Kühne, 2022; Rossetto, 2021).

Mapping a highly mobile phenomenon such as a virus, which does not respect territorial boundaries as they are seldom physically completely sealed, this territorial thinking becomes problematic, as is being revealed during the COVID-19 pandemic. The COVID-19 maps reinforce visually territorial entities as the ones at which health policies are aimed (Dodds et al., 2020; 290). In the case of pandemics, this ‘territorial trap’ (Agnew, 1994) resulted in policies that produced specific problems, as it does not reflect the everyday lives of many people moving within these territories.

Wang et al. (2020: 2) explain the example of migrants during the COVID-19 crisis: “since international travelers and migrants are not fixed in a single territory and may have multiple citizenships, they cannot be precisely placed in territorialized governance”, and “territorial traps can still be found among the thousands of stranded migrants all over the world due to border closures and travel restrictions” (Wang et al. 2020:3); for the case of Mexico, the stricter border regime made the entrance of American migrants into the US almost impossible and contributed to an even more precarious situation on the US-Mexican border, facing an increase in migration movements due to the pandemic (Pradilla, 2021). One general consequence of the global crisis due to COVID-19, reported by Wang et al. (2020: 4) is that it “may resonate and even augment territorial thinking in both nationalist stereotyping and geopolitical strategies”. We might also observe the consequences of the territorial trap when it comes to the example of the globally uneven distribution of vaccines.

Epidemiological disease maps carry with them not only specific visual thematic frames and rational-spatial logics (territorial nation-state, homogenous space, differences between distinct sub-spaces due to their characteristics (density or policy measures taken), spreading due to physical co-presence) but also activate associations that are emotionally charged (Geise, 2017). In the current case, it might be the danger of a disease limiting the capability to breathe and which comes dangerously close (or retreats when it is successfully combated). In the sense of visual framing as “a latent structure of meaning, constructed through a semantic unit of specific informational visual cues, all presented simultaneously” (Geise, 2017: 1), maps connect several knowledge reservoirs and patterns (such as territorial battles in wars in which ‘the enemy’ gains or loses terrain). Disease

maps are a visual communication form within a multi-modal discourse (Egbert, 2019), which also includes other types of visual interpretations of the pandemic (such as images of people in masks) as well as textual interpretations. Within this discourse, social power relations are negotiated – and in the case of maps, the territorial nation-state – as a power container is visually framed and unquestioningly referred to as a relevant action entity.

Mapping styles: different contextualisations of a national crisis

Similarly to infographics that include numbers or charts, maps influence the public discourse on the pandemic by enforcing or disguising specific narratives (e.g., the nation-state), imaginaries, and affective atmospheres (Lindón, 2007; Hiernaux, 2007). Socially, there is a awareness of the fact that apparent proof artefacts such as images, street signs or infographics can be manipulated to convey a particular message. There has been a discussion on what the COVID-19 cases represent (test capacities rather than actual disease spread) and what the value of global maps might be and how the data can be presented in a misleading way. There are many critiques on current COVID-19 mapping practices and, therefore, a call for cartographic literacy (Griffin, 2020; Juergens, 2020; Mooney & Juhász, 2020; Santee, 2022).

While some propose that map authors use this manipulative power consciously (Monmonier, 2018), instead it seems that social practices cannot, speaking from a sociology of knowledge standpoint, be free from implicit assumptions and from making use of social norms, which were negotiated prior to a specific act – even if interpreting it in a unique and new way (and therefore making social change possible). Social codes and communication structures exist on different levels of meaning – as sociologist Karl Mannheim explained using the example of giving someone on the street money: On a communicative level, this is recognised as a charity, while on an intentional level, this is understood as a sign of goodwill, while on a documentary level it might be understood as hypocrisy (Mannheim, 1921). The documentary level of meaning documents something about the social context of the practice author(s) and their social frame of reference. This kind of knowledge is intuitive and embodied. It corresponds to what Bourdieu (1977) called ‘habitus’, a practical knowledge we get acquainted with in the course of our socialisation (Berger & Luckmann, 1966) and might have trouble explaining explicitly. It is this implicit knowledge, the social codes inscribed into the artefact of the map, that is expressed in different ‘designs’, which can be best seen if the exact same quantitative data are presented in various manners. By their choice of colours, headings, arrangement of visual elements and so forth, maps can suggest specific readings of the same data.

