

LINES, WHEN TO STRAIGHTEN THEM? FROM *FORMAL* *MAPMAKING* TO *SUBJECTIVE MAPPING*

Vinicius Sodré Maluly¹

Universidade de Brasília (UnB)
Brasília, DF, Brasil



Enviado em 23 mar. 2024 | Aceito em 1 out. 2024

Abstract: Maps are a frequent focus of research and debate in a variety of areas. Analysis on basic cartographic components and symbols is frequently found in these discussions, but in a formal aspect. In this research, the line, as a key-component for representation of space itself, is analyzed in an epistemological aspect. After presenting the central arguments that revolve around the curved and the straight line, the impacts of modernity, and the interactions between lines and dots, we propose to address the role of the line and how it performs in two contrasting perspectives: formal *mapmaking* (traditional cartography) and subjective *mapping* (spontaneous spatial representation). The main question is: besides its uses in cartography, can we also use lines to represent the individual and its perception of space?

Keywords: Lines, mapmaking, mapping, perception, cartography

LINHAS, QUANDO ENDIREITÁ-LAS? DO MAPEAMENTO FORMAL AO MAPEAR SUBJETIVO

Resumo: os mapas são um foco frequente de pesquisa e debate em diversas áreas do conhecimento. A análise dos componentes e símbolos cartográficos básicos é frequentemente encontrada em tais discussões, mas em um aspecto formal. Nesta pesquisa, a linha, como um componente-chave para a representação do próprio espaço, é analisada sob um aspecto epistemológico. Depois de apresentar os argumentos centrais que gravitam em torno da linha reta e da linha curva, os impactos da modernidade e as interações entre linhas e pontos, propomos abordar o papel da linha e seu desempenho em duas perspectivas aparentemente contrastantes: mapeamento formal (cartografia tradicional) e mapeamento subjetivo (representação espacial espontânea). A questão principal é: para além de seus usos na cartografia, podemos também usar linhas para representar o indivíduo e sua percepção do espaço?

Palavras-chave: Linhas, mapeamento, mapear, percepção, cartografia

LES LIGNES, QUAND LES REDRESSER ? DE LA REPRÉSENTATION CARTOGRAPHIQUE FORMELLE À LA CARTOGRAPHIE SUBJECTIVE

Résumé: Les cartes sont souvent au centre des recherches et des débats dans de nombreux domaines. L'analyse des composants et symboles cartographiques de base se retrouve fréquemment dans ces discussions, mais sous un aspect formel. Dans cette recherche, la ligne, en tant que composante clé de la représentation de l'espace lui-même, est analysée d'un point de vue épistémologique. Après avoir présenté les arguments centraux qui tournent autour de la ligne courbe et de la ligne droite, les impacts de la modernité et les interactions entre les lignes et les points, nous proposons d'aborder le rôle de la ligne et ses performances dans deux perspectives contrastantes : la cartographie formelle (cartographie traditionnelle) et la cartographie subjective (représentation spatiale spontanée). La question principale est la suivante : outre son utilisation en cartographie, peut-on également utiliser les lignes pour représenter l'individu et sa perception de l'espace ?

Mots-clés: Lignes, cartographie, cartographie, perception, cartographie

Introduction

The study of symbols and their uses as a “cartographic code”, (METZ, 1971, p. 746) has been recurrent among scholars from different areas of study who often focus on the so-called “historical cartography”. An example of the breadth of this area of research is “The History of Cartography” series, published by the University of Wisconsin since 1977 and having, for the latest edition, the sixth volume, which was published in 2015. The first editors were David Woodward and John Brian Harley and the last Mark Monier². There are also recurring collections dedicated to old maps that aim to curate and make them accessible (often online and in high resolution). These initiatives can be private, such as the David Rumsey Historical Map Collection³ or public, such as the BN Digital⁴ or the “Département des cartes et plans” from the Bibliothèque Nationale de France⁵.

As stated, the specialists in maps, their printings, and their symbols are numerous. As Robin Butlin points out, “The language of maps, including the form of reproduction of the names of places, is an important and interesting object for investigation (...) The older the map, the more necessary does it become to contextualize and decode its meanings and its symbolism” (BUTLIN, 1993, p. 90–91). For those more dedicated to old maps, some world renowned examples are the works of the aforementioned David Woodward (1975) and John Brian Harley (2001), of Jaime Cortesão (1969), of Gilles Palsky (1996), and of José Omar Moncada Maya (2018). As classics of the discussion of cartographic representation, we must mention Edward Tufte (1983) and Jacques Bertin (1967), as well as Mark Monmonier (1996), R. P. Misra and A. Ramesh (1989), and Hervé Thery (2005). There are also scholars, since the 1990s, who bring the critique of cartography and the representation of space to current technologies, such as Jeremy Crampton (2007), John Krygier and Denis Wood (2005), and David Martin (1996).

However, the debate presented in this text does not reside in what is understood as historical cartography. Although we seek a discussion related to a symbol present in virtually any map – the line –, we aim for an epistemological argument, based on interlocutions promoted by interdisciplinary authors focused on the map as language and representation. That would be the example of Yaïves Ferland (2000), Jean-Marc Besse and Gilles Tiberghien (2017), Carla Lois (2015; 2017), and Franco Moretti (1998). Nonetheless, the geographic implication of the overall discussion is notorious. Even more so when we seek to discuss lines and their uses not only in the cartographic scope, but in the context of the relation between the subject and the reality that is to be depicted. In this matter, we could extrapolate from cartography to the individual perception of objects, what E. J. Green establishes as “structure constancy”, i.e., “seeing objects as retaining properties across certain non-rigid transformations” (GREEN, 2017, p. 3). The perception of an object from the point of view of the subject does not depend on a constant size or shape, but in other forms of retention, such as with axes (human forms recognized through the abstraction of spatial recognition by lines) (Figure 1). This would be the case of a constant visual retention of an object with the use of lines as a foundation of a “one-to-one mapping” (GREEN, 2023, p. 15).

