Geometries : From analogy to performativity

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11 Geometries

From Analogy to Performativity

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Being Somewhere in Particular

Everyone is somewhere in particular, always located somewhere and not somewhere else, and that makes a difference. In the difference that it makes, the various forms of geometry are important techniques, among others, that people use to measure, and sometimes to create, the conditions that geometry describes. Of course, being located is not always a simple matter, as many other contributions to this volume have shown. Gaining a right to be physically present somewhere without some entity having the power to remove you is not easy to achieve in many parts of the world. Actually, it is becoming less easy now that most people and places can be tracked electronically, so that others know where you are, where you came from and whether you should be there or not.[1] And, again as other contributions have shown, it is not only the surface of the Earth, which many are used to thinking of as a two-dimensional political map with lines, colors, and names marking territories: the matter is now much more obviously three-dimensional as well, and includes subterranean places, the sea, air, and outer space.[2] And while the idea of control over water as well as land goes back a very long time,[3] attempts to get control over the air are a little more recent, perhaps because it has not been that long since people were able to occupy it in any meaningful way, at least in terms of very big vertical distances.

Thus far, it is only the Israeli government that has come up with the idea of creating a vertical border separating the earth from the air just above it: Hebron, a place in which the ground belongs to Palestinians, but the air above the ground belongs to Israelis. Israel has been particularly innovative with spatial and territorial technologies, though it is not the only political authority that has engaged in such practices.[4] In all cases, the increased technical capacities to precisely specify, measure, survey, track, and define every aspect of three-dimensional life—height, depth, volume—not only in terms of the earth and the depths and spaces below and above it, but also in terms of the volumetric dimensions of the human body, has been a key part of what makes such control possible, and perhaps also what makes it imaginable.[5]

On that last point, the fact that both places and bodies have volume has become important in this age of new surveillance techniques. For centuries, the right to move across physical space has been fraught with difficulties and potential transgressions, both formal and informal. In the past, this has been dealt with mostly through paperwork or some other kind of seal or token that allows passage, combined with attempted control of the crossing points.[6] Today, with the increasing use of biometric techniques and combinations of digital and satellite technologies in which data are remotely and directly read off bodies and places (related to what Paul Rabinow called *biosociality* many years ago),[7] there has been a merging of the relationship between bodies, territories, and data: the volumes, both bodily and spatial, have been translated into numerical and then graphic data. In that sense, biometric techniques have begun to catch up with the fantasies of security experts, who would prefer to carry out permanent surveillance of everyone and everywhere.[8] These techniques, which have the ultimate logic of creating a dense meshwork of perfectly controlled exclusion zones (the idea is to separate and disconnect people and places, while interconnecting an entire global surveillance system), have a growing market just now. A common thread within the current rise of nationalist and ethnonationalist political parties in Europe and elsewhere in the wealthier parts of the world is a negative depiction of migrants and migration: "Close the borders" and "Build more walls" are among the most common rallying cries for that type of political party. Currently in the European region, those parties are expressing particular hostility toward the people who are trying to cross the Mediterranean in their bid to escape from trouble and to find something better.[9]

It is not the first time, of course; the current market for "smart border" technologies is being fed by a fear of letting people in, which has erupted into attempts to shore up the borders many times before. Hannah Arendt noted that after World War I, formally stateless people became a large-scale phenomenon,

with hundreds of thousands if not millions finding themselves without the right to reside anywhere at all.[10] In World War II as well, many countries refused to let in the refugees from the Nazi regime.[11] A significant part of the fear, then as now, was quantity: too many people coming in from outside all at once.

Both past and present, a fundamental practical part of the political techniques used to establish the difference between inside and outside has been based on the principles and logic of a range of different forms of geometry. The two-dimensional graphic image of a political map is based on simple geometric principles, and the territorial logic of what the map depicts is based on historically variable understandings of space, place, and location.[12] Given the proliferation of mapping techniques (GIS, Google Maps, and a range of digital and satellite-based technologies) in today's world, it is worth looking into the interplay between maps that geometrically depict locations in diverse ways, and wider politically and socially relevant understandings of belonging, rights, and moral worth related to spatial location. Or to put it in another way: how is the (historically contingent) logic of geometry drawn upon in a way that informs political decisions and materially affects people's three-dimensional lives? Asking the question in that way provides a route into thinking anthropologically about the different kinds of logic behind these power-inflected spatial arrangements, which result in diverse spatial relations and, as importantly, spatial separations, spatial cuts, and spatial hierarchies.