Intentions are not accessible to empirical analysis (following a sociology of knowledge perspective, we can only empirically access communication acts, which are the basis of our social reality (Knoblauch, 2013) – someone might announce intentions, but there is no way of empirically ‘proving’ them right or wrong). This implicit, commonly shared knowledge can be investigated through means of

hermeneutical analyses – as will be detailed for the medium of maps in the next chapter.

Methodology

The documentary method is interested in the implicit knowledge of social practices experienced and shared amongst social groups structured along categories such as gender, milieu, or generation (Bohnsack, 2014). The methodology acknowledges two different levels of meaning: theoretical, abstract, codified and communicable knowledge on the one hand – explicit knowledge – and embodied, practical, implicit knowledge on the other hand – implicit or tacit knowledge (Przyborski & Slunecko, 2020), a common distinction also in geography (Meusburger, 2015).

The documentary method was introduced by German sociologist Ralf Bohnsack in the 1980s and had a significant impact on German-speaking interpretative sociology. Its main interest is the social differentiation of meaning, also named collective action orientation frames (Przyborski & Slunecko, 2020; Bohnsack, 2014). This view of social differentiation was adopted by Berger and Luckmann, who stated that “no society known to us that does not have some division of labour and, concomitantly, some social distribution of knowledge” (Berger & Luckmann, 1966:158).

This connects to the aspect of implicit knowledge, which Bohnsack links to Bourdieu’s or Panofsky’s concept of the *habitus*, an incorporated knowledge (Bourdieu, 1977; Bohnsack, 2014), which expresses itself in the way we move or act rather than through rational explanations. Conceptual dualism is mirrored in a differentiation between the ‘what’ and the ‘how’ of any observable practice or artefact, such as maps, images or talks. Therefore, the documentary method proposes first the so-called formulating interpretation in which the contents of practice are being analysed (Bohnsack, 2014). In the case of images, the figurative elements depicted in an image (a city, a man, an object) are analysed. It includes the naming of specific scenes or genres (a party, a landscape, a welcoming scene). Everything should be described and re-formulated in all detail, estranging the interpreter from the contents to suspend their intuitive understanding. This reflects the documentary method’s link to ethnomethodological techniques (Przyborski & Slunecko, 2020).

In the second step, the reflecting interpretation, the ‘how’ of the practice, is analysed. Images are analysed for the way the figures and/or objects have been depicted. This, for example, looks into the colours being used, the geometrical arrangement, or the perspective. Using comparative material is important – if not to say essential – to this second step in order to get more comparing horizons into play than only the researcher’s own imagination. At the same time, this allows the elaboration of the different orientation frames of each case, resulting in a typology in which the practices conducted and the artefacts in which they resulted might not be practically the same but are identical in their structure. The practical

knowledge becomes visible (Bohnsack, 2014). This is called the sense-genetic typology. Another multi-dimensional typification can be reached when looking into social dimensions such as migration or generational background, which might play into the development of the orientation frames (Bohnsack, 2014). In this research, only a sense-genetic typology has been elaborated, linking different structural aspects to each other, which came up during the interpretation process.

Investigating the multi-modal map

While the two-step structure with the formulating and reflecting interpretation is also found when it comes to the analysis of visual material, the analysis, details need to be adapted to the inherently different logic of images as a form of communication. The most crucial difference between texts and images is between sequential and simultaneous logic. While in an interview, the meaning is unfolded in the sequential steps of the interview, the image reveals its meaning all at once, as art historian Max Imdahl states (Bohnsack, 2009; Montanari, 2020).

Also, the characterization of the image as a two-dimensional object must be considered. Therefore, again relying on art history methodologies, Bohnsack proposes the analysis of three aspects of the formal composition of the image: the planimetry, which refers to the geometric composition of the image; the scenic choreography, referring to the spatial relation of the objects depicted; and lastly, the perspectivic projection, which looks at the relation between the objects depicted and the viewer (Bohnsack, 2009).

When it comes to maps, just as with images, we have to account for their specificities; while it is a visual object, it usually also contains texts and data. Therefore, the analysis of maps needs to be adapted to fit their specificities as a special kind of infographic, which, according to French cartographer Bertin, is “a ‘language’ for the eye” that aims at “storing, understanding, and communicating essential information” (Bertin, 2011 [1983]:2). Bertin defines maps as objects in which “the elements of a geographic component are arranged on a plane in the manner of their observed geographic order on the surface of the earth” (Bertin, 2011 [1983]:285), and clarifies that text is no necessary part of maps, while the “arrangement of geographic components” and the plane which refers to the visual representation of a two-dimensional object are an integral part of them.

