



INTRODUCTION TO THE SPECIAL ISSUE

MAPPING EMOTIONAL CARTOGRAPHY

Sébastien Caquard
Concordia University

Amy L. Griffin
RMIT University

INTRODUCTION

Maps are somehow shy. They tend to hide their emotional side behind their clear lines, precise points, minimalistic words, numerical data and informative purpose. But when we scratch the cartographic surface, maps appear to be impregnated with all sorts of emotions. The emotions associated with the topic mapped and the ones evoked through the cartographic design. The emotions felt by the mapmaker while drawing the map and the ones felt by the map user when discovering it. The anger and sadness triggered by social injustices revealed on a map, or the simple pleasure felt while admiring a beautiful cartographic design. The emotional experiences we clearly remember and the most common ones we hardly notice or we simply forget. Beneath the surface, maps and mapping teem with emotions of all sorts. In this introduction to the special issue on Maps and Emotions, we will reveal the multiple relationships that exist between maps, mapping, and emotions.

Before looking at these relationships, let's first clarify what we mean by "emotions" in the context of mapmaking. The term *emotion* is often used interchangeably with the term *affect*, since both are generally understood by scholars as embodied experiences. Beyond this commonality there are distinct differences between affect and emotion that vary depending on the disciplinary lens through which each is viewed. While both arise from our interaction with the environment, affects are generally conceived as arising from the body, while emotions are usually linked to the conscious mind and expressed through emotion concepts (e.g., fear, joy, embarrassment). One major disciplinary distinction lies in the relationship between affects, the body, and the mind. For affectual geographers, affects are non-cognitive (Pile 2010), while for neuroscientists affects are the mind's interpretation of the body's physiological state within the world (Feldman Barrett 2017). This differentiation is significant for cartography. For affectual geographers, because affects cannot be conscious, they can be neither expressed nor represented, while according to neuroscientists, affects can be both expressed and represented. On the other hand, both disciplines envision emotions not only as being conscious and representable, but also as being locatable within both bodies and the spatial contexts in which they are felt (Anderson and Smith 2001; Bondi 2005; Feldman

Barrett 2017). Geographical understandings of emotion acknowledge that place and context shape emotions, but also attend to how emotions shape space and place.

In this paper we review the relationships that exist between maps and emotions from a geographical perspective. This review is organized through three main themes: (1) the emotions that we place on maps; (2) the emotions that shape the mapping process and the map; and (3) the emotions people experience in response to maps. We conclude by identifying which of these aspects have been explored in the literature and more generally in this special issue, and which ones remain to be better studied to expand our understanding of the complex relations that exist between places, maps, and emotions.

1. THE EMOTIONS THAT WE PLACE ON MAPS

The placing of emotions on maps serves multiple interests. It can help urban planners to integrate citizens' perceptions into the planning process (Zeile et al. 2015; Resch et al. 2016; Fathullah and Willis 2018), it can serve to identify positive and negative hotspots such as places of fear in the city (Curtis et al. 2014), and it can be mobilized by marginalized groups and communities to resist unwelcomed development projects by demonstrating a specific and profound attachment to certain places (Graybill 2013). In more general terms, putting emotions on maps can inform social scientists—including geographers—about the kinds of relationships individuals have developed with places. In other words, mapping emotions can help us to better understand places and their relationships with our bodies and our minds.

Various attempts have been made to collect emotions connected to place, mainly in urban contexts. Already in the 1950s, psychogeographers were drifting in the streets of Paris to cross psychogeographic barriers while identifying and mapping “*unité d'ambiance*” based on their personal feelings (Debord 1957). The idea of drifting throughout the city to collect emotional data has been pushed further since then. In his famous “*bio mapping*” project, artist Christian Nold (2009) invited individuals to walk in their neighborhood equipped with a device combining a GPS receiver and a polygraph, which recorded the ups and downs of certain bodily reactions (such as the quantitative level of sweat) associated with locations. To refine what we can call “*affect data*,” Nold organized debriefing sessions after each walk, during which participants would explain the reasons behind the bodily reactions measured by the device. These comments and personal stories gave some meaning to the polygraph's quantitative measurements of the body's reactions. In that sense, this device “*functions as a total inversion of the lie-detector, which supposes that the body tells the truth, while we lie with our spoken words*” (Nold 2009, 5).

In a later paper, Nold (2018) distinguishes his approach from what Peter Zeile and colleagues (2015) have called “*Urban Emotion*,” which includes a range of methodologies dedicated to harvesting emotions as expressed in social media and through crowdsourcing approaches (see below). Building on Bruno Latour's argument that the modernist division between material objects and human subjects has created an artificial hierarchy in which human experiences and narratives have been systematically delegitimized because of their lack of precision in comparison to the scientific measurement of objects, Nold (2018) argues that only a combination of the measured and the perceived can enable an understanding of our emotional responses to places and situations, dismissing the capacity of systematic machine interpretation of emotions. In other words, mapping emotions requires more than what machines and lines of code can do: it requires some form of human unpacking of

affect data or emotional proxy measurements. This view is supported by the psychological theory of constructed emotion, which hypothesizes that producing emotional experiences requires emotion concepts to make meaning from bodily sensations in the world (Feldman Barrett 2017).