² On “The History of Cartography” project and its publications, see: <https://geography.wisc.edu/histcart/>

³ For more information: <https://www.davidrumsey.com/>

⁴ For more information: <http://bndigital.bn.gov.br/>

⁵ For more information: <https://www.bnf.fr/fr/departement-cartes-et-plans>

Figure 1 – “The medial axis structure of three human silhouettes”.

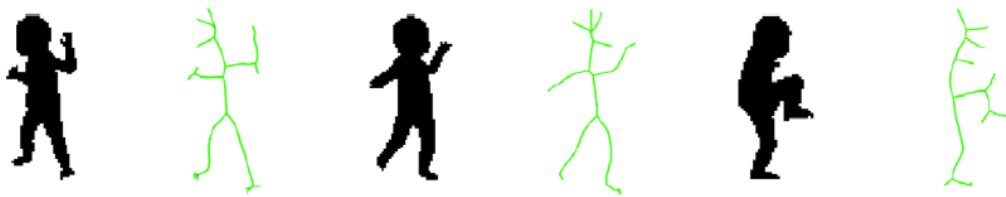


Image from: E. J. Green, “On the perspective of structure” (GREEN, 2017, p. 13).

Nonetheless, we shall discuss forms in which lines appear in what we call “formal *mapmaking*”, cartography *strictu sensu*, and “subjective *mapping*”, spatial perception and representation. Thus, we intend not to avoid the cartographic implications of the argument, but, at the same time, seek a more comprehensive and subjective view of the issue. There are countless high-quality researches regarding maps and their uses throughout the centuries (as mentioned above), but there are also those that bring spatial experience and representation closer to the subject or the individual. For instance, Valerie Mace proposes that “Sensory space is not one homogeneous entity. As we move through space and our senses actively seek information, the information filters into consciousness and gradually we perceive space as a series of arrivals into and departures from nested sensory territories (...)” (MACE, 2018, p. 5). The same goes for Zoë Boden, Michael Larkin, and Malvika Iyer when, in the context of “Interpretative phenomenological analysis”, define experience as “both *perspectival* (it has a point of view, which is situated and embodied) and *relational* (it reaches out and is concerned with the objects of the lifeworld)” (BODEN; LARKIN; IYER, 2019, p. 219).

This paper aims to contribute to the different debates, offering a perspective that may be useful to those more dedicated to cartography or those fond of other forms of spatial perception and representation. These other forms of spatial perception and representation will be exemplified with the possible outcomes of this approach, such as mental maps, drawings and sketches. Lines permeate all these different spatial productions and, in a way, connect them. The question “Lines, when to straighten them?” lies much less in the importance of the line in the different cartographic approaches and much more in the ways in which it can be used. We will also seek to deepen the debate by approaching the use of the line (straight or not) in specific social contexts, linked to the impacts of modernity on the social being and, therefore, the subject “geographically situated” (BAMMAN; DYER; SMITH, 2014, p. 828).

Lines and dots

From time to time, certain questions on maps and spatial representations come up while we are caught in the process of producing and analyzing maps. Lines are always present and catch our attention in different circumstances. May it be on the depiction of certain roads and paths, the lines that come out from a compass rose, or even the lines that structure the frame of a certain cartographical production (see Figure 2).

Figure 2 – Istoria delle guerre del regno del Brasile by João José de Santa Teresa (1698)