As a base to evaluate and analyse different elements of a map, the practical guide to map-making of John Krygier and Denis Wood has been used. They differentiate between the data, the geographic framework (scale, projection), the layout and design aspects, data generalization and classification, symbols, words, and colours (Krygier & Wood, 2011). All these elements of a map are included in the proceeding steps of the analysis, which were sorted into three map dimensions, taking into account the map’s multi-modality: data, image qualities, and textual elements (Table 1).

Table 1. Steps of analysis for maps

Formulating interpretation		
Image	Texts	Data
<ul style="list-style-type: none"> • Pre-iconographic interpretation • Iconographic interpretation 	<ul style="list-style-type: none"> • Topics • Reformulation • Selection of texts for comparison 	<ul style="list-style-type: none"> • Phenomenon • Data source • Form • Spatial reference
Reflecting interpretation		
Image	Texts	Data
<ul style="list-style-type: none"> • Iconic interpretation (planimetry, centralization, symbols, blurriness, colours, scenic choreography, projection, scale) • Spatial interpretation • Iconology-iconographic interpretation 	<ul style="list-style-type: none"> • Types of texts • Organization of texts • Typography • Semantic interpretation 	<ul style="list-style-type: none"> • Data representation • Classification • Generalization
Typology		

The six maps analysed for this research have gone through all the steps, even though for the more detailed comparison presented in this article, only three maps are discussed in detail and used as examples for the kind of interpretation that came out of the first two analysing steps. The sense-genetic typology relied on the analysing result of all six maps.

The Cartographic Depiction of the COVID-19 Crisis in Mexico

At the start of the pandemic, in Mexico, as in other countries worldwide, world maps dominated the coverage. As the discussion was still about singular COVID cases, the virus spread from country to country, again with only isolated cases being detected. The global maps alone were enforcing the idea that this was a global, transnational problem. At the same time, it still referred to national states as power containers and as the individual unities affected by the virus. The focus on global maps changed as soon as the first cases appeared, and the spread over national territory began. In Mexico, the Secretary of Health began early with daily reports on COVID-19, even before cases were confirmed in the country. In these reports, not only a world map was included but also a national map that indicated federal states with suspected cases. Figure 3 shows two suspected cases on February 28, 2020, with the first definite case of COVID-19 in Mexican territory being confirmed later that same night.

The thematic information that is depicted on maps in Mexican news outlets is broad. For example, they visualise the number of cases per 100.000 inhabitants, the epidemiological state the federal states are in (in Mexico, similar to a traffic light: red, orange, yellow and green), absolute numbers, or the dynamic of the spread (increase, decrease). In some cases, maps are also used to localise only some federal states that are characterised in more detail (such as in the second map in the collage of Figure 4). In many newspapers, they dominated the infographic section of the COVID-19 coverage. The maps were and are updated

on a daily basis (at least during weekdays), contributing to an enormous number of individual maps being produced during this pandemic (even if only differing slightly by the day). Academic maps showcased how the pandemic first affected cities in Mexico and, in its course, hit regions with high vulnerability hardest, such as the country's North and South (Suárez-Lastra et al., 2022).



Figure 3. First page of Mexico's Secretary of Health daily reports on the new coronavirus, February 28, 2020
Source: SALUD (2020a)

For this study, almost two dozen maps of the COVID epidemic in Mexico were collected in June 2020. The criteria for the map selection were: (1) to include some maps that use the same database on the same or similar day (in order not to analyse differences that were due to data differences), (2) to cover a broad range of illustrating styles (therefore different newspapers), (3) to include online and printed versions, assuming both sources are used by people in everyday life in order to get informed, and (4) maps that were produced by other institutions than

newspapers but sometimes reproduced by smaller outlets or seen in the news coverage on TV (such as the maps presented during the daily press conference of the Secretary of Health).

The maps were specifically collected in printed and online newspapers on the 23 and 26 of June 2020 (Tuesday and Friday). The newspapers included titles such as *El Economista*, *Reforma*, *El Universal*, and *Excelsior*. Smaller local newspapers such as *Metro* or *El Sol de México* were considered, but they did not include any maps (neither on their homepages). The homepages of the more prominent national newspapers as well as mere online publications were checked. The map appearing when searching *covid-19 cases Mexico* in Google was also collected for the original search.