Geometries and Power

The question involves two issues: the logic that is used—by governments, by technical specialists, by whoever—to classify space (both horizontal and vertical) and then arrange the relations and separations between these spaces according to that classification; and secondly, how that articulates with the lives of those who have some relation with these spaces.

Everyone knows that people's relations with physical space—their presence and relations within it and movements across it—constantly involve the exercise of power, which incorporates and reflects diverse ways of defining and classifying the difference between here and somewhere else, and then imposing that logic onto the landscape in a way that directly or indirectly affects how people can engage with the spatial configuration thus defined. Within political geography and other social sciences, many have turned to geometry and related branches of mathematics, including fractal theory and, most particularly, topology, for inspiration in trying to understand such matters.[13] Some, especially those influenced by actor network theory (ANT) and/or Deleuze,

have argued that today's world is a "post-Euclidean" topological world which can no longer be understood using the flat, static, geographical, geometric worldview of things being fixed in place, for not even place is fixed in place anymore, if it ever was.[14]

The key point for those shifting from classical geometry to topology is that topological thinking implies constant change in multiple dimensions (not only in the single dimension of lines or the two dimensions of maps). In this depiction, topology is understood as the mathematical "study of malleable shapes."[15] Metaphorically at least, the shift from classical geometry to topology implies a focus on the indeterminacy and malleability of human spatial existence, rather than its fixed characteristics. For those political geographers and social and cultural theorists drawing on topology as an idea, this apparently fits certain kinds of social theory and understandings of our contemporary world rather better than the idea of natural or immovable borders, for example.[16]

In a different approach, which is focused more on political economy, Doreen Massey famously suggested that the world is made up of *power-geometries*, a phrase she developed in relation to her thoughts about globalization.[17] What she meant was that the effects of the spatial dimensions of people's lives cannot be fully understood simply by describing such dimensions geometrically (i.e., in terms of measuring and mapping areas, angles, volumes, and lengths): the geometry is always warped by the operations of power, which generates hierarchical relations between here and somewhere else.

Massey was particularly concerned with neoliberal capitalist power in her discussion of this. She closely linked that form of power with the ideology informing contemporary ideas of the local and the global: for Massey, both local and global, and the relations between them once they have been defined as such, are created and defined through historically contingent concepts that are open to challenge. As she puts it: "In a relational understanding of neoliberal globalisation 'places' are criss-crossings in the wider power-geometries that constitute both themselves and 'the global.' . . . Understanding space as the constant open production of the topologies of power points to the fact that different 'places' will stand in contrasting relations to the global. They are differentially located within the wider power-geometries."[18] Massey's point is that Mumbai and London (for example) are not simply located on different parts of the planet; the way power works to generate a hierarchical relation between them, in both material and ideological terms, warps the way in which they are positioned, so that both the material and symbolic effects of being in each place are hierarchically calibrated by the operations of neoliberal capitalist

power. Massey meant this literally, and in geological as much as geometrical terms: neoliberal capitalist power molds, twists, and churns the material, physical relations caught within and defined by that power: all three dimensions are involved.

Massey's reference to topology points to these condensing or stretching effects on geographical locations: long distances can become either meaningless or insurmountable depending upon the way different places are located with respect to the operations of power. This is a different understanding of topology than that provided by the more Deleuzian or ANT readings. Massey, who is in this respect similar to John Allen,[19] suggests that physical distances can be squashed or stretched so that the ~~physical~~ geographical distance between locations is completely different from the way people physically experience those distances. A simple example: a rich person can get from London to New York in less time than they can get to Ioannina (the capital of Epirus, in northwestern Greece), even though the distance between London and Ioannina is far shorter than it is to New York. This is simply because it is possible to fly directly to New York from London. Of course, for a person who cannot afford the flight, the situation is completely different; and for those with no passport or visa paperwork, the trip is almost not possible at all. It is not that the warped distances created by air travel permanently change the shape of the Earth; it is that the distances are warped for some people and not for others.

delete "physical"