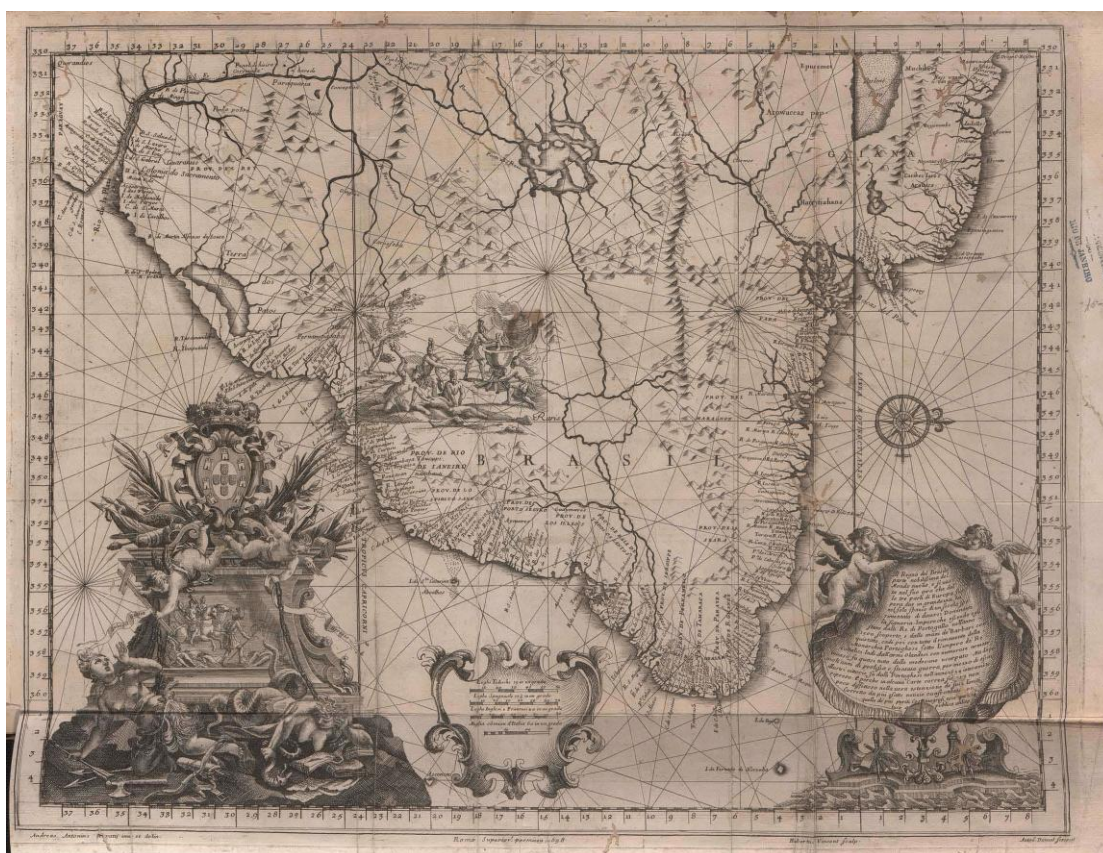
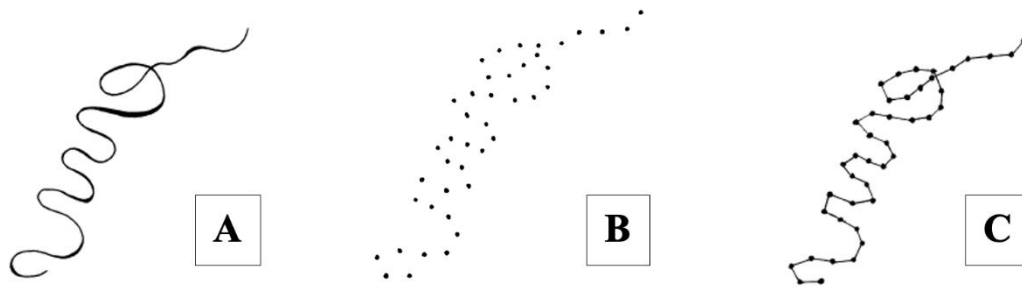


Image from: Fundação Biblioteca Nacional (<https://cutt.ly/PnP88vV>)

Anthropologist Tim Ingold, in 2007, shed some light on how society is based on and reacts to lines. An ecology of life composed of lines, as he puts it in his book “A brief history of lines” (INGOLD, 2007), running from music, to language, from writing to literature, from sewing to cartography. His arguments will vary from topic to topic, but, essentially, the world and society are composed of lines. To see and to understand this is a task based on trying to figure out the world in a much larger sense, bearing with human activities across the centuries. The third chapter of his book, “Up, across and along”, concentrates, amongst other subjects, on space-representation issues and on the idea that modernity created a certain comprehension of lines. In short, and not trying to oversimplify his intriguing approach to the question, the author wishes to show us that a continuous line (Figure 3-A), an assembly of dots composing a line (Figure 3-B), and a point-to-point line (Figure 3-C), are not the same and do not mean to be the same. Modernity socially shapes our comprehension of things, and we must try to differentiate “walking *along* a path” (Figure 3-A) from “walking *through* a path” (Figure 3-C). The author states: “What we see is no longer the *trace of a gesture* but an assembly of *point-to-point connectors*.” (INGOLD, 2007, p. 74–75)

Figure 3 - Traced lines, dotted lines, and point-to-point connected lines



Images from: Tim Ingold, "Lines: A Brief History", 2007: 72–74.

Modernity is presented to us as a main character in this history of lines. A transformer of the curved and sinuous lines into the straight and lifeless ones that we are more than used to. Marshall Berman states that "To be modern is to find ourselves in an environment that promises us adventure, power, joy, growth, transformation of ourselves and the world – and, at the same time, that threatens to destroy everything we have, everything we know, everything we are" (BERMAN, 1988, p. 15). Harvey adds "that the only secure thing about modernity is its insecurity" (HARVEY, 1990, p. 11). Modernity would be, at the same time, a propeller of lines and a condition of their downfall – at least as a representation of organic movement. The modern logic would be located at the newly founded core of this relation between lines and dots, curiously reproducing heavily the use of the line, but in an uncharacterized form. A dialectical imbrication between modernity and the use of lines.

Production lines, in the industrial post-1945 scenario, were a force to be reckoned with. Harvey affirms that "The belief in linear progress, absolute truths, and rational planning of ideal social orders under standardized conditions of knowledge and production was particularly strong" (HARVEY, 1990, p. 35). The same was encountered in architecture and planning: "a prevailing passion for massive spaces and perspectives, for uniformity and the power of the straight line (always superior to the curve, pronounced Le Corbusier)" (HARVEY, 1990, p. 36). On this subject, Laurent Vidal presents to us the importance of the chronometer and the "social power of the clocks" in the building of a modern and industrial world (VIDAL, 2020, p. 105–106). When dealing with a modern ideal of maximization of production, there would be a "fascination for speed", opposing the "slowness and resistance" to the "almighty power of the straight line" (VIDAL, 2020, p. 133; 195).