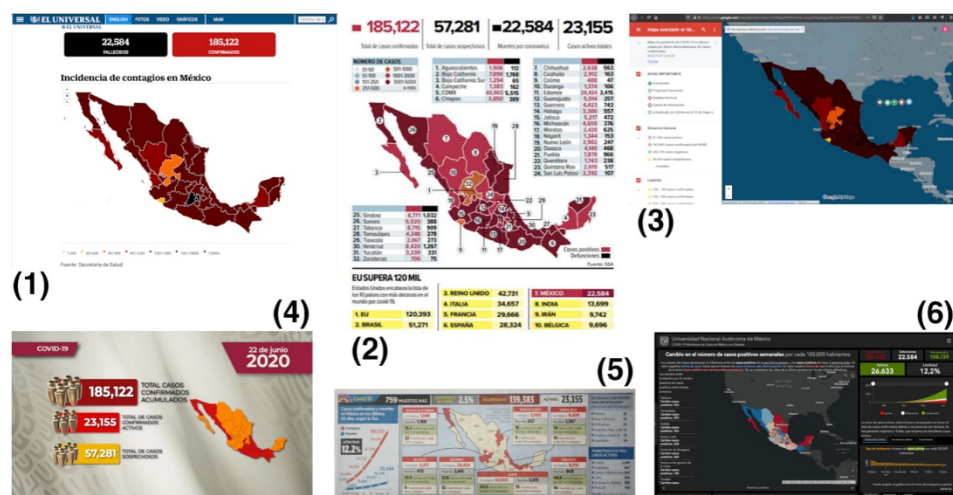


Figure 4: Selection of six online and print maps of the COVID-19 epidemic in Mexico, 23 and June 26, 2020

Sources: *El Universal*, 2020; Rodríguez Calva, 2020; GoogleMyMaps, Salud 2020b; *Reforma* 2020; UNAM 2020

Maps that met at least three of the above-mentioned criteria came up to six (Figure 4). All of them were individually analysed in full detail and are the basis of the typology presented in the last empirical section. The presentation of the first two analysis steps focuses on the comparison of only three maps to exemplify the interpretation process. Those three maps were the only ones that used the exact same database for the map itself (the three maps in the first row in the collage of Figure 4(1-3)). The maps are the following: Figure 4(1) a map published in an overview article published online by the newspaper *El Universal*, Figure 4(2) an infographic with a map published online and in the printed version of the newspaper *Excelsior*; and Figure 4(3) a map that was linked as a thumbnail on the homepage of the newspaper *La Jornada*.

This last map is a specifically curious case since *La Jornada* did not create its own maps of the pandemic. In the first months, *La Jornada* linked online to the map analysed here – created by an independent user on the platform GoogleMyMaps. Since this map was discontinued in the course of 2020, *La*

Jornada included online the map provided by Johns Hopkins on its coverage (similar to Figure 4(6)). The printed newspaper of La Jornada almost never features any infographics, so in general, it is a very text-loaded newspaper using only photographs to accompany its articles. For a far-reaching news outlet, it might be an exception in not creating maps, but this is due to its overall design style, generally abstaining from the use of infographics.

Results and discussion

The outcome of the analysis will be presented in three parts which reflect the analysing steps of the documentary method: the formulating and reflecting interpretation and the typology generated. Therefore, in the first part, the formal aspects of the maps will be discussed, using the details of analysis for three maps. In the second sub-section, their visual arrangement and design differences are analysed. The final part introduces the typology of maps which was developed based on the results of the complete analysis of six maps.

Formal aspects of the maps

Communalities and differences in the maps' content will be the main topic of this first empirical section. The leading question is: what is to see and read on the map?

In the first three cases, we recognise a map of Mexico that is either used as an infographic or as an interactive internet map. Two of the maps have interactive elements (Figure 4(1) and Figure 4(3)) and let the viewer at least zoom in – Figure 4(3) even has symbols indicating that there is something to click on. Figures 4(1) and 4(3) have a menu included that specifies them as maps published on the internet. Figure 4(2) was also used in online articles but as a fixed image graphic and as such, was also included in the printed newspaper version. It lacks any menu features. All three maps use the same kind of data published by the Ministry of Health (abbr. 'Ssa'). In the case of Figure 4(3) some different counts are featured in the text part of the map; also, the cited source is not Ssa (the Health Ministry), but INDRE, the government epidemiological institute overseen by Ssa. They are choropleth maps visualising the number of confirmed COVID-19 cases in the federal states of Mexico, indicating a varying intensity of the phenomenon. The minimalistic map by El Universal Figure 4(1) is integrated into the article, featuring only two numbers on top before the title. It has a small legend on its bottom. Figure 4(2) by Excelsior has no title and is part of more numbers and lists, which are arranged around the map. The map itself also includes numbers, which refer to the list and the federal states. A legend is presented on the above left, and the source is named (Ssa). The map published on Google and linked to by La Jornada Figure 4(3) separates the map itself on the right from the legend, further explications, and numbers on the left. The title is cut off, also indicating that it is a flexible online publication whose visualisation in part depends on the display at the viewer's hardware. This map uses the familiar design of