In addition, this critical positioning vis-à-vis the capacity of machines to properly interpret our emotions is part of a larger movement of resistance against the use of biometric technologies as a form of control and surveillance (see, for instance, Raqs Media Collective 2009). Nold recounts that in a workshop he led in Munich, “all the participants refused to be wired up with the sensing devices” because of the association of these devices with the Nazi regime, while in another workshop in London with an intergenerational Bangladeshi group, the device triggered a discussion about the use of technology for racial profiling (Nold 2018, 13).

These strong emotional reactions against using biometric technologies contrasts with the growing use of fitness apps that collect personal bodily data (such as heart rates), as well as with the use of social media to make public these data and their associated feelings and emotions. Social media have become a new El Dorado for researchers and companies looking to mine personal information, including emotions. Verbal expressions of joy, anger, fear, and sadness have been extracted from social media posts such as Tweets (Resch et al. 2015; 2016) and Flickr photo captions (Hauthal and Burghardt 2013) and then mapped. Other projects such as EmoMap (Ortag and Huang 2011) rely on a voluntary crowdsourcing approach to collect emotional spatial data over the Internet (see also Klettner et al. 2013). While Web 2.0 offers an extensive source of emotional spatial data, it is important to keep in mind that social media are highly performative in the sense that they are used extensively to perform, promote, and brand ourselves (Papacharissi 2012) rather than solely to communicate highly intimate and emotional information (Longhurst 2016; Shaw 2018). In other words, data available throughout social media likely reflect the emotions we *want* to be associated with, rather than the ones we feel most deeply; at times these may coincide, but they do not do so systematically. So when we claim to map emotions based on data mined from social media, what we more likely map is performed emotions or rather performed emotion proxies.

Emotions are extremely difficult to characterize and to circumscribe spatially. Mapping emotions involves mobilizing two types of proxies: those associated with the emotion itself (i.e., how can we identify and characterise an emotion?) and those related to their locations (i.e., what is the spatial extent of this identified emotion?). Emotion proxies can range from simple words identified in texts such as social media posts, to self-reflections about the emotional dimensions associated with measurements of our bodily reactions to the environment, as illustrated in Christian Nold’s workshops. A major challenge here is that emotions do vary between people, clearly evidenced by the fact that some languages and cultures have no concept (and therefore word) for particular emotions (Pavlenko 2014). Thus a given proxy such as the words used or facial expressions displayed may not always represent the same emotion in the same way.

Spatial proxies have been developed to circumscribe these emotional proxies more or less precisely (see Bleisch and Hollenstein, this issue). These range from very specific point locations (for example, a geolocated Tweet that contains an identified emotion; Resch et al. 2015), to more personal and conceptual spatial expressions that respect as much as

possible the emotions themselves at the expense of precise geographical locations (Knowles, Westerveld, and Strom 2015; Westerveld and Knowles 2018; Caquard et al., forthcoming). The diversity of these approximations emphasizes the necessity of approaching the mapping of emotions through a combination of cartographic methods, of quantitative and qualitative data, and of conventional and creative ways of collecting and mapping them. It also highlights the importance of being extremely cautious and humble when making any final statements about the relationships between maps, places, and emotions.

2. THE EMOTIONS THAT SHAPE THE MAPPING PROCESS AND THE MAP

Just like writing and drawing, the practice of making maps can generate emotions. Davisi Boontharm (2019) emphasizes the pleasure she experiences while sketching maps of the cities she has visited or in which she lives. Jo Gerlach (2018) hypothesizes the possible “experiential jouissance” that might arise from being involved in collective mapping efforts such as OpenStreetMap. In the context of community mapping, Young and Gilmore (2013) describe how mapping together in a *minga* (a traditional communal work party) helped to generate an atmosphere in which participants could counter negative reminders of colonial mappings that erased their communities from official maps, and instead generated positive emotions by collectively imagining and mapping new futures for their traditional lands. But community mapping can also be a source of frustration if it does not live up to the standards originally imagined by the participants (Sletto 2009), while online collaborative mapping can be frustrating because of the poor design of some map editing tools (Ballatore 2014). Frustration can also emerge from the lack of reliable data, from a shallow understanding of complex mapping software, and from the disappointing cartographic design quality of the map itself. In other words, mapmaking is a process that can be as painful as it can be joyful, but it is certainly not emotionless.