Lines and dots?

Addressing Ingold's reasoning on the relation between lines and dots, if we request someone to trace a line between point A and point B, not knowing at all the supposed path between both points, what would be the answer? (Figure 4) Effectively, the answer to this question may also be the beginning of the answer to what we propose to be the difference between "formal *mapmaking*" and "subjective *mapping*".

Figure 4 - Unknown connection between point A and point B

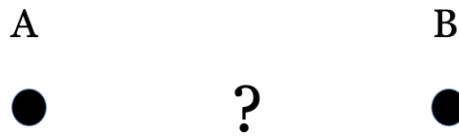


Image: author

Assuming that maps are representations of a territory and that "Maps are arrays, in that they are typically two-dimensional, connected sets of points that represent, point for point, some other connected two-dimensional set of points" (CASATI; KULVICKI; ZEIMBEKIS, 2020, p. 2), we can state that maps are composed, essentially, of connected points. Komedchikov (2005, p. 3) goes a bit further in saying that the signs of a map "are shown by means of qualitative and quantitative background, areas, isolines, dots, collations, lineal signs, and movement signs", but Delano-Smith (2007, p. 540) breaks it down indicating that "Stripped to essentials, a map sign is an assemblage of lines or dots, and its composition is the way these several lines or dots are arranged or bent to form, for example, a loop or circle".

Harley (1989, p. 84), on the other hand, introduces a critical sense to the discussion, assuring that "the mapping of the past" "requires a double act of mimetic faith. We are always assuming that there is a presence to be reached, an original which we can copy and that our image has established a correspondence with that 'reality'". In fact, with the use of lines and dots, there is a reality (past or present) that maps seek to mimic. The success of a map resides on that achievement. The same can be said on the pretended "accuracy" of a map when Besse (2008, p. 20) affirms that "it is the very nature of the map that prohibits it from being accurate". A map never ceases to be a representation. These concepts are equally found in Monmonier when he sustains that "There's no escape from the cartographic paradox: to present a useful and truthful picture, an accurate map must tell white lies" (1996, p. 1), and that "A good map tells a multitude of little white lies" (1996, p. 25).

Attempting to resolve the question brought up by Figure 4 and presuming that the person that must connect point A to point B has no knowledge of what is in between, she or he will perhaps solve the enigma using a straight line (Figure 5).

Figure 5 - Straight line connecting point A to point B



Image: author

In this scenario, the person drew a straight line to, most probably, avoid any misunderstanding on the represented path. Even if it is a curvy one or a path composed of several lines, the straight line accomplishes the intention of the map, in demonstrating that we can go from point A to point B or that they are somehow connected forming an area, for example. Does this example fall into Ingold's argument that "the line, in the course of its history, has been gradually shorn of the movement that gave rise to it" (2007, p. 75)? And in what instance is it different from Figure 6?

Figure 6 - Curve line connecting point A to point B

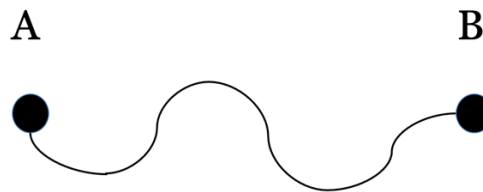


Image: author

We can reflect on this subject based on the “technical certainties” that formal *mapmaking* offers us. For instance, if I wish to go from my house to the hospital, I simply search the name of the destination on my phone and it will show me a route to get there, by foot, bus, or car, and normally the most *efficient* one. That is, my phone will take me there based on a path that has an infinite number of curves, of stops, of turns, but that will be the fastest (and constantly updated depending to any traffic incidents). It will even update its course if needed. But, in a broader sense, Figures 5 and 6 have the same nature and induce equal comprehension, connecting, by the use of lines, point A to point B. We can even consider Figure 5 as merely an oversimplification of Figure 6. The same goes for Figure 7 which refers to Ingold's examples.

Figure 7 - Point-to-point curve lines

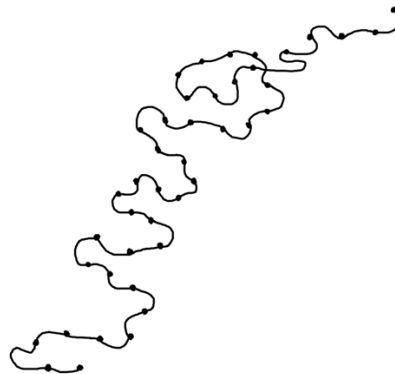


Image: author

Does the depiction of the curves in Figure 7 resolves Ingold's attention on the lack of movement created by modernity? They do not. Their purpose is still the same and the problem remains. It is not the line between the dots (or points) that matter, but the dots (or points) themselves that *require* to be connected. Referring to cartography, Ingold states that the “lines are not traces but connectors” (2007, p. 85). This is, the lines present in formal *mapmaking* are mere connectors of pre-established points, with clear intentions. The lack of movement attributed to modernity is not an esthetic one. The same discussion is presented by Delano-Smith when she ponders over the presumption “that a ‘transformation from paint to line’ distinguishes medieval and Renaissance maps, has proved to be untenable” (2007, p. 549).