GoogleMaps (also, it is published on a platform by Google, GoogleMyMaps, which allows users to produce simple thematic maps themselves). Also, the sea and other land masses (Middle America and the USA) are depicted on the fringes of the map. It furthermore includes some names of states, cities, or countries. The map by Excelsior also includes numbers specifying the countries.

While all three maps feature the same kind of data (categorized absolute numbers of COVID-19 cases in the federal states), they differ in the amount of textual explanation they give within the image. Only one map (El Universal, Figure 4(1)) has a title, which is positioned as the title on the upper part of the map. Excelsior does not give the infographic a title, while Figure 4(3) is accompanied by an incomplete title. All three images include information on their source. Figure 4(1) and Figure 4(3) are interactive and can be zoomed into. In general, Figure 4(1) is more minimalistic as well as formal; Figure 4(3) is the most formalistic one featuring a very extensive legend; Figure 4(2) is less formal but also includes numbers and is surrounded by generally more textual and numeric information.

Reflecting the map: Visual arrangements of spatial differences

The leading question is how the visual, textual and data information is arranged (see methodology section). This part will focus on the results of the reflecting interpretation, describing the most important commonalities as well as notable differences in the planimetry, colour schemes, scenic choreography, semantic interpretation, and the showcasing of spatial differences.

Planimetry

Figure 5(1) by El Universal features a very simple planimetry. It consists of only two lines: an upper, horizontal one and one diagonal from the upper left to the lower right. The field lines follow the contents, thereby fixing the view statically on the map itself. Figure 5(2), on the other hand, is characterised by also simple field lines that are accompanied by an oval area containing the map itself. The lines create areas with contents, keeping the view of the audience on the map's specific areas, tables, or numbers. Contrary to such a rather stabilizing arrangement are compositions that guide the viewer through the visual image – which is the case in Figure 5(3). The map published on GoogleMyMaps and featured on La Jornada features three dynamic lines, which all start from the upper left. The first vertical one separates the text-focused part of the legend from the map; the other two lines frame the landmass of Mexico within the map. This area is also where the most is happening – it includes another visual legend and the coloured territory of Mexico. Therefore, this map creates areas but also guides the vision from the upper left and the textual parts (starting from the map's title) to the map itself. It creates attention to the textual part as important, almost independent information while also bringing visual attention to the map itself.



Figure 5: Planimetric composition of the maps 1-3 (left to right)
 Sources: El Universal, 2020, Rodríguez Calva, 2020, GoogleMyMaps, 2020

Colours

All three maps are choropleth maps, using a (black-to-)red-to-orange colour scheme indicating the number of cases. In all examples, red is a dominant colour, which is oftentimes associated with danger and is generally a colour of extremes (Adams, 2017). In the map published by El Universal, the red of the map is accompanied by a black-red antagonism in the upper part of the image, where the two boxes with the numbers of the deceased and the overall COVID-19 cases are presented. The background is white. Therefore, the general colour scheme of the image appears to be rather clean. The red in the second map by Excelsior is accompanied by more colours, most notably black (for some numbers and the texts) and light blue used for the lists. In the lower part, we also see some yellow colours for the separate list of the countries with the most deceased persons due to COVID-19. Here, the different colours are used as a visual organizing tool in a variegated image. Figure 5(3) is also dominated by red, which is not only used for the choropleth map but also for highlighting the title of the map as well as for organizing the legend on the left. Apart from red, there is a clear distinction between the white background used in the legend on the left and the blueish areas of the map, which indicate other land masses besides Mexico and the sea (in darker blue). The red of the map can be even better distinguished from the rest of the image.

The choice of colours, as well as the categorisations of the absolute numbers within the maps themselves, and the colour structure of the federal states, leave a slightly different image with the viewer: El Universal (Figure 5(1)) is characterised by somewhat contrasting colours within the red colour scheme – it ranges from yellow (the state Colima on the Pacific coast) to black (Mexico City and the surrounding State of Mexico). The differences between other states are only lightly noticeable; the focus lies on the dark Mexican Valley and some more positive cases in the northern parts.