This goes beyond the simple point that different parts of the globe are in unequal relation to one another; Massey's argument is that these inequalities diversely shape how people experience the three-dimensional geometry of the world, that they twist, turn, warp, squeeze, and mold how people experience their spatial dimensions so that the same spaces are experienced differently by people who find themselves in different relation to these spaces, yet the spaces are ~~topologically~~ the same. Such inequalities also work at the level of the Earth, differentially tying parts of the world together and ripping them apart, so that an action in one part of the world may reverberate instantly on the opposite side of the planet, while not affecting the places in between those two spots at all. And given that political and economic conditions change regularly, such power-inflected calibrations for establishing where we are in the world are always historically and conceptually contingent, changing according to the logic and techniques used to measure them, combined with the practical enforcement of those logic and techniques.[20]

replace "topologically" with ", geographically speaking,"

Massey was drawing on the idea of topology as an analogy here, as a way of enabling the reader to understand the idea of spatial relations being warped

by powerful forces. The political and economic hierarchies are what interest her, not the mathematical abstraction, as such. My interest in geometry goes slightly beyond that: it concerns how the geometrical concepts themselves might be incorporated within the political and economic logic that generates those hierarchies—neither drawing on geometry as an analogy to describe what happens in the world, nor borrowing from the concept of topology in order to generate social theories, but instead trying to understand how the logic and techniques of geometry (including topological techniques) are drawn upon in performatively generating conditions that affect people's three-dimensional existence.

The idea that the abstractions of geometry might be combined with the abstractions and hierarchies of political and economic power in establishing where places are in the world could be extended to somewhat more anthropological concerns: to explore what this might mean in terms of social relations, in terms of how people differentially experience being somewhere in particular, and in terms of how location is implicated in the establishment, expression, and maintenance of differences. The implications are important, partly for making the historical contingency of any particular understanding of borders explicitly visible.[21] Arguably, contemporary dominant concepts of political borders have relied more than any other historical logic of location on two-dimensional maps with one-dimensional lines marked on them in order to make that logic visible. This has flattened political imagination about the three-dimensional world, whilst at the same time encouraging the idea of an inherent, static, and vertical rootedness of particular people to a particular patch of the Earth.[22]

If the power-inflected logic of location is historically contingent, changing along with people's understanding of space, territory, and spatial relations, then two things follow from that. First, changes in forms of geometry deployed in calculating and depicting the locations probably signal a shift in logic. Second, it is also possible that more than one such logic could coexist at the same time. The implications of that are important for thinking through what contributes to people's understanding and experience of where they are located. Paying attention to the multiple relations and, as importantly, the separations, between here and somewhere else can draw attention to the copresence of different logics, almost always power-inflected, operating simultaneously in the same place, perhaps differently across different scales. Doing that might provide an intriguing, and more specifically relational, way of thinking about how people simultaneously locate themselves and are located in the world.

Locations

My long-term anthropological interest in locations, which more recently developed into a wider interest in mathematical abstractions such as geometry, topology, and fractals, began with earthquakes, both literal and political, in the Greek-Albanian border region of Epirus. In 1992, I was asked to explore local people's attitudes toward their tectonically unstable landscapes. There are regular earthquakes, land fractures, and landslides in the region, and my task was to find out how rural people who lived off the land dealt with this unstable ground beneath their feet. Geoff King, a geophysicist in the research project, visited Epirus and told me about mountains bobbing up and down, lakes filling and emptying, the seabed being churned up and twisted over, which in the end resulted in parts of that seabed being located on the top of hills.[23] The goats seek out those places on hilltops where the old seabed ended up, so they can lick stones and eat the plants that grow there, as they like the salt.

All of that gave me a sense of how the logic of topology is used in geophysics, as a way to describe and model, in geophysical terms, the deformations of the Earth's surface. That was quite different from the more metaphorical and analogical uses of the topology idea discussed in the social sciences. The geophysical description made it appear as if the skin of the Earth was being literally stretched, twisted, crumpled, folded, cracked, and bent like an old and decaying rubber sheet. Confronted with the sheer scale at which the logic of geophysics operates (the Earth's crust undulating over a period of hundreds of millennia), the people of Epirus, who were the focus of my own attention, seemed irrelevant somehow. It was as if their place in the world was incidental to something much more enduring than the short lives of a few people, their travels, their sheep and goats, and ~~the~~ troubles with a modern political border. What is more, these people seemed to be indifferent toward their constantly morphing landscape, which was a problem for me, as I was supposed to be researching their attitudes toward the geophysical instabilities in their landscape.[24]

replace "the" with "their"

That was one thread. But there was more, as this was the early 1990s, and a different kind of shape-shifting was going on at the same time. In late 1991, the Albanian communist regime collapsed, and the Greek-Albanian border reopened, after almost fifty years of tight closure. That political earthquake changed the shape of the region overnight, making a previously invisible and impassable section of land suddenly come into view—actually, for both the Albanian as well as the Greek sides. Before the reopening of the Greek-Albanian border, it was impossible to cross between Greece and Albania in

either direction; afterward, it was literally a matter of a stroll across the border, so long as you had the right paperwork, of course.