Dotted lines abide by the same rules, only changing their pattern and their function in formal *mapmaking*. Delano-Smith notes that, in Renaissance maps, “boundary lines on printed topographical

maps were always shown by means of discontinuous lines. These may have been composed of points (pricks), short vertical lines or pecked lines" (2007, p. 555). Also, the use of color can be associated with the depiction of "territorial units" (2004, p. 3). Portuguese America 17th century maps are a clear example of this (Figure 8-A), also representing pathways with dotted lines (Figure 8-B)⁶.

Figure 8 - A) "Le Bresil" by Nicolas Sanson (1696) and B) "Afbeelding der stad fortressen van Parayba" by Nicolaes Visscher (1635)



Images from: David Rumsey Map Collection (<https://cutt.ly/OnP8rDp>) and Fundação Biblioteca Nacional (<https://cutt.ly/AnP8PFf>)

Therefore, in a modern notion of formal *mapmaking*, lines will normally serve as connectors, indicating "occupation, not habitation" (INGOLD, 2007, p. 85). Tiago Gil, when discussing "the creative language" of Jacques Bertin, between the 1960s and 1970s, defines a series of maps as "contour line-maps" that "show the process through areas separated by boundary lines, as if they were waves, (...) used to indicate social processes" (GIL, 2021, p. 2). Cartography presents, through this network of dots and lines, a political and epistemological appropriation of territory, and this is not unique to historical cartography. Cartograms fall into the same category, changing only the depicted variables (MONMONIER, 1996, p. 16–17). Joe Gerlach, when discussing the idea of cartography as "the drawing and interpretation of a line" affirms that "Straightforwardly, these cartographic lines *perform* (...) lines are performative" and adds that "the line is expected to narrow the gap between reality and representation, so as to make claim to both accuracy and a sense of cartographic verisimilitude in which the map user places their wayfinding trust" (GERLACH, 2013, p. 26). The use of the line, even if "as a kind of generative constraint for movement", is understood as "a crucial element of spatial history, one that goes beyond a critique of the line as a technology of static abstraction juxtaposed to the lived" (MCCORMACK, 2012, p. 725). That is, even if in search of a critical understanding of lines and their transformation/simplification throughout the process of modernity, they are necessary active actors in the cartographic representation of space. So how do we go from formal *mapmaking* to subjective *mapping*?

Maps, mapmaking, and mapping

When Ingold affirms that "My present point is that the gestural trace, or the line that has gone out for a walk, has no business in the discipline of cartography" (2007, p. 85), formal *mapmaking* is ruled out. But what about mental maps, sketches, and drawings? These do not necessarily belong to the realm of cartography, but to spatial perception and representation in a broader sense. Maps

⁶ On this matter, Delano-Smith comments that, in 1500, Erhard Etzlaub's *Romweg* map depicted roads with dotted lines but also distance, "the space between two dots representing one mile" (DELANO-SMITH, 1985, p. 13)

dispose of information and represent them through the conscious or unconscious choices of the cartographer. Mental maps, sketches, and drawings, on the other hand, do not deal with these issues. The cartographer is transformed into any individual willing to represent space as they experience it.

Istomin and Dwyer define a mental map as “a mental representation (model) of Euclidian relations that exist between objects” (2009, p. 30). This notion can be disputed if we consider that there are at least three types of space: absolute, relative, and relational. The first and the second may have a Euclidian nature, but the third does not and could still incur in a mental map (HARVEY, 2006). Harvey deepens the relational aspect of space in association with time: “The relational notion of space-time implies the idea of internal relations; external influences get internalized in specific processes or things through time” (2006, p. 285). Thus, mental maps, as a projection of the subjective experience and perception of space, refer to relational space-time. In 1976, Elspeth Graham already defined mental maps as “the mental filtering and coding of sensory data and is something subjective, private, unique” (GRAHAM, 1976, p. 259). As for sketches, they are not understood here as drafts. That is, a draft or a version of a map is not the same as a sketch. A sketch resides on a spatial indication, drawn seamlessly on any surface (a piece of paper or on a wall), and that, thus, performs subjective *mapping* and not formal *mapmaking*. Finally, drawings, applied within the “Interpretative phenomenological analysis”, are not seen as “a direct representation of experience. The participant *impresses* meaning upon the paper through the act of drawing and offers up an *expression* of the experience for consideration” (BODEN; LARKIN; IYER, 2019, p. 220–221).

Dissonances aside, mental maps, sketches and drawings, in terms of spatial (dis)orientation (FRIEDBERG, 2018), produce lines “formed through the gestural re-enactment of journeys *actually made* (...) They are lines of movement” (INGOLD, 2007, p. 84). This process of subjective *mapping*, be it with sketches or with gestures, interacts with space in a completely different way. Lines are also present in sketches, but they do not intend to appropriate space in connecting pre-established points. They serve as guides and can be easily discarded when their objective is fulfilled. Delano-Smith, to this matter, shows that “the map contains no unnecessary lines, or visual ‘noise’ (...). The lines of a sketch map or a map in diagrammatic style are thus typically smoothed curves or ruled lines” (2004, p. 18). Formal *mapmaking* maximizes the efficiency of lines; subjective *mapping* brings them to life.