In general, it communicates a centre-vs-rest-of-the-country logic. Similarly, Figure 5(3) also features stark contrasts, which are more focused on a brighter north and dark south-east (black-coloured states include not only the Mexican Valley but also Veracruz, Puebla and Tabasco). The darker parts of the country are not even readable; the situation appears rather dramatic or of a rather stark

difference within the country. The exception in the South is the state of Campeche, which gets a bit lost because there is a lot of text surrounding it. Figure 5(2), on the other hand, presents a balanced red colour scheme, reaching from dark orange to dark red. Lighter colours are seen in the north, while the south appears rather dark. Mexico City does not appear in such a dramatic colour; it is still noted as red. The whole image appears balanced; the whole country appears to be affected.

Scenic choreography

The map of El Universal (Figure 5(1)) is framed by the title, the legend as well as the two boxes with numbers. The map itself is centred; the rest appears simplistic. This is not the case with Figure 5(2) by Excelsior, characterised by a complex organization featuring the map in the centre, surrounded by tables (as well as a legend in the same design on the left), titled by four numbers, and on the bottom complemented by another table and text (which is slightly separated due to the black line on the bottom of the map). Numbers are included within the map, which link to data in the tables. The image is full of information, with some apparent order (national data in the upper part, the tables of all states in the tables, and the map in the centre). Figure 5(3) also centres the map itself due to the darker colours. But the stark contrast to the legend also gives some weight to the individual textual part of the overall image while at the same time giving visual priority to the heavily coloured map on the right.

Semantic interpretation

Very noticeable in the textual part of all maps is the use of different words for the same phenomenon. Only two maps include titles: El Universal titled its map “Incidencia de contagios en Mexico” (“Incidence of contagions in Mexico”), the La Jornada map (Figure 5(3)) opted for “Mapa avanzado en tiempo real” (describing the process of map-making, which supposedly is actualised in real-time), beneath the title the content of the map is described as “Mapa de pandemia del COVID-19 en México” – a very general description of what its cartography is about. The Excelsior map (Figure 5(2)) does not even have a title and just suggests it is clear what is to see in the map – darker colours indicating that the virus is being observed with more intensity. In general, this map uses a rather abstract language, which is not very visual in itself – the use of “casos activos” and “casos confirmados” refers to the abstract case file of infected persons or simply the act of confirmation – also a bureaucratic act.

The map of EL Universal, on the other hand, uses a slightly more visual language but is still quite formal. “Fallecidos” (engl. ‘deceased’) refers to individual persons, as does the word “confirmados”, and leaves it open if it refers to cases or persons. In the example of Figure 5(2) by Excelsior the language touches emotional terrain – here, it is “Muertes” (engl. ‘cases of death’), seemingly a formal word as it not links to persons. But the association with “death” makes it a visually strong word, almost sensational. At the same time, in this image, the

words “defunciones” (‘fatality’) and “decesos” (‘deceased’) are included – the variant makes the texts more diverse and hints at an intent to touch emotionally.

Mapping types which suggest different relations to the reader-viewer

A more general pattern is revealed in the way the image relates to the viewer/reader, or consumer of the image. The total of the visual arrangement, as well as the textual company to the image, implies different interpretations of what this map is supposed to be for the reader and what kind of cognitive processes it is to generate. By that, it implies notions of a specific relation between the reader of the image and its producer (which, in the case of news maps, is a collaborative author composed of graphic designers, journalists, and editors).

Firstly, the maps analysed can be differentiated into two categories – of which the second one can be separated into two further types. The first type is a map to see something; the other one is a map to read information. The last one can be further differentiated into maps to study and maps to refer to. This typology was not only based on the interpretation and analysis of the three maps presented in the section “Reflecting the map: Visual arrangements of spatial differences” but was also developed by contrasting those to the three other maps included in the analysis (Figure 6).

