

from C. Freksa, and D. Mark (eds.), *Spatial Information Theory. Cognitive and Computational Foundations of Geographic Information Science* (Springer Lecture Notes in Computer Science 1661), 1999, 267–282.

Agglomerations

Barry Smith

Department of Philosophy, Center for Cognitive Science and NCGIA,
SUNY Buffalo, NY 14260-1010, USA
phismith@acsu.buffalo.edu
<http://wings.buffalo.edu/philosophy/faculty/smith>

Abstract. Where some have attempted to apply cognitive methods to the study of geography, the present paper is designed to serve as a starting point for applying methods of geographic ontology to the phenomena of cognition. Agglomerations are aggregates of entities that are dispersed through space on geographic scales. Examples include: plagues, biological species, major world religions. The paper applies standard mereotopological theories of spatial regions to agglomerations in this sense. It offers the beginnings of a general theory of the relations between social, cultural, ethnic and religious agglomerations on the one hand and territorially demarcated spatial objects on the other. In this way it serves as the basis for a general ontological theory of types of human groups and also of types of conflict between these groups. At the same time it provides ontological foundations for the epidemiological study of cognitive phenomena, and especially of cognitive phenomena in the sociopolitical realm.

Keywords: ontology, mereotopology, ethnic conflict, territoriality, cognitive epidemiology

1. Introduction

Consider aggregates, for example the aggregate of molecules in your cup of coffee, or the aggregate of Romanesque cathedrals. These are wholes made up of simultaneously existing entities, hereafter called members or participants, which stand to each other in determinate relations of similarity. Some aggregates are of table-top scale; they belong to the domain of our everyday human actions and perceptions. Others, however, are such that their members are widely scattered through space, in such a way that perceiving them—where this is possible at all—would require a succession of observations across a plurality of spatial regions. An *agglomeration* is an aggregate whose members are activities, objects, features, competencies or conditions that are dispersed through space in this sense. They are aggregates of geographic scale. The aggregate of all currently existing token instances of the species *owl* is an agglomeration, but so also are populations and colonies within a given species, for example a plague of locusts, the Peruvian Shining Path, the Bavarian Christian Social Union.

Agglomerations have a principle of unity (a principle of connectedness or mutual relevance of their members) by which they are held together as agglomerations and distinguished from other agglomerations. (For a formal treatment of the principles of relevant mereology governing agglomerations see Smith 1991.) The principle of unity of a biological kind might be one of common DNA. The principle of unity of an organization might be a hierarchical structure of authority with a single head. Other

principles of unity are exhibited by those types of agglomerations we call *avatars* (Damuth 1985), *tribes*, *demes*, *colonies*, *communities*, *corporations*, and so on.

The domain of agglomerations includes also populations of beliefs, representations and other memetic entities on the part of human beings, populations of speech acts of a given language or dialect, populations of common religious affiliation or voting preference, and other large-scale agglomerative phenomena depicted in language and dialect atlases, atlases of religions, electoral atlases, historical atlases, DNA atlases, and so on.

Agglomerations are wholes whose parts are concrete realizations of given activities, objects, features, competencies or conditions at *given times*. Thus our perspective in what follows will be primarily synchronic: we shall examine relations between agglomerations obtaining at a time. But agglomerations will also have histories; they may grow and develop and have a beginning and an end. Occasionally, therefore, we shall need to consider agglomerations also from the diachronic perspective. Agglomerations are, ontologically speaking, *spatial objects*. Their lives or histories are *spatio-temporal objects*. Many of the types of agglomerations which here concern us are hosted by determinate but typically changing aggregates of human carriers and they are analogous in this respect to populations of bacteria or viruses. Hence they admit also of being studied by diachronic methods, of a sort familiar from epidemiology and evolutionary biology.

Agglomerations may evolve. They may merge and split, and they may spawn further agglomerations. A theory of agglomerations will thus need to make room for *principles of identity* which are responsible for the continued existence of agglomerations as identical through changes of different sorts, including spatial displacements.

2. Territorially Demarcated Spatial Objects

Agglomerations are spatial objects which inherit their spatial properties from the spatial properties of the relevant members or participants. The agglomeration called 'antisemitism' (a certain population of beliefs and attitudes of human beings) is in a given spatial region because there are people in that region with those beliefs and attitudes.

Agglomerations are distinguished in this respect from spatial objects, like Kansas, which are demarcated directly in territorial fashion. Such *territorially demarcated spatial objects* will be of interest to us here in virtue of the fact that many agglomerations in the human world, including nationalism, the World Cup, and organized religion, track territorial demarcations. Territorially demarcated spatial objects are themselves artefacts of certain cognitive practices which are spatially dispersed. They depend for their coming into existence upon human fiat (Smith 1994, 1995) and for their continued existence upon certain associated agglomerations of beliefs and actions (Searle 1995).

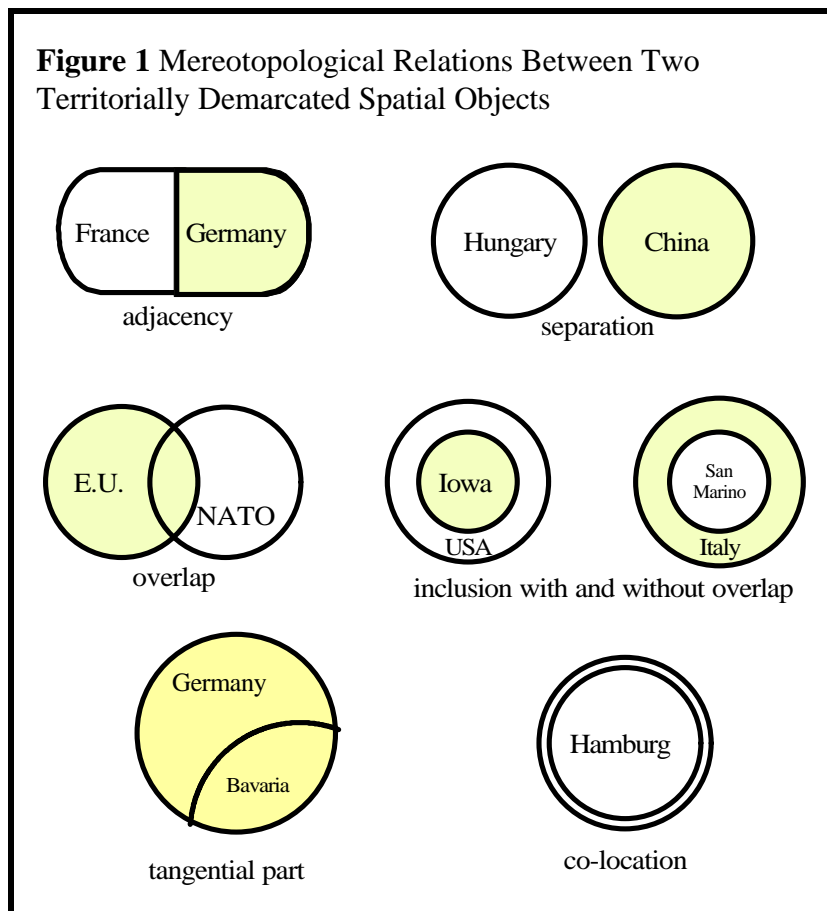
We may encounter here a sort of reciprocal co-determination. Kansas is sustained in existence as a result of the continued existence of an agglomeration of pertinent beliefs about Kansas, which is in turn dependent for its existence on Kansas itself. The structure of authority in the Catholic Church rests on a tessellation of the world into sees, bishoprics, ecclesiastical provinces and so on. The latter are maintained in

existence as territorially demarcated spatial objects because of associated agglomerations of beliefs and actions which are themselves determined in their nature by the determinate territories in which they exist. (They are what we might call indexical beliefs and actions, being indexed by the spatial locations at which they occur.)

This dependence on human fiat and on associated agglomerations of beliefs and practices will imply that territorially demarcated spatial objects (states, provinces, census tracts, administrative districts) are distinct from their underlying regions of space. Each territorially demarcated spatial object coincides, at any given time, with some specific spatial region, but it is not identical therewith. For spatial regions do not have political or cultural or historical properties. They do not begin or cease to exist or change shape or location due to historical events.

3. Mereotopology and Geopolitics

It will nonetheless be useful to draw in our inquiries on standard accounts of simple mereotopological relations between spatial regions. These yield a familiar typology of



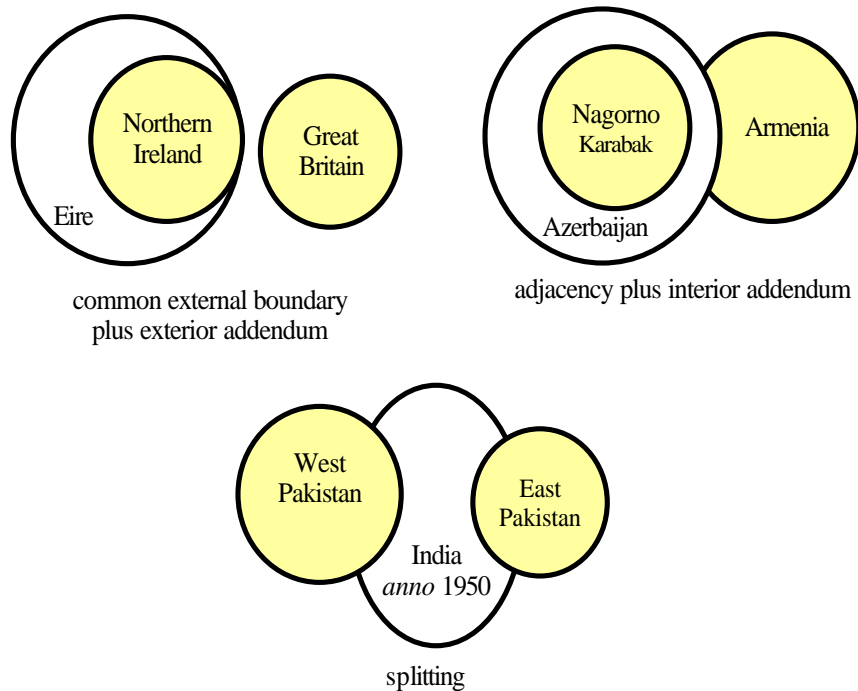
cases (Randall et al. 1992, Cohn et al. 1997, Rugg et al. 1997), which can be applied to territorially demarcated spatial objects derived from the sphere of geopolitics (Figure 1).

Here solid circles represent territorially demarcated spatial objects (shading is used as an informal marker of object-identity within a given figure). Basic mereotopological relations are defined in standard fashion. *Overlap* signifies the sharing of common parts by two objects. *Adjacency* signifies the sharing of boundaries with no sharing of common parts. *Separation* signifies no sharing of common parts and no sharing of boundaries.

All but the last of the cases depicted in Figure 1 can be interpreted equally either in terms of the sharing of common parts or in terms of the sharing of spatial location (Casati and Varzi 1999). This is because, for territorially demarcated spatial objects, sharing of location obtains if and only if there is also a sharing of common parts. Territorially demarcated spatial objects are tied intrinsically to space, even if they are not identical with any given spatial regions. The last case is somewhat tricky, however. *Co-location* signifies the relationship between two spatial objects which share an identical spatial region. For some sorts of entities, as we shall see, co-location does not involve a sharing of parts. Not, however, in our present case. For just as the City of Munich is part of the German Federal State of Bavaria, so the City of Hamburg is part of the German Federal State of Hamburg. But Hamburg *Stadt* is not identical with Hamburg *Land*. Hence the standard mereological remainder principle (according to which, if one thing is part of but not identical to another thing, then there is some third thing which makes up the difference between them) here breaks down. (For more on such paradoxical cases see Smith 1995a.)

We have a narrowing of the range of possibilities if we focus exclusively on those mereotopological relations which can arise among territorially demarcated spatial objects on the same level within a given political-administrative hierarchy (for example on the level of states enjoying equal degrees of sovereignty). Germany can share territory with Bavaria, not however with France. Israel can share territory with the spatial object which is the region under Israeli authority—not, however, with Egypt or Jordan. In giving an account of relations like those between Germany and France, all forms of overlap (except in exceptional and problematic cases, such as on and around the Indo-Chinese border) are excluded. Here, accordingly, the range of alternative possibilities is much narrower, being restricted to adjacency, separation, and surrounding. On the other hand a more variegated repertoire of types of cases arises where one or other of the sovereign objects involved is non-connected (see Figure 2).

Figure 2 Mereotopological Relations between Two Sovereign Geopolitical Objects (One Connected, One Non-Connected) where overlap of spatial location is excluded



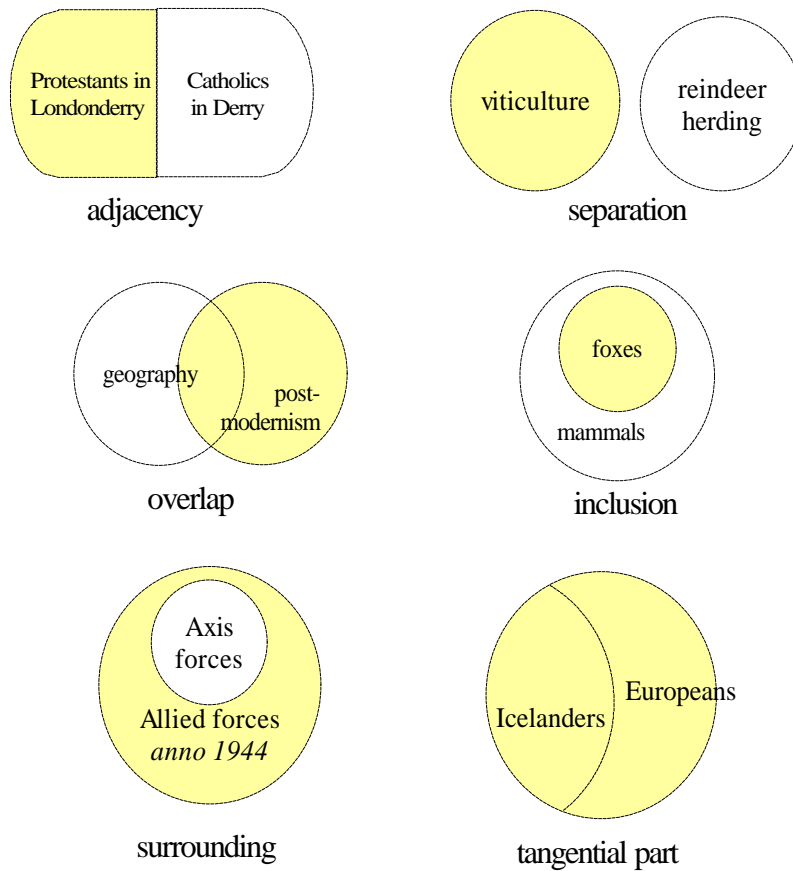
4. Mereotopological Relations amongst Agglomerations

We are now in a position where we can deduce the analogous repertoire of simple mereotopological relations amongst agglomerations. Again, we begin with a treatment of the binary relations which arise amongst agglomerations in virtue of the mereotopological relations among the underlying spatial regions. In addition, we adopt a simplifying assumption to the effect that agglomerations are spread densely and uniformly across the spatial areas which they occupy. The study of such simplified cases is not only useful as a starting point for a complete theory of the relations among agglomerations in general; it is also of value because, as we shall see, it captures important features of the ways we cognize agglomerations when thinking about large-scale social and political phenomena, features that are no longer strictly spatial.

As for territorially demarcated spatial objects, so also for agglomerations, overlap of parts implies also overlap of spatial location. For agglomerations, however, the

converse does not hold. That is, agglomerations may overlap spatially (may occupy overlapping spatial regions) without themselves sharing common parts. This can arise in virtue of an incommensurability of ontological categories. Thus for example the agglomeration of Christian beliefs overlaps spatially, but not mereologically, with the agglomeration of Poles: this is because the parts of Poles are not beliefs, but rather their arms, legs, bodily organs, and so on. Figure 3 depicts cases involving overlap of spatial location which involve also a corresponding overlap of parts. A parallel set of cases could be presented in which agglomerations overlap in spatial location only, and in the absence of any overlap of parts.

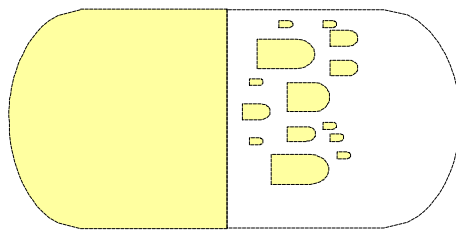
Figure 3 Simple Mereotopological Relations Between Two Agglomerations



5. Diasporas and Archipelagos

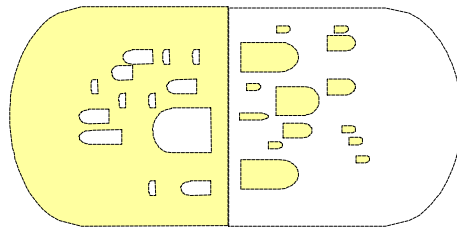
Agglomerations will however very rarely be spread uniformly and with high density across any given spatial area. Agglomerations will thus in very many cases not stand to each other in one or other of the simple binary relations depicted above. Rather they will be such that their spatial relations manifest a greater or lesser degree of one-sided or reciprocal spatial interpenetration, the most simple types of which are represented in figure 4.

Figure 4 One-Sided and Reciprocal Interpenetration between Agglomerations



Diasporas/Archipelagos

*Swedish speakers in Sweden and amongst Finns in Finland
Anglophones in Anglophone Canada and amongst Francophones in Quebec*



Reciprocal Interpenetration

*Catholics and Protestants in Ireland
Arabs and Jews in Israel and in the Occupied Territories*

Such spatial involvement can be all-pervasive (consider, for example, the interrelation between the agglomerations of males and females in human societies or between the agglomerations of hydrogen and oxygen atoms in bodies of water). It can be compounded further via complications which arise through phenomena such as bilingualism, dual nationality, intermarriage and other factors conducive to divided allegiances. Reciprocal spatial embrangement can arise also in the realm of territorially demarcated spatial objects. Consider, for example, the relations between Baarle Nassau and Baarle Hertog, a pair of mutually embrangled (Dutch and Belgian) inland archipelagos in the region south of Turnhout.

6. Agglomerations and Territorially Demarcated Spatial Objects

Where the prototypical examples of territorially demarcated spatial objects (such as Spain and New Zealand) are settled creatures of international law, the associated agglomerations (of Spaniards and New Zealanders) are relatively informal products of habit or convention or of elective affinity. Our current stock of territorially demarcated spatial objects evolved historically against a background of prior agglomerations. In many cases the consciousness of belonging to a group came first; claims on behalf of this group to occupy a specific territory developed later, sometimes via violent conquest. But the evolution of agglomerations themselves has been influenced in its turn by spatial factors, including features of the underlying topography. And there are territorial nations and territorially determined national groups (for example: South Africans, Canadians, Swiss) which exist not primarily because of prior agglomerations, but rather because territories themselves have served as attractors for and, to a degree, as consolidators of the formation of groups.

Indeed the study of the relations between territorially demarcated spatial objects and agglomerations (see Figure 5) can be of quite general service in helping us to understand the ways in which not only our representations of geosocial reality but also *this reality itself* are transformed through social, cultural, political and military processes of a range of different sorts.

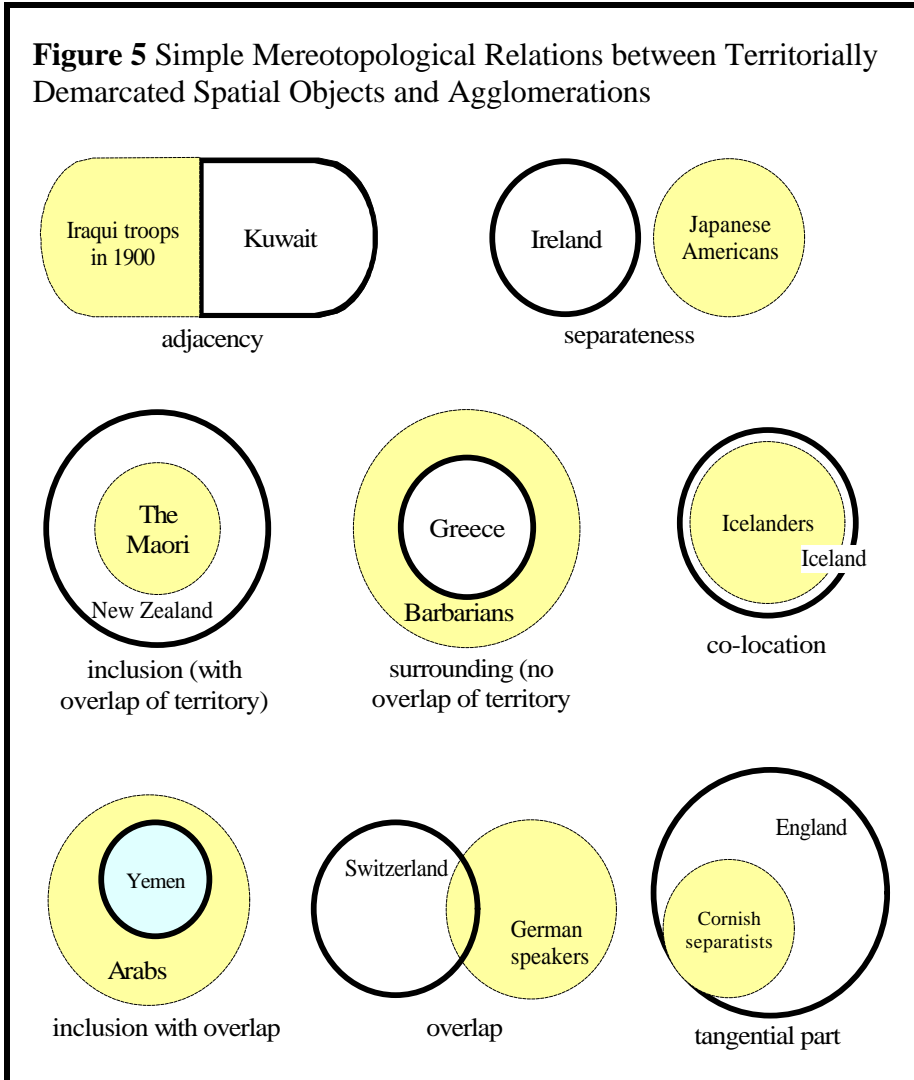
A theory of agglomeration dynamics, of the merging and splitting of agglomerations and of their spatial transformations (see Hornsby and Egenhofer 1997, 1998, Cohn et al. 1997, sect. 7.3) can provide a taxonomy of such real effects. Thus for example it can provide a taxonomy of the types of ways in which sociopolitical entities can be unified together. Such unifications may be lasting (as when the separate British colonies in North America came together to form the United States), or they may be ephemeral (when two social groups enter into dialogue or negotiation, or form of more or less lasting alliance).

Over the course of the last 200 years the land surface of the globe has been subject incrementally to what is now an exhaustive tiling into territorially demarcated spatial objects at the level of nation states. This does not mean, of course, that the order of territorially demarcated spatial objects and the counterpart order of agglomerations have been brought into perfect harmony with each other. On the contrary, there are many regions of the globe where conflicts arise because populations which lack fixed territories of their own are mobilized in ways which threaten to encroach upon this

settled tiling (populations of Kurds, Armenians, of Tamils in Sri Lanka, Moslem Kashmiris in India, Russians in Moldova and the Ukraine, and so on). A theory of the relations between territorially demarcated spatial objects and agglomerations may thus have significance in providing a taxonomy of actual and possible conflicts of this sort. It can supply also a correlative taxonomy of actual and possible types of