This opposition between formal *mapmaking* and subjective *mapping* is, in a way, present in Sébastien Caquard's considerations, based on Robert MacFarlane (2007), between ‘story maps’ and ‘grid maps’ where the former “describe forms of spatial expressions that embody our personal experiences of the environment and contribute to creating a deep understanding of places” (CAQUARD, 2011, p. 136). Martin Dodge, in turn, defines deep mapping as an attempt to “evoke the richness of small places and different kinds of experiences and emotions they can engender” (DODGE, 2016, p. 3). The relational space of which we spoke of is brought to our attention once again when debating on the possibilities and challenges of mapping the experience of the individual concerning space as it presents itself. ‘Grid maps’, on the other hand, would be “a way of suppressing alternative geographical imagination” (CAQUARD, 2011, p. 136). Nevertheless, the author recognizes that “the distinction between the story map and the grid map is blurred by the fact that more and more often they coexist within a common mapping platform such as Google Maps” (CAQUARD, 2011, p. 140).

When evoking the notions of formal *mapmaking* and subjective *mapping*, we do not wish to discuss the map itself. One can refer to digital platforms or handmade confections, regardless. The technical result, variable depending on the time and conditions of production, is not the center of debate at hand. We aim to discuss the spatial intention of those who create the map and the role that lines have in their various performances.

Conclusion: subjective *mapping* as an embracement of reality

So, to try to answer the question “Lines, when to straighten them?”, we could affirm that, in formal *mapmaking*, lines are *straightened out* as connectors between previously conceived dots. In subjective *mapping*, on the other hand, lines do not obey this and represent, in fact, movement. The agency of lines is divergent between the two, since, in the former, they are under the primacy of the points or dots – representatives of the initial intention preceding the cartographic production. In the latter, lines create the map as their movement unfolds.

Some examples come to mind when lines are associated to the *mapping* of subjective experience. When somebody asks us where the nearest supermarket is, we can point it out or give some instructions on how to get there. In our own way, a mental map has just been conceived and shared between individuals, with lines that go, in Ingold’s expression, *along* and not *across* space. To cite Margaret Pearce on this topic: “To mark an individual’s path across a map, regardless of the scale of that map, we draw a line. The problem with that line is that it does not reflect the fullness of the world as we experience it while traveling along a path. Traveling is not a linear sensation but a sense of enclosure by a moving landscape” (PEARCE, 2008, p. 10). The same is put by Djeovani Roos and Cláudio Ferraz when they state that a map cannot be reduced to what is being represented in a given scale, but also to what lies beyond the symbols of the legend. A map is “the agency of these forces, of these lines/bodies that affect each other and point to senses of location and spatial orientation” (ROOS; FERRAZ, 2018, p. 89).

Mary Corey March’s “Identity Tapestry” (Figure 9) redefines the use of lines when *mapping* the subjective comprehension of oneself, creating a visual impact that demonstrates explicitly the movement of life. Citing the artist’s description of her own work:

The piece begins as a blank wall of statements that may be part of identity. Participants select a color of yarn to represent them and wrap it around each statement that identifies them. No statements contradict, some are simple and many are challenging. Intersections between people and patterns become apparent in the weaving. Each person leaves their yarn with its anchoring stone as a mark of their identity as a part of this complex *Identity Tapestry* which is itself a portrait of that particular group of people in that time and place⁷.

The use of lines, in this case, is symbolic in our definition of subjective *mapping*, as they do not connect pre-established dots or points in a modern sense of appropriation. The statements, presented at the wall beforehand by the artist, can or not be chosen by participants. The lines form their personal narrative, in a subjective representation of their own lives. In addition to this, the importance given to the intersection between people and the links that are made by the crossing of the yarns is a notorious overlapping of experiences, both past and present.

⁷ This description and many other details can be found at: <http://www.marymarch.com/identity-tapestry-gallery.php>

Figure 9 - Mary Corey March's Identity Tapestry Iteration #10 (Switzerland, 2016)

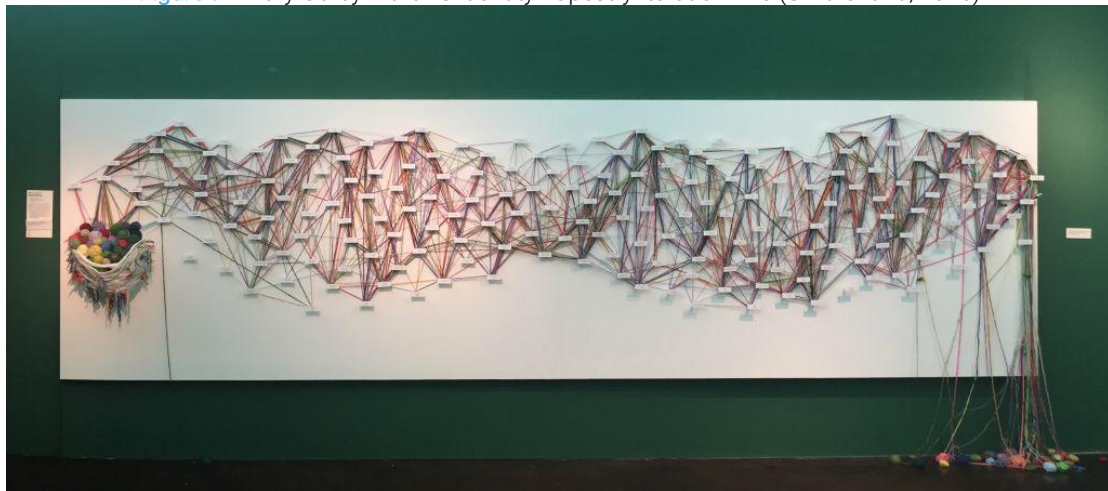


Image from: <http://www.marymarch.com/identity-tapestry-gallery.php>

For a final example of subjective *mapping*, artist Ayako Sato develops a *Personal Memory Mapping*, recollecting, on a 'grid-map', "the everyday lives and cherished attachments of individuals (...)" in order to both reveal and archive the characteristics of that particular area"⁸. With this example, lines come and go from formal *mapmaking* to subjective *mapping*, as they are superposed and interact, forming a synthesis of cartographic and emotional information. The straight lines and their counterparts are both visible and, in this case, complementary.