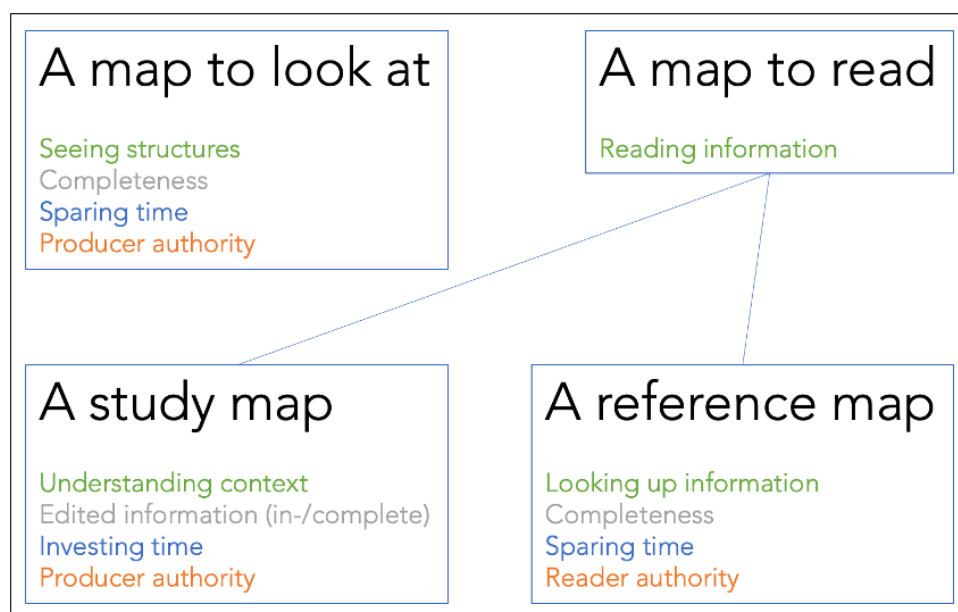


Figure 6. Map typology
Source: Author's analysis

There are four aspects that differentiate the maps: the cognitive process they apparently nudge the reader into; the kind of information they carry; their usefulness for the reader; and the relationship between the producer and reader/viewer they suggest.

What should the reader do with the map? Implicit suggestions by design

The image makes it easy for the viewer/reader to understand a specific cognitive activity in which to engage. If the topic appears interesting to the reader and there is already a level of motivation to engage more with the image/map, two activities can appear: (1) one is to view the map and see structures. Looking at the map, the viewer sees a map of Mexico's national territory and sees differences – some states are hit harder than others. The viewer will probably recognize some of the states and get some information out of this structure itself. (2) A second and different activity suggested by the map arrangement is not to see but rather to read the map and its accompanying information. It relates to a process rather than a piece of information. Further differentiating this activity, one is to study the map and its details to understand the context, while the second comes down to looking up information provided for the reader-viewer.

What does the map contain?

The maps also differ in the kind of meaning or knowledge they contain. When “seeing” the map, the information it contains is complete. In this case, the maps deal with data provided for each state within the Mexican territory. The complete information lies behind the visual, which produces a specific structure revealing some spatial ‘truths’ about the physical territory. Similarly, the reference map contains comprehensive information, but in this case, it does so to provide the information you personally might be interested in. The information in the study map, in contrast, is not complete but rather edited to give you an insight you might only see when properly analysing the map – therefore, the producer edited/changed the original data to produce something interesting to the one studying it. This makes the information more complex but also supposedly lets you learn some context about the information presented.

What usefulness does the map have?

When it comes to the question of why someone should read a specific map, the motivation the viewer's map indicates is to save time – an image lets you see a structure. The map's reader needs an investment of time to understand the information provided and learn about the context. The reference map saves the reader time as it is not to understand/read in completeness but rather used for looking up information the reader lacks in that given moment.

Who is the one in charge?

The maps also differ in where the authority of knowledge/information lies. The ‘map to see’ provides a visual structure thanks to the producer of the map. The reader gets to read visual information that allegedly is intuitively understandable and therefore does not need more information or explanation accompanying it. The reference map, on the other hand, gives authority to the reader-viewer. It provides the information, but the reader-viewer chooses which information to look up. In the study map, even if giving the reader/viewer time to consider and understand the information provided, the authority lies with the producer. It is

them who edited the information to give you some interesting insights into the topic. Incomplete information suggests that other cases were not interesting or relevant. Complete information has been transformed into something interesting that lets you understand some context of a map – you need to trust the producer and their expertise.

There are two kinds of maps, which differ in whether they are for seeing something at a glance or if they require some reading – either to study it or to look up information. The map to look at offers you the possibility to recognise visual patterns in a familiar way – the Mexican territory, in this case. It contains complete data, producing a visual pattern that you can recognise just by looking at it – with almost no need to read explanations; therefore, you are supposed to save time. For the exact same reason, the authority in the interaction process lies with the producer who chose the data and made differences visible to the viewer – and only included the image in the newspaper in the first place. An example is Figure 4(1) by *El Universal*. It has a title and implies the viewer understands the information immediately. It is included in an article but works as an independent infographic. The other example is the map by *Ssa* (Figure 4(6)) which does not even include an explanation of the map, indicating that the viewer knows what to see, giving relevant information. The last example is Figure 4(3) (*La Jornada/GoogleMyMaps*), which contains a lot of background data one could study but it is given as just that, as background – the focus lies on the map itself and its appearance.