Throughout the entire mapping process, all of the individuals involved experience a series of emotions that arise in response to the topic mapped, to technological and practical hurdles, to the context of map production, to some personal life events, or to the more general context within which the map has been produced (see some examples of these emotions described at acartographersstory.com). How does a major political or humanitarian crisis affect the work of a cartographer mapping this topic? What if they were depressed or in love while working on this project? How do these emotions shape the mapping process?

Telling the story of the mapmaking process might contribute to partially addressing these questions and to helping better understand the meaning of a map through revealing some of the intentions and emotions of the mapmaker(s) (Caquard and Cartwright 2014). Building on this idea, Giada Peterle (2018) proposes the concept of “carto-fiction,” which combines mapping with creative writing to enable the mapmaker to express their feelings about the mapping process through the mapping output. She argues for “the exploration of creative writing as a method of research in the field of cartographic theory [that] could stimulate the affective, emotional and embodied aspects related to maps as mapping experiences to emerge, making them readable through the telling of stories” (Peterle 2018, 7). This idea of combining mapping with creative writing to “give shape to cartographic emotions in their multiple nuances” is also explored by Tania Rossetto (forthcoming).

While Rossetto argues rightly that critical cartographers have often associated maps with a “negative mood” based on the assumption that maps control, assert, and command, she makes

the map tell a different story: its own life story. Under Tania Rossetto's pen, Fonteuropa—a large mosaic map sculpture located in the center of Padova (Italy)—becomes a narrator that tells its life story, echoing the story of the European project to which the map is intimately linked (Rossetto, forthcoming). From this perspective, making maps talk through creative writing can serve not only to “unmask” the Machiavellian plots of power and control that lay behind them, but also to reveal the larger historical, cultural, and social context in which they are embedded, as well as certain emotions associated with this context that resonate with our own experiences and lives.

Maps are indeed part of our lives. They contribute not only to revealing but also to activating “complex geographies of perception” (della Dora 2009, 348). These geographies of perception are affected by the map, by the context in which it was received, by the mood of the receiver, and by the way the map affects the receiver's mood. The narrative and emotional power of maps is not, as pointed out by Peterle (2018, 6), “merely confined to the creative effort made by the cartographer”; it is also “refracted in every moment map-users engage with maps, composing their emotional, affected, memorial and sensuous narrative trajectories to follow.” For example, a map user may have difficulty reading a map when they are anxious or under great stress (Thoresen et al. 2016), as any driver who is trying to find their way in an unknown city will know. The emotions that affect the mapping process do not stop with the map's production but keep on evolving with the different contexts within which the map will be received, used, mobilized, and instrumentalized.

3. THE EMOTIONS EXPERIENCED IN RESPONSE TO MAPS

Maps have appeared in films, novels, and visual art not only to support the plot and the message but also to suggest, convey, and evoke emotions (see Bruno 2002; Conley 2007; Harmon 2009). Maps can evoke emotions based on their aesthetic properties, on the pleasure or nostalgia they arouse, on the information they convey, and the way they convey it. “When [maps] represent space well they also draw us in imaginatively and emotionally,” as Craine and Aiken (2009, 152) point out. In other words, a map that “represents space well” is inherently a potentially unlimited source of emotions for its users, as long as the context of its reception is propitious. While this “good map” might evoke emotions unintentionally simply by “representing space well,” cartographers and other mapmakers have developed techniques to provoke emotions deliberately, as epitomized in propaganda maps.

Propaganda maps—as well as other types of persuasive visual communication—harness the rhetorical power of emotional appeals in an attempt to shape opinions and beliefs (Tyner 2015). Although systematic empirical research on the design of persuasive maps and the efficacy of their emotional appeals is still relatively sparse (Griffin and McQuoid 2012), some interesting aspects have been unveiled. Keates (1996) wrote extensively on rhetoric and maps and noted that expert cartographers often make design choices that aim to persuade by evoking emotional responses among map readers. Emotional appeals may be direct and sharp, as in the case of a World War II propaganda map that deliberately oriented the map west-up, thereby showing the USSR weighing down on Nazi Germany (Jaeger 1942), or subtle, as in the modern-day visitor map to the Sachsenhausen concentration camp, which uses carefully modulated color choices to evoke the mood of a brutal landscape that is present only in remnants at that location today (L2M3 Kommunikationsdesign GmbH 2008). Although more openly propagandist cartographic styles might be more memorable,

they are also characterized by map users as less trustable, as demonstrated by Muehlenhaus (2012) in his study of different rhetorical cartographic styles.