Figure 10 - Ayako Sato's Personal Memory Mapping

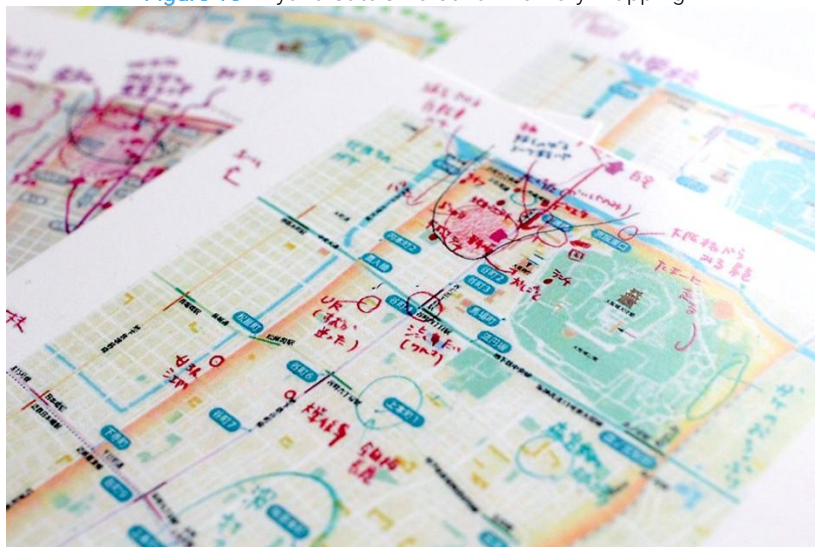


Image from: <https://www.mot-art-museum.jp/en/exhibitions/mot-satellite-2019/>

With the aforementioned examples, which do not belong to the traditional cartographic field of study, we can visualize the broad use of lines in different optics, privileging the perspective of the subject and his/her experience. The map is only a product of this experience and can be redone whenever the cartographer so desires. The lines produced reflect the intention of representing space and can, as we have seen, connect people and places, disappearing soon after to give way to new lines, not necessarily straight, but certainly dynamic and spontaneous.

⁸ Description transcribed from: <https://www.mot-art-museum.jp/en/exhibitions/mot-satellite-2019/>

Bibliography

- BAMMAN, D.; DYER, C.; SMITH, N. (2014) *Distributed representations of geographically situated language*. Proceedings of the 52nd Annual Meeting of the Association for Computational Linguistics. Anais... In: 52ND ANNUAL MEETING OF THE ASSOCIATION FOR COMPUTATION LINGUISTICS. Baltimore, Maryland.
- BERMAN, M. (1988) *All That is Solid Melts Into Air: The Experience of Modernity*. Harmondsworth: Penguin Books.
- BERTIN, J. (1967) *Sémiologie graphique: les diagrammes, les réseaux, les cartes*. Paris: Éditions Gauthier-Villars.
- BESSE, J.-M. (2008) Cartographie et pensée visuelle. Réflexions sur la schématisation graphique. In: LABOULAIS, I. (orgs.). *Les usages des cartes (XVII^e-XIX^e siècle)*. Pour une approche pragmatique des productions cartographiques. Strasbourg: Presses universitaires de Strasbourg, p. 19–32.
- BESSE, J.-M.; TIBERGHIE, G. A. (orgs.) (2017) *Opérations cartographiques*. Arles: Actes Sud.
- BODEN, Z.; LARKIN, M.; IYER, M. (2019) Picturing ourselves in the world: Drawings, interpretative phenomenological analysis and the relational mapping interview. *Qualitative Research in Psychology*, v. 16, n. 2, p. 218–236.
- BUTLIN, R. (1993) *Historical Geography: through the gates of space and time*. London: Routledge.
- CAQUARD, S. (2011) Cartography I: Mapping narrative cartography. *Progress In Human Geography*, v. 37, n. 1, p. 135–144.
- CASATI, R.; KULVICKI, J.; ZEIMBEKIS, J. (2020) Borgesian maps. *Analytic philosophy*, v. 00, p. 1–9.
- CORTESÃO, J. (1969) *História do Brasil nos Velhos Mapas*. Rio de Janeiro: Ministério das Relações Exteriores.
- CRAMPTON, J. (2007) *Mapping: a critical introduction to cartography and GIS*. Hoboken: Wiley-Blackwell.
- DELANO-SMITH, C. (1985) Cartographic Signs on European Maps and Their Explanation before 1700. *Imago Mundi*, v. 37, p. 9–29.
- DELANO-SMITH, C. (2004) Smoothed lines and empty spaces: the changing face of the exegetical map before 1600. In: *Comblant les blancs de la carte : Modalités et enjeux de la construction des savoirs géographiques (XVII^e-XX^e siècle)*. Strasbourg: Presses universitaires de Strasbourg, p. 1–22.
- DELANO-SMITH, C. (2007) Signs on Printed Topographical Maps, ca. 1470-ca. 1640. In: WOODWARD, D. (Ed.). *The History of Cartography*. Chicago: University of Chicago Press, v.3, p. 2272.
- DODGE, M. (2016) Cartography I: Mapping deeply, mapping the past. *Progress In Human Geography*, p. 1–10.
- FERLAND, Y. (2000) Les défis théoriques posés à la cartographie mènent à la cognition. *Cybergeo : European Journal of Geography*, Dossiers, document 148.
- FRIEDBERG, M. (2018) *Geographies of Disorientation*. New York: Routledge.
- GERLACH, J. (2013) Lines, contours and legends: Coordinates for vernacular mapping. *Progress In Human Geography*, v. 38, n. 1, p. 22–39.
- GIL, T. L. (2021) Taking speed seriously: motion, simultaneity, and context in map-making for historical analysis. *Cartography and Geographic Information Science*, p. 19.
- GRAHAM, E. (1976) What Is a Mental Map? *Area*, v. 8, n. 4, p. 259–262.
- GREEN, E. J. (2017) On the Perception of Structure. *Noûs*, p. 1–29.
- GREEN, E. J. (2023) Perceptual constancy and perceptual representation. *Analytic philosophy*, v. 00, p. 1–41.
- HARLEY, B. (1989) Historical geography and the cartographic illusion. *Journal of Historical Geography*, v. 15, n. 1, p. 80–91.
- HARLEY, J. B. (2001) *The new nature of maps: essays in the History of Cartography*. Baltimore and London: University of Chicago Press.
- HARVEY, D. (1990) *The Condition of Postmodernity*. Oxford: Blackwell.
- HARVEY, D. (2006) Space as a keyword. In: CASTREE, N.; GREGORY, D. (orgs.). *David Harvey: a critical reader*. Malden e Oxford: Blackwell.