The map to read has two sub-categories. The study map needs the reader/viewer to invest time to understand the complex information that the map contains. The information is openly edited to provide interesting information; the authority, therefore, lies with the producer. The information can be complete (Figure 4(6), published by UNAM), but it still needs you to invest in understanding what the colours exactly mean; also, it is accompanied by much more information; the map is only one of several graphics. The ‘map to refer to’ does not hint at the visual differences very much (Figure 4(2), by *Excelsior*) but rather provides the information you can look up. In Figure 4(2) by *Excelsior*, the exact numbers accompany the map. Interested and motivated readers can save time looking up information that is important to them. At first sight, the authority on what to take from the map lies with the reader/viewer.

Concluding the empirical section, it is important to point out that these types do not say anything about how the maps are used, as this was not part of the analysis. It is an empirically grounded typology which considers the visual characteristics of the maps that came up during the analysis and were abstracted in the course of a hermeneutical interpretation analysis. It is also not a concluding typology and is likely to be modified when adding more maps to the analysis or when referring it to other typologies, which would be the result of different hermeneutical research.

Conclusion

This contribution started off with the observation of maps being an important visual medium accompanying the public discourse of the COVID-19 pandemic. It is and will be informing the memory of this historic event on a societal level. While it remains unclear in what way precisely the readings of epidemiological maps interact with other aspects of our collective knowledge of how society works and how maps resonate with different groups of society, this research is the first try at understanding what the maps themselves try to communicate. Other than the typology of COVID maps presented by Guallart & Moreno (2020), which relied on formal aspects and the maps' audience, the one shown here serves the aim of understanding the implicit knowledge of the cartographic practice. They sensitize for different readings of maps with the same data, provoked by their design. It also investigates how formal aspects of the map, data, and text can make a difference in reading it.

In the typology presented, four dimensions came up, which relate to various discussions in the fields of critical cartography and social geography. The first question tackles the cognitive process – viewing or reading, studying or referring to – that is allegedly ignited. If one is looking up information or studying a map, it refers to the question of what kind of information or knowledge a map contains and in what mode of communication they work. As it has been pointed out when comparing the logic of text (sequential) vs the logic of the image (simultaneous), the map (as the kind of maps analysed here) follows its own logic as it assembles mathematical knowledge, visual knowledge, and textual logic. Maps themselves might, therefore, even be an interesting case to avoid either logocentrism or iconocentrism (Traue et al., 2019), and rather understand how these mediums interact with each other.

These different materialities (Egbert, 2019) and their specific assemblage provoke different cognitive processes in/with the viewer/reader. It can be seen as a communicative form (“Gattung” in German sociology) (Knoblauch, 2013) with its own social order (Przyborski & Slunecko, 2020). At the same time, how this (or any other form) is conducted, hints at a different social order at some other level. The categorisation of maps to read, view or study could therefore be seen as different map sub-genres (with the broader field of epidemic spread maps). Each sub-form assembles the data, the text, and the image of the map in its own way.

Depending on how these three formal aspects are related to each other within the maps, the maps showcase different postures of what they communicate, how they should be read, how they relate to the producer and the viewer/reader, and what their usefulness is. This does not mean that these maps do, in fact, save the reader/viewer time or that the authority of the cognitive process lies with the producer, as the information/the knowledge is always curated and interpreted beforehand – even if their style proposes a neutral posture. Or as Denil (2016:16) puts it: The map makes a rhetorical argument on its “use (what the map is for), usability (how it can be used), and believability (why it should be used)”. It is important to add the aspect of “who is in charge”.

Therefore, the types presented here should be understood as a suggestion on how they implicitly communicate through their design. The results of this study link to calls for more cartographic literacy in times of an emerging 'cartocracy' (Kent, 2021).

Questions of how the maps actually interact with the viewer/reader and what kind of cognitive processes they provoke are topics for different types of research. One example might be cognitive-psychological investigations into how the perception of personal/societal danger changed when looking at maps about the COVID-19 pandemic (Thorpe et al., 2021). Another example might be how the implicit argument the maps make about the relevance of the territorial nation-states is used in broader public discourse, possibly contributing to the territorial trap in policy discourse leading to nation-centred reactions to the pandemic and neglecting solutions that tackle the social, economic, cultural, and epidemiological mechanisms at work on a global level.

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