Experiencing how Epirots lived with and spoke about all this began my long-term interest in borders, both political and physical, and how shifts in borders changed how people were located in the world. This was not so much about the identities of people, about the way that contemporary borders regularly become enmeshed in questions of national and other kinds of identifications;[25] it was more about the relationships between people and places, and how that deeply affected the way people lived and their understanding of the significance of where they were in the world and their place in it. Given that the shape of places changes regularly, this relation between people and places also changes regularly, and it matters to people.

At the time, questions of the way that geometry might come into this story of spatial dimensions being altered by these political changes still eluded me. In focusing on the people and their relations with places, the only spatial element that seemed to matter involved a social sense of belonging that came into conflict with the logic of belonging that was imposed by the contemporary state powers over this same territory, a logic which expressed a different kind of relation between people and places. I drew on Michael Herzfeld's research to think through the ideological and historical changes that generated shifts in the political relationship between people and places; and I drew on Marilyn Strathern to help explore how the logic of people's social relations might crosscut the politically imposed logic of nation.[26] The combination made it possible to understand how the location of the Greek-Albanian border made spatial sense in one way (by the logic of nation), but locally made little sense in another (by the logic of kinship). People from the area reported to me that they remembered a time when they hardly paid attention to the political border at all, as it was awkwardly located for them in practical terms, and they had a relatively limited sense of their nationality as being rooted in the ground beneath their feet. In fact, on the contrary, for as long as people around there could remember, they had been long-distance seasonal workers and pastoralists who took their sheep and goats to high grounds in the summer and low grounds in the winter, so moving around was part of their understanding of their relationship with the landscape; borders, national or otherwise, did not feature very strongly. In practical terms, these people needed to cross the Greek-Albanian border with the seasons not only to find good pastures for their animals; they also needed to do so to reach the biggest town for supplies and trade, Argyrokastro/Gyrokastër, which was on the Albanian side. Getting

to the big town on the Greek side (Ioannina) took a lot longer. Moreover, the majority of families straddled the two sides of the political border.

Overall, the assumptions, or perhaps better, the assertions, that informed the placement of the border were not shared by many people living nearby, particularly the implication that it is normal for nationals to live in one place and not to move around all the time. The people in the region experienced it as a severe inconvenience when the border was formally closed after the Second World War, rather than thinking that it appropriately reflected what kind of (national) belonging they had with the landscape. The closure made it impossible for people around there to live the lives they had lived before. So most of those on the Greek side left, found somewhere else to live, and something else to do. Those on the Albanian side, being part of a command socialist regime that did not permit people to change residence without permission, could not leave so easily. But they were cut off from their kin and neighbors now, so their location had changed even if they had not physically moved.

That situation involved two crosscutting threads that came together in this place, but there was more. The Greek-Albanian border not only contradicted the spatial logic of the social relations between people and place, it also contradicted the previous Ottoman political logic in that region. At that point, various forms of geometry began to seem like a useful source of metaphors or analogies: in particular, I drew on the idea of the difference between classical and fractal geometry to try to describe what I understood to be the material effects of the difference between the political logic of the Ottoman Empire and the political logic of nation-states.[27] The importance of the difference between fractal and more classical (Euclidean or Cartesian) geometry concerns the way they differently incorporate scale: Fractals, which operate at a dimension that is somewhere between one and two (i.e., fractions of dimensions), repeat the same pattern across scales. This contrasts starkly with more classic geometry, in which shapes appear in whole dimensions (one, two, or three), and are scale dependent.

An example from fractal patterns that have been identified in plants makes the difference clearer: In fractal terms, the veins in the leaves of a tree follow the same branching pattern as the branches and the roots of the tree; what is important in fractal terms is the pattern of relations between them, which are all the same. In contrast, in more classical geometrical terms, leaves, branches, and roots are all distinctly different parts of the tree, taking up different spaces, and the question of how they relate together involves a consideration of scale and dimension. Fractal geometry evades geometrical scale, working in the same way at any scale, and the dimension of fractals is determined by the pattern of the relations

between the parts. In contrast, classical geometry concerns the measurement of fixed objects, and is not about relations: "Measurements of angles and lengths, proofs of congruencies of figures, and computations of areas and volumes all rely on precise and unmoving geometric structure."[28] The key point here is that classical geometry and fractal theory are two different ways of describing the same thing: whether speaking in classical geometric or fractal terms about the tree, it is still the tree that is being described, but the one focuses on the pattern of relations, whereas the other focuses on the measurements of the dimensions of the entities that make up the tree.

At the time I was studying what was going on at the Greek-Albanian border for the people associated with the region, I was still thinking about these geometries metaphorically, and in terms of representations, not as part of the performative creation of spatial location. I argued that the ideologically inflected meaning of *the Balkans* had historically developed, within Western hegemonic discourse that relied on statistical thinking, to represent chaos, toxic conditions that repeated themselves infinitely and in the same way at every level, defying both scale and the logic of a three-dimensional geometrical world in which shapes can be neatly separated out into lines, squares, circles, and triangles. Instead, according to this perspective, it looked like in the Balkans no borders would ever settle down enough so that the territories they contained might come to resemble a stable thing (the nation) that could be appropriately associated with distinct people (the nationals) but would constantly morph into something else. The trouble, I argued, was caused by a mismatch in the Balkan region between Ottoman political logics and this linear-borders approach toward territory.

More recently, I have drawn on Doreen Massey's concept of power-geometries and stretched it into realms that she probably never intended, in order to explore the idea of the coexistence of different geometries in the same space. This is where the idea comes in of geometry as a mathematical concept and technique with a distinct history and logic that might be drawn upon by people who direct power-geometries.

It is important to recall that geometry, fractal theory, and topology were developed by mathematicians to describe and explore the quality of shapes in mathematical terms, and not to study political geography or the dynamics of social relations. These shapes are abstractions: they do not have to relate, directly or indirectly, to anything that exists in the world. In that sense, a *topological tree* is not a tree: it is a mathematical description of a tree shape. René Magritte's famous "Ceci n'est pas une pipe," written underneath Magritte's drawing of a pipe, makes the same point: Magritte drew an image of a pipe; it is not actually a pipe. Similarly, the graphs, or graphic images, that regularly go with

fractal and topological mathematics are not the entities that they describe: they are graphic images, representations, of abstract mathematical ideas.

Of course, certain aspects of the thinking behind fractal theory, topology, and geometry have been usefully explored, either by analogy or metaphor, to think about social relations in connection to space in some way. As I mentioned above, I myself have done this in my work on the Greek-Albanian border. However, as noted by several others who have critically studied how mathematical metaphors have been used in the social sciences, if you treat a mathematical concept as if it has no history and comes from nowhere, there is always the danger of importing the historically contingent assumptions embedded in those mathematical theories into the conceptual work done on social and political lives.[29] When social theorists describe *topological worlds* or *topological structures*, or say that something in the world is more *topological* today than it was in the past, it is easy to intuitively understand what they mean. But it is important to remember that this is an analogy or metaphor that borrows from a mathematical abstraction to describe something the author is trying to describe, and not a theory to explain some ontological reality. When someone says that a tree is *topological*, what they are saying is that they are choosing to describe that tree in topological terms, rather than, for example, in geometrical, botanical, or aesthetic terms. There is nothing inherently wrong in doing this, of course; but it is important to be careful not to reify the analogy.

Where the logic of geometry, fractals, and topology might directly affect the spatial worlds in which people live, rather than being a good source of metaphors for describing those worlds, is if these logics become incorporated into the political, economic, and other logics that are used to attempt to build the three-dimensional physical world in their image. It is for this reason that I find the work of the likes of Doreen Massey and Stuart Elden rather more engaging on such topics than, for example, the work of Rob Shields or Scott Lash.[30] Even though taking very different approaches, both Massey and Elden are concerned with how epistemologies, the study of the logic of knowledge, performatively create the worlds in which people live. Massey's approach implies that within a certain overarching powerful system, such as neoliberal capitalism, a multiplicity of hierarchically differentiated places would emerge as "criss-crossings in the wider power-geometries that constitute both themselves and 'the global.'" My work on the Greek-Albanian border suggests that these crisscrossings were not only the result of power-geometries generated by one logic of power, but, rather, the outcome of the coming together, and the coexistence, of several different logics: the logic of the nation-state; the remaining traces of the Ottoman Porte's logic of statecraft; and the social logic

of the people of the Greek-Albanian border. It was neither the Ottoman nor the nation-state logic that generated a sense of chaotic fractality in the view of what Roy Wagner would call the *Western hegemonic logic*, but rather the contradictions between these logics.[31]

More than that, the clashes that resulted from these contradictions seem to have generated a sense of coexisting locations in the same place here, both in material and conceptual terms. On the one hand, it was two locations—a patch of Greece and a patch of Albania. On the other hand, the same place was also, for many of those living around the border region, one location, not two: it was the place associated with the villages and pastoral lands of these people. And in a third sense, the place still bore the traces of having been an outpost of the Ottoman Empire, constituting one small section of the dense network of routes across the Ottoman territories, territories that had been structured to facilitate constant movement across these routes, and which resulted, from the perspective of nation-state logic, in such hopelessly mixed populations in the Balkan region.

Here, it would be intriguing to look more closely, not only at the incorporation of geometrical ideas into the construction of contemporary political maps (that is quite easy to trace, as much of the work has already been done);[32] but also the incorporation of those ideas, or other historically contingent spatial concepts, into the work of Ottoman statecraft, and the more contemporary logics of both defining and then creating relations and separations, between here and somewhere else.

In this sense, the various geometries become a part of the story by informing those who create borders, ideologies, roads, rules, and infrastructures, by being part of the logic that informs how they think about the world. In my previous work, I had already argued that the coexistence of different power-inflected logics in the Greek-Albanian border area generated different ways of organizing relations and separations, as well as meaning and value, within the same place. This was unlike Massey's political geography, in which each place had its hierarchically organized location within specific power-geometries (those generated by neoliberal capitalism). Instead, it appears more like that particular place was the site of crisscrossing conflicts between more than one powerful logic that warped the spatial logic that each was attempting to impose in the area. The experience of being in that place was thus characterized by the process of the playing out of those conflicts, which resulted in unstable relations and separations between here and somewhere else. What I do not yet know is how the different geometrical logics were playing out in informing the different parts here. The important element to emphasize for now is the coexistence of the different logics.[33]

Geometries, Cutting, and Gluing

That brings me finally onto the crucial issue of cutting (and gluing). While a key aspect of topological thinking is its focus on the maintenance of similarity and continuity despite all the twists and deformations that can be made with a shape (the element that makes topology particularly interesting to Deleuzians), there is an equally important point, which concerns cutting (and gluing): the topological similarity and continuity between shapes ceases when a cut is made in the shape—metaphorically, one can imagine a balloon being burst, or a doughnut being sliced—or when one part is glued onto another part. As Strathern noted many years ago, cuts (and gluing) are essential to kinship if not for all social life, as well as being a means to stop endless proliferations so as to understand where you are.[34] The cuts and gluing that people make in the world—including the borders and the rules by which you can both connect and separate different parts—are a key part of everyday life, as well as political life. Paying attention to that gives a sense of where the people are in this story of geometries: thinking up ways to rearrange the world, with and without historically contingent ideas and techniques of geometries, in the company of others who have different ideas and poke a pin in your balloon.

NOTES

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1 See, e.g., Katja Franko Aas, "'The Earth Is One but the World Is Not': Criminological Theory and Its Geopolitical Divisions," *Theoretical Criminology* 16, no. 1 (2012): 5–20; Katja Franko Aas, Helene Oppen Gundhus, and Heidi Mork Lomell, *Technologies of Insecurity: The Surveillance of Everyday Life* (London: Routledge-Cavendish, 2009); Ruben Andersson, *Illegality, Inc.: Clandestine Migration and the Business of Bordering Europe* (Oakland: University of California Press, 2014); Eyal Weizman, *Hollow Land: Israel's Architecture of Occupation* (London: Verso, 2007).

2 Yücel Acer, *The Aegean Maritime Disputes and International Law* (Aldershot: Ashgate, 2003); Saskia Sassen, *Territory, Authority, Rights: From Medieval to Global Assemblages*, updated ed. (Princeton: Princeton University Press, 2008); David Valentine, Valerie A. Olson, and Debbora Battaglia, "Extreme: Limits and Horizons in the Once and Future Cosmos: Introduction," *Anthropological Quarterly* 85, no. 4 (2012): 1007–26.

Align note 3 with notes below.

3 Irad Malkin, *A Small Greek World: Networks in the Ancient Mediterranean* (Oxford: Oxford University Press, 2011).

4 Wendy Brown, *Walled States, Waning Sovereignty* (New York: Zone Books, 2010); Madeleine Reeves, *Border Work: Spatial Lives of the State in Rural Central Asia* (Ithaca, NY: Cornell University Press, 2014); Weizman, *Hollow Land*.

5 See, e.g., Glenda Garelli, Charles Heller, Lorenzo Pezzani, and Martina Tazzioli, "Shifting Bordering and Rescue Practices in the Central Mediterranean Sea, October 2013-October 2015," *Antipode* 50, no. 3 (2018): 813–21; Helga Tawil-Souri, "Digital Occupation: Gaza's High-Tech Enclosure," *Journal of Palestine Studies* 41, no. 2 (2012): 27–43; Nick Vaughan-Williams, *Europe's Border Crisis: Biopolitical Security and Beyond* (New York: Oxford University Press, 2015). Pezzani and Heller have also initiated a fascinating forensic oceanography project, which uses volumetric surveillance techniques to recreate drowning disasters in the Mediterranean. See Charles Heller, "Traces Liquides," May 26, 2015, Vimeo video, 17:59, https://vimeo.com/128919244.

6 Jane Caplan and John C. Torpey, *Documenting Individual Identity: The Development of State Practices in the Modern World* (Princeton, NJ: Princeton University Press, 2001); John C. Torpey, *The Invention of the Passport: Surveillance, Citizenship and the State* (Cambridge: Cambridge University Press, 2000).

7 Paul Rabinow, "Artificiality and Enlightenment: From Sociobiology to Biosociality," in *Incorporations*, ed. Jonathan Crary and Sanford Kwinter, 234–52 (New York: Zone Books, 1992).

8 Aas, "Earth Is One"; Katja Franko Aas and Helene Oppen Gundhus, "Policing Humanitarian Borderlands: Frontex, Human Rights and the Precariousness of Life," *British Journal of Criminology* 55, no. 1 (2015): 1–18.

9 Heath Cabot, *On the Doorstep of Europe: Asylum and Citizenship in Greece* (Philadelphia: University of Pennsylvania Press, 2014); Katerina Rozakou, "Nonrecording the 'European Refugee Crisis' in Greece: Navigating through Irregular Bureaucracy," *Focaal: Journal of Global and Historical Anthropology* 77 (2017): 36–49.

10 Hannah Arendt, *The Origins of Totalitarianism*, 2nd English ed. (New York: Meridian Books, 1958), 267.

11 Paul Weindling, *Epidemics and Genocide in Eastern Europe, 1890–1945* (Oxford: Oxford University Press, 2000), 400.

12 Denis E. Cosgrove, *Mappings, Critical Views* (London: Reaktion, 1999); Stuart Elden, *The Birth of Territory* (Chicago: University of Chicago Press, 2013).

13 E.g., Doreen Massey's concept of *power-geometries*, and John Allen's concept of *power-topologies*. See Doreen Massey, "Imagining Globalisation: Power-Geometries of Time-Space," in *Global Futures: Migration, Environment and Globalization*, ed. Avtar Brah, Mary J. Hickman and Máirtin Mac an Ghaill, 27–44 (Basingstoke: Macmillan, 1999); John Allen, "Topological Twists: Power's Shifting Geographies," *Dialogues in Human Geography* 1, no. 3 (2011): 283–98.

14 Euclidean geometry is often used as shorthand for the measurement of static shapes, which is contrasted with topological and fractal geometries that focus on transformations (Lauren Martin and Anna J. Secor, "Towards a Post-

Mathematical Topology," *Progress in Human Geography* 38, no. 3 [2014]: 420–38). As Stuart Elden points out, geometry has come a long way since Euclid, though some of the distinctions still hold (Stuart Elden, "What's Shifting?," *Dialogues in Human Geography* 1, no. 3 [2011]: 304–7). See also, e.g., Nishat Awan, "Introduction to Border Topologies," *GeoHumanities* 2, no. 2 (2016): 279–83; Scott Lash, "Deforming the Figure: Topology and the Social Imaginary," *Theory, Culture and Society* 29, no. 4–5 (2012): 261–87; John Law, "After ANT: Complexity, Naming and Topology," *Sociological Review* 47, no. S1 (1999): 1–14; Rob Shields, "Cultural Topology: The Seven Bridges of Königsburg, 1736," *Theory, Culture and Society* 29, no. 4–5 (2012): 43–57.

15 David S. Richeson, *Euler's Gem: The Polyhedron Formula and the Birth of Topology* (Princeton, NJ: Princeton University Press, 2008), 2.

16 Awan, "Introduction to Border Topologies."

17 Massey first suggested the concept in a paper published in 1999 (Massey, "Imagining Globalisation"), and then reworked it in Massey, *For Space* (London: Sage, 2005), part 3.

18 Massey, *For Space*, 101.

19 Allen, "Topological Twists."

20 One could call the combination of logic, technique, and enforcement a *scale*, but that discussion would take this paper too far outside its limits, as it were.

21 Raffaella A. Del Sarto, "Borderlands: The Middle East and North African as the EU's Southern Buffer Zone," in *Mediterranean Frontiers: Borders, Conflict and Memory in a Transnational World*, ed. Dimitar Bechev and Kalypso Nicolaidis, 149–65 (London: Tauris Academic Studies, 2010).

22 Liisa Malkki, "National Geographic: The Rooting of Peoples and the Territorialization of National Identity among Scholars and Refugees," *Cultural Anthropology* 7, no. 1 (1992): 24–44.

23 Geoffrey King, Derek Sturdy, and John Whitney, "The Landscape Geometry and Active Tectonics of Northwest Greece," *Geological Society of America Bulletin* 105 (1993): 137–61.

24 Sarah Green, *Notes from the Balkans: Locating Marginality and Ambiguity on the Greek-Albanian Border* (Princeton, NJ: Princeton University Press, 2005), 26–29.

25 For some excellent examples of that kind of ethnographic focus, see Daphne Berdahl, *Where the World Ended: Re-Unification and Identity in the German Borderland* (Berkeley: University of California Press, 1999); Hastings Donnan, "Material Identities: Fixing Ethnicity in the Irish Borderlands," *Identities* 12, no. 1 (2005): 69–106; Mathijs Pelkmans, *Defending the Border: Identity, Religion, and Modernity in the Republic of Georgia* (Ithaca, NY: Cornell University Press, 2006).

26 Michael Herzfeld, *Cultural Intimacy: Social Poetics in the Nation-State* (London: Routledge, 1997); Michael Herzfeld, *Ours Once More: Folklore, Ideology, and the Making of Modern Greece* (New York: Pella, 1986); Marilyn Strathern, *After Nature: English Kinship in the Late Twentieth Century* (Cambridge: Cambridge University Press, 1992); Marilyn Strathern, "Cutting the Network," *Journal of the Royal Anthropological Institute* 2, no. 3 (1996): 517–35.

27 Green, *Notes from the Balkans*, chapter 4.

28 Richeson, *Euler's Gem*, 156.

29 See, e.g., Christian Abrahamsson, "Mathematics and Space," *Environment and Planning D: Society and Space* 30, no. 2 (2012): 315–21; Iulian Barba Lata and Claudio Minca, "The Surface and the Abyss/Rethinking Topology," *Environment and Planning D: Society and Space* 34, no. 3 (2016): 438–55; Martin and Secor, "Towards a Post-Mathematical Topology."

30 Elden, *Birth of Territory*; Elden, "What's Shifting?"; Lash, "Deforming the Figure"; Massey, *For Space*; Shields, "Cultural Topology."

31 Roy Wagner, "The Fractal Person," in *Big Men and Great Men: Personifications of Power in Melanesia*, ed. Marilyn Strathern and Maurice Godelier, 159–73 (Cambridge: Cambridge University Press, 1991).

32 John Pickles, *A History of Spaces: Cartographic Reason, Mapping, and the Geo-Coded World* (London: Routledge, 2004).

33 I am currently working with a number of colleagues on two research projects that will hopefully take me closer to an answer (see Sarah Green, "Crosslocations: Rethinking Relative Location in the Mediterranean," University of Helsinki website, accessed October 14, 2019, https://www.helsinki.fi/en/researchgroups/crosslocations).

34 Strathern, *After Nature*.

Align notes 27 and 28 with the notes below.