Beyond the persuasive aims of cartographic design, evoking emotional responses in map readers can influence cognitive processes such as attention, working memory, and long-term memory (Fabrikant et al. 2012; Montello, Fabrikant, and Davies 2018). Several cartographic design decisions have been studied to assess their capacity to stimulate specific emotional responses among map readers, with different and sometimes contradictory results. For instance, Anderson (2018) found that affective incongruence (e.g., using bright cheery colors to map negative topics) confused map readers, and made the map unpleasant, while it was not clear in a study conducted by Fish (2018) if the use of vivid cartographic designs evoked specific emotions and were more persuasive than less vivid ones. On the other hand, researchers such as Field (2018) argue that subtle cartographic designs are more efficient to evoke emotions and increase the user's level of engagement with the map, while Kent (2012, 48) goes as far as arguing that "the absence of detail inherent to cartographic symbolization allows a free play of the imagination necessary for the development of emotions associated with that sense of place." The more minimalistic cartographic design would then be potentially more likely to arouse map users' emotions. However, Kent's later work seems to hint that more cartographic detail might prompt more flights of imagination among map users (Kent and Hopfstadt, this issue).

All these different arguments emphasize the complexity of assessing the real potential of cartographic design to evoke and convey emotion, especially when combined with different media such as video, senses such as smell (Lammes et al. 2018), and technologies such as sat nav (Speake and Axon 2012). It also illustrates the need for cartographers attempting to evoke and convey emotions with their maps to either collaborate with designers (Gardener, Cartwright, and Duxbury 2017), artists, filmmakers, journalists, or other individuals who have developed expertise in conveying emotions, or to simply focus on what they know best: designing maps that "represent space well."

4. MAPS AND EMOTIONS IN THIS SPECIAL ISSUE

In this last section, we will assess how the six papers that are part of this special issue address the three main aspects of the relationships between maps and emotions identified above: (1) the emotions that we place on maps; (2) the emotions that shape the mapping process and the map; and (3) the emotions experienced in response to maps. These papers were first presented as part of a two-day workshop on "Maps and Emotions" conducted in Washington, DC in July 2017, prior to the International Cartographic Conference. About fifty persons attended, including researchers and students of cartography, geographic information science, and design, alongside practicing artists.

Jiří Pánek's contribution critically discusses and reflects on his experiments with methodologies for locating perceptions and emotions in cities in the Czech Republic as part of a series of mapping exercises that supported participatory planning processes. In his mapping exercises, he iterated from crayons on paper to colorful (physical) pins placed on a paper map to a web application that allowed participants to use different spatial proxies (points, lines, and polygons). He eventually concluded that points allowed participants to most precisely locate where they remembered experiencing a particular emotion. Points also had the benefit of being easily aggregated and visualized through hexbins or heat maps. Pánek's focus is not

solely on the emotions being placed on maps. He argues that the process of participating in emotional mapping exercises (i.e., the mapping process itself) increases a participant's level of engagement with and sense of ownership of places and cities.

Susanne Bleisch and Daria Hollenstein present a cartographic method for mapping place-related emotion data. Like Pánek, they are interested in relationships between places, the design characteristics of places, and people's experiences of these places. Working with data from interviews with elderly women about their everyday experiences in a Swiss city, their mapping method visually represents the underlying valence of these expressions (positive or negative) rather than particular emotions themselves. Using these coarser emotional proxies avoids the challenges of inferring specific emotions, instead focusing on similarities in the experiences of these women at a less emotionally granular level. Bleisch and Hollenstein explore how emotion proxies can be covisualized with other information about the locale (e.g., the materials present in a place) to explore relationships between urban design and emotional experiences. Their mapping method also grapples with the issue of spatial proxies, in particular, vagueness in the location where emotions were and are felt. A final interesting point raised in this contribution relates to how emotions could affect the mapping process. Bleisch and Hollenstein's research was undertaken in an interdisciplinary context in collaboration with social scientists, so they made the decision to act as visualization guides, handling the manipulation of the interactive maps so that the social scientists could avoid the potential frustration of working with a new and complicated technology.

Hovig Ter Minassian's contribution explores how mental maps can be used to reveal emotions associated with experiences of virtual places in video games. He used a mental map methodology and a subsequent semi-structured interview to collect data on emotions and their relationships to experiences of virtual (and real/referential) places associated with playing video games. Like the women interviewed by Bleisch and Hollenstein, Ter Minassian's study participants often expressed emotions they remembered from the past (e.g., from playing a favorite game from childhood) instead of emotions they experience currently while playing games. The process of drawing their mental map(s) of these game environments evoked the emotion of nostalgia among some participants. Ter Minassian's study also demonstrates that accompanying stories are often needed to understand the emotions hidden in maps. He found that synecdochical mental maps were best able to express emotional attachments to places in video games.

Élise Olmedo and Mathilde Christmann demonstrate how the mapping process can reveal and capture emotional experiences in place. They present a mapping protocol, called the map-score, inspired by the landscape scores produced by Lawrence and Anna Halprin, a landscape architect and choreographer, respectively. Their map-scores provide intentions to guide the experience of people in a place and simultaneously allow the recording of these experiences. When a map-score is performed repeatedly, it could support investigation of how the context of a performance (e.g., weather, time of day or year, whom one is with, the emotions or mood of the performer at the start of the map-score) might alter the sensorial and emotional experience of a place. The map-scores themselves can in some cases capture some traces of the emotional state of their authors, though without accompanying stories, these emotions may remain somewhat mysterious.

Alex Kent and Anja Hopfstadt reflect on a creative activity that explored how different topographic maps mediated the experience of place, whether a specific map stimulated

distinct emotional responses to the place, and how these experiences and their accompanying emotional responses related to the map's design. They found some evidence that greater detail in topographic maps might be more stimulating, and that map users' perceptions of the map designer's intentions might have the greatest influence on the users' ranges of emotional experiences in response to the map. Their study was based on the analysis of a series of emotional proxies (photographs taken during the creative activity) and shared by the participants on an online platform. These photographs provide some hints that the performative nature of emotional expression that photography encourages, similar to those observed in other social media contexts, may also have produced some performance of emotions within the urban environment. They point out as well that photographs can be taken with the intent of evoking an emotion in the viewer rather than to reveal the emotion felt by the photographer. This conclusion reiterates the importance of triangulating sources of emotional data when investigating relationships between maps, emotions, and places.

In the final contribution to this special issue, Catherine Turk touches on all three aspects of the relationships between maps and emotion that we have outlined here. Her contribution explores the cartographic challenges of putting place-linked emotions on the map, through a participatory digital spatial database that recorded examples of emotional engagements with two rivers in Western Australia. Emotional engagements with place were recorded in the database when contributors uploaded objects that contained content that expressed emotions implicitly such as stories, images, video, and audio recordings. These objects could then also be given tags that identified emotions explicitly. Turk describes how the researchers chose to use a map as an organizing mechanism for the database in part because they believed it provided an emotionally neutral entry point to the database that (they believed) would not influence how or why people might contribute to the database. This raises the question of whether this was in fact true. Finally, Turk notes that context affects the interpretation of emotions, and thus connects to the third theme: the emotions experienced in response to maps. (How) does placing the emotion on the map instead of experiencing it where it was felt in the landscape change its interpretation? In her analysis, Turk questions the impact of the researchers' own emotional engagements with place, which were represented alongside those contributed by other participants. How did the process of curating the map affect what emotions might be found within it, and could telling that curation story reveal something more about emotional engagements with the places themselves?

CONCLUSION

The different papers that compose this special issue illustrate to some degree the main aspects of the way we currently approach the relationships between places, maps, and emotions. They illustrate the necessity of envisioning the mapping of emotions through emotional and spatial proxies. They recognize the importance of combining different data sources, methods, techniques, and designs to reduce, insofar as it is possible, the cartographic gap between places and emotions represented by these proxies. They acknowledge that the mapmaker should find ways to articulate what has been lost and gained in terms of emotional meaning and precision throughout the mapmaking process, suggesting that narratives might be a relevant form for telling the story of the decisions that have shaped these proxies. They also go beyond the unique aspect of placing emotional proxies on maps to suggest broadening the way we approach the relationships between maps, places, and emotions. They seem aware of the impact of the fluctuating emotional positionality of the data provider, of the mapmaker, and of the map receiver throughout the mapping process,

although this awareness is translated more through suggestions than through solutions. In fact, we don't really know *how* to link the emotional context of mapmaking to the map produced and the emotional context of map reception to the map use. Although there is growing recognition of the importance of better understanding these aspects of the mapping process, this might require some help from other domains such as artistic practice, storytelling, neuroscience, cognitive science, and geography to address this issue properly. The relationships between places and emotions are too complex to be properly captured solely by maps, but the mapping process is just too powerful not to play a central role in our attempt to better understand our emotional engagements with places. It is time to break through the impersonal reserve of maps to reveal their multiple emotional layers.

REFERENCES

- Anderson, Cary. 2018. "The Influence of Affectively Congruent Color Assignment in Categorical Map Interpretation." Master's thesis, The Pennsylvania State University.
- Anderson, Kay, and Susan Smith. 2001. "Editorial: Emotional geographies." *Transactions of the Institute of British Geographers*, 26 (1): 7–10. doi: [10.1111/1475-5661.00002](https://doi.org/10.1111/1475-5661.00002).
- Ballatore, Andrea. 2014. "Defacing the Map: Cartographic Vandalism in the Digital Commons." *The Cartographic Journal* 51 (3): 214–224. doi: [10.1179/1743277414Y.0000000085](https://doi.org/10.1179/1743277414Y.0000000085).
- Bondi, Liz. 2005. "Making Connections and Thinking through Emotions: Between Geography and Psychotherapy." *Transactions of the Institute of British Geographers* 30 (4): 433–448. doi: [10.1111/j.1475-5661.2005.00183.x](https://doi.org/10.1111/j.1475-5661.2005.00183.x).
- Boontharm, Davisi. 2019. "Sketch and Script in Cultural Mapping." In *Artistic Approaches to Cultural Mapping, Activating Imaginaries and Means of Knowing*, edited by Nancy Duxbury, W. F. Garrett-Petts, and Alys Longley, 65–74. London and New York: Routledge. doi: [10.4324/9781315110028-4](https://doi.org/10.4324/9781315110028-4).
- Bruno, Giuliana. 2002. *Atlas of Emotion: Journeys in Art, Architecture, and Film*. London and New York: Verso.
- Caquard, Sébastien, and William Cartwright. 2014. "Narrative Cartography: From Mapping Stories to the Narrative of Maps and Mapping." *The Cartographic Journal* 51: 101–106. doi: [10.1179/0008704114Z.00000000130](https://doi.org/10.1179/0008704114Z.00000000130).
- Caquard, Sébastien, Emory Shaw, José Alavez, and Stefanie Dimitrovas. Forthcoming. "Mapping Memories of Exiles: Combining Conventional and Alternative Cartographic Approaches." In *Memoryscape Handbook*, edited by Sarah De Nardi, Hilary Orange, Eerika Koskinen-Koivisto, Danielle Drozdowski, and Steven High. London and New York: Routledge.
- Conley, Tom. 2007. *Cartographic Cinema*. Minneapolis and London: University of Minnesota Press.

- Craine, Jim, and Stuart C. Aitken. 2009. "The Emotional Life Of Maps And Other Visual Geographies." In *Rethinking Maps: New Frontiers in Cartographic Theory*, edited by Martin Dodge, Rob Kitchin, and Chris Perkins, 149–167. London and New York: Routledge.
- Curtis, Jacqueline W., Ellen Shiau, Bryce Lowery, David Sloane, Karen Hennigan, and Andrew Curtis. 2014. "The Prospects and Problems of Integrating Sketch Maps with Geographic Information Systems to Understand Environmental Perception: A Case Study of Mapping Youth Fear in Los Angeles Gang Neighborhoods." *Environment and Planning B* 41(2): 251–271. doi: [10.1068/b38151](https://doi.org/10.1068/b38151).
- Debord, Guy. 1957. *The Naked City. Illustration de l'hypothèse des plaques tournantes en psychogéographique [Illustration of the hypothesis of psychogeographic hubs]*. Copenhagen: Permild & Rosengreen. Lithograph.
- della Dora, Veronica. 2009. "Travelling Landscape Objects." *Progress in Human Geography* 33: 334–354. doi: [10.1177/0309132508096348](https://doi.org/10.1177/0309132508096348).
- Fabrikant, Sara I., Sidonie Christophe, Georgios Papastefanou, and Sara Maggi. 2012. "Emotional Response to Map Design Aesthetics." In *Proceedings of GIScience 2012 (Extended Abstracts)*, edited by Ningchuan Xiao, Michael Goodchild, Shashi Shekhar, and Hui Lin, 1–6.
- Fathullah, Afif, and Katherine S. Willis. 2018. "Engaging the Senses: The Potential of Emotional Data for Participation in Urban Planning." *Urban Science* 2 (4): 98. doi: [10.3390/urbansci2040098](https://doi.org/10.3390/urbansci2040098).
- Feldman Barrett, Lisa. 2017. "The Theory of Constructed Emotion: An Active Inference Account of Interoception and Categorization." *Social Cognitive and Affective Neuroscience* 12 (1): 1–12. doi: [10.1093/scan/nsw154](https://doi.org/10.1093/scan/nsw154).
- Field, Kenneth. 2018. *Cartography*. Redlands, CA: Esri Press.
- Fish, Carolyn. 2018. "The Cartography of Climate Change in United States Media." PhD diss., The Pennsylvania State University.
- Gardener, Joanna, William Cartwright, and Lesley Duxbury. 2017. "An Interdisciplinary Approach to Mapping through Scientific Cartography, Design and Artistic Expression." In *Proceedings of the International Cartographic Association* 1: 1–6. doi: [10.5194/ica-proc-1-43-2017](https://doi.org/10.5194/ica-proc-1-43-2017).
- Gerlach, Joe. 2018. "Nodes, Ways and Relations." In *Time for Mapping: Cartographic Temporalities*, edited by Sybille Lammes, Chris Perkins, Alex Gekker, Sam Hind, Clancy Wilmott, and Daniel Evans, 27–49. Manchester, UK: Manchester University Press. doi: [10.7765/9781526122520.00010](https://doi.org/10.7765/9781526122520.00010).
- Graybill, Jessica K. 2013. "Mapping an Emotional Topography of an Ecological Homeland: The Case of Sakhalin Island, Russia." *Emotion, Space and Society* 8: 39–50. doi: [10.1016/j.emospa.2012.09.005](https://doi.org/10.1016/j.emospa.2012.09.005).

- Griffin, Amy L., and Julia McQuoid. 2012. "At the Intersection of Maps and Emotion : The Challenge of Spatially Representing Experience." *Kartographische Nachrichten* 62: 291–299.
- Harmon, Katharine. 2009. *The Map as Art: Contemporary Artists Explore Cartography*. New York: Princeton Architectural Press.
- Hauthal, Eva, and Dirk Burghardt. 2013. "Extraction of Location-Based Emotions from Photo Platforms." In *Progress in Location-Based Services: Lecture Notes in Geoinformation and Cartography*, edited by Jukka M. Krisp, 3–28. Berlin, Heidelberg: Springer. doi: [10.1007/978-3-642-34203-5_1](https://doi.org/10.1007/978-3-642-34203-5_1).
- Jaeger, Hugo. 1942. "German Military Chart." The LIFE Picture Collection. Editorial # 50715632. <https://www.gettyimages.com.au/detail/news-photo/german-military-chart-no-data-given-news-photo/50715632>.
- Keates, John S. 1996. *Understanding Maps, Second Edition*. Harlow, UK: Longman.
- Kent, Alexander J. 2012. "From a Dry Statement of Facts to a Thing of Beauty: Understanding Aesthetics in the Mapping and Counter-Mapping of Place." *Cartographic Perspectives* 73: 37–60. doi: [10.14714/CP73.592](https://doi.org/10.14714/CP73.592).
- Klettner, Sylvia, Haosheng Huang, Manuela Schmidt, and Georg Gartner. 2013. "Crowdsourcing Affective Responses to Space." *Kartographische Nachrichten* 63: 66–72.
- Knowles, Anne K., Levi Westerveld, and Laura Strom. 2015. "Inductive Visualization: A Humanistic Alternative to GIS." *GeoHumanities* 1: 233–265. doi: [10.1080/2373566X.2015.1108831](https://doi.org/10.1080/2373566X.2015.1108831).
- L2M3 Kommunikationsdesign GmbH. 2008. *Memorial and Museum Sachsenhausen Visitor Map*. Stuttgart: L2M3 Kommunikationsdesign GmbH.
- Lammes, Sybille, Kate McLean, and Chris Perkins. 2018. "Mapping the Quixotic Volatility of Smellscapes: A Dialogue." In *Mapping Time: Cartographic Temporalities*, edited by Sybille Lammes, Chris Perkins, Alex Gekker, Sam Hind, Clancy Wilmott, and Daniel Evans, 1–41. Manchester, UK: Manchester University Press. doi: [10.7765/9781526122520.00011](https://doi.org/10.7765/9781526122520.00011).
- Longhurst, Robyn. 2016. "Mothering, Digital Media and Emotional Geographies in Hamilton, Aotearoa New Zealand." *Social & Cultural Geography* 17 (1): 120–139. doi: [10.1080/14649365.2015.1059477](https://doi.org/10.1080/14649365.2015.1059477).
- Montello, Daniel R., Sara I. Fabrikant, and Clare Davies. 2018. "Cognitive Perspectives on Cartography and Other Geographic Information Visualizations." In *Handbook of Behavioral and Cognitive Geography*, edited by Daniel R. Montello, 177–196. Cheltenham, UK: Edward Elgar Publishing.
- Muehlenhaus, Ian. 2012. "If Looks Could Kill: The Impact of Different Rhetorical Styles on Persuasive Geocommunication." *The Cartographic Journal* 49 (4): 361–375, doi: [10.1179/1743277412Y.0000000032](https://doi.org/10.1179/1743277412Y.0000000032).

- Nold, Christian. 2009. *Emotional Cartography: Technologies of the Self*. <http://www.emotionalcartography.net>.
- . 2018. “Bio Mapping: How Can we use Emotion to Articulate Cities?” *Livingmaps Review* 4: 1–16. <http://livingmaps.review/journal/index.php/LMR/article/view/103/176>.
- Ortag, Felix, and Haosheng Huang. 2011. “Location-Based Emotions Relevant for Pedestrian Navigation.” In *Proceedings of the 25th International Cartographic Conference*, edited by Anne Ruas. https://icaci.org/files/documents/ICC_proceedings/ICC2011/Oral%20Presentations%20PDF/B1-Volunteered%20geographic%20information,%20crowdsourcing%20-%20data%20analysis/CO-063.pdf.
- Papacharissi, Zizi. 2012. “Without you, I’m Nothing: Performances of the Self on Twitter.” *International Journal of Communication* 6: 1989–2006.
- Pavlenko, Aneta. 2014. *The Bilingual Mind: And What it Tells Us About Language and Thought*. Cambridge, UK: Cambridge University Press.
- Peterle, Giada. 2018. “Carto-Fiction: Narrativising Maps through Creative Writing.” *Social & Cultural Geography*, in press. doi: [10.1080/14649365.2018.1428820](https://doi.org/10.1080/14649365.2018.1428820).
- Pile, Steve. 2010. “Emotions and Affect in Recent Human Geography.” *Transactions of the Institute of British Geographers* 35: 5–20. doi: [10.1111/j.1475-5661.2009.00368.x](https://doi.org/10.1111/j.1475-5661.2009.00368.x).
- Raqs Media Collective. 2009. “Machines Made to Measure: On the Technology of Identity and the Manufacture of Difference,” In *Emotional Cartography: Technologies of the Self*, edited by Christian Nold, 14–25. <http://www.emotionalcartography.net>.
- Resch, Bernd, Anja Summa, Günther Sagl, Peter Zeile, and Jan-Phillip Exner. 2015. “Urban Emotions—Geo-Semantic Emotion Extraction from Technical Sensors, Human Sensors and Crowdsourced Data.” In *Progress in Location-Based Services 2014: Lecture Notes in Geoinformation and Cartography*, edited by Georg Gartner and Haosheng Huang, 199–212. Cham, Switzerland: Springer. doi: [10.1007/978-3-319-11879-6_14](https://doi.org/10.1007/978-3-319-11879-6_14).
- Resch, Bernd, Anja Summa, Peter Zeile, and Michael Strube. 2016. “Citizen-Centric Urban Planning through Extracting Emotion Information from Twitter in an Interdisciplinary Space-Time-Linguistics Algorithm.” *Urban Planning* 1 (2): 114–127. doi: [10.17645/up.v1i2.617](https://doi.org/10.17645/up.v1i2.617).
- Rossetto, Tania. Forthcoming. *Object-Oriented Cartography: Maps as Things*. Abingdon, UK: Routledge.
- Shaw, Emory. 2018. “Parsing Perceptions of Place: Locative and Textual Representations of Place *Émilie-Gamelin* on Twitter.” Master’s thesis, Concordia University.
- Sletto, Bjørn I. 2009. “‘We Drew What We Imagined’: Participatory Mapping, Performance, and the Arts of Landscape Making.” *Current Anthropology* 50 (4): 443–476. doi: [10.1086/593704](https://doi.org/10.1086/593704).

- Speake, Janet, and Stephen Axon. 2012. "I Never Use "Maps" Anymore': Engaging with Sat Nav Technologies and the Implications for Cartographic Literacy and Spatial Awareness." *The Cartographic Journal* 49: 326–336. doi: [10.1179/1743277412Y.0000000021](https://doi.org/10.1179/1743277412Y.0000000021).
- Thoresen, John C., Rebecca Francelet, Arzu Çöltekin, Kai-Florian Richter, Sara I. Fabrikant, and Carmen Sandi. 2016. "Not All Anxious Individuals get Lost: Trait Anxiety and Mental Rotation Ability Interact to Explain Performance in Map-based Route Learning in Men." *Neurobiology of Learning and Memory* 132: 1–8. doi: [10.1016/j.nlm.2016.04.008](https://doi.org/10.1016/j.nlm.2016.04.008).
- Tyner, Judith A. 2015. "Persuasive Cartography." In *History of Cartography, Volume Six: Cartography in the Twentieth Century*, edited by Mark Monmonier, 1087–1095. Chicago: University of Chicago Press.
- Westerveld, Levi, and Anne K. Knowles. 2018. "I was There." *Visionscarto*. <https://visionscarto.net/i-was-there>.
- Young, Jason C., and Michael P. Gilmore. 2013. "The Spatial Politics of Affect and Emotion in Participatory GIS." *Annals of the Association of American Geographers* 103 (4): 808–823. doi: [10.1080/00045608.2012.707596](https://doi.org/10.1080/00045608.2012.707596).
- Zeile, Peter, Bernd Resch, Jan-Phillip Exner, and Günther Sagl. 2015. "Urban Emotions: Benefits and Risks in Using Human Sensory Assessment for the Extraction of Contextual Emotion Information in Urban Planning." In *Planning Support Systems and Smart Cities: Lecture Notes in Geoinformation and Cartography*, edited by Stan Geertman, Joseph Ferreira, Jr., Robert Goodspeed, and John Stillwell, 209–225. Cham, Switzerland: Springer. doi: [10.1007/978-3-319-18368-8_11](https://doi.org/10.1007/978-3-319-18368-8_11).