- INGOLD, T. (2007) *Lines: A Brief History*. New York: Routledge.
- ISTOMIN, K.; DWYER, M. (2009) Finding the Way: A Critical Discussion of Anthropological Theories of Human Spatial Orientation with Reference to Reindeer Herders of Northeastern Europe and Western Siberia. *Current Anthropology*, v. 50, n. 1, p. 29–49.
- KOMEDCHIKOV, N. (2005) The General Theory of Cartography Under the Aspect of Semiotics. *Trans. Internet-Zeitschrift für Kulturwissenschaften*, v. 16.
- KRYGIER, J.; WOOD, D. (2005) *Making maps: a visual guide to map design for GIS*. New York: The Guilford Press.
- LOIS, C. (2015) El mapa como metáfora o la espacialización del pensamiento. *Terra Brasilis (Nova Série)*. Revista da Rede Brasileira de História da Geografia e Geografia Histórica, v. 6, p. 1–27.
- . (2017) ¿Cuándo la geografía perdió su “graphia”? un ensayo histórico y crítico sobre las habilidades gráficas promovidas en la geografía escolar. *GEOgraphia*, v. 19, n. 40, p. 56–74.
- MACE, V. (2018) *Cognitive Mental Space as the Product of Active Sensing*. CFP: Arrivals and Departures: edges, borders, transitions, transitory spaces. *Anais...* In: SPACE AND PLACE RESEARCH HUB. London: London College of Communication, 2018.
- MACFARLANE, R. (2007) *The Wild Places*. London: Granta Books and Penguin Books.
- MARTIN, D. (1996) *Geographic Information Systems and their Socioeconomic Applications*. London: Routledge.
- MCCORMACK, D. (2012) Geography and abstraction: Towards an affirmative critique. *Progress In Human Geography*, v. 36, n. 6, p. 715–734.
- METZ, C. (1971) Réflexions sur la “Sémiologie graphique” de Jacques Bertin. *Annales. Economies, sociétés, civilisations*, v. 26, n. 3–4, p. 741–767.
- MISRA, R. P.; RAMESH, A. (1989) *Fundamentals of Cartography*. New Delhi: Ashok Kumar Mittal.
- MONCADA-MAYA, J. O. (2018) La cartografía de los ingenieros militares. Instrumento para el conocimiento del territorio. *Revista de geografía Norte Grande*, v. 69, p. 9–31.
- MONMONIER, M. (1996) *How to lie with maps*. Chicago and London: The University of Chicago Press.
- MORETTI, F. (1998) *Atlas of the European novel (1800-1900)*. London, New York: Verso.
- PALSKY, G. (1996) *Des chiffres et des cartes: naissance et développement de la cartographie quantitative française au XIX^e siècle*. Paris: Comité des travaux historiques et scientifiques.
- PEARCE, M. W. (2008) Framing the Days: Place and Narrative in Cartography. *Cartography and Geographic Information Science*, v. 35, n. 1, p. 17–32.
- ROOS, D.; FERRAZ, C. B. O. (2018) Cartografias geográficas: o que pode um mapa. *GEOgraphia*, v. 19, n. 41, p. 101–109.
- THÉRY, H. (2005) *Le Brésil*. 5. ed. Paris: Armand Colin.
- TUFTE, E. (1983) *The visual display of quantitative information*. Cheshire: Graphisc Press.
- VIDAL, L. (2020) *Les hommes lents. Résister à la modernité, XV^e – XX^e siècle*. Paris: Flammarion.
- WOODWARD, D. (1975) *Five centuries of map printing*. Chicago: University of Chicago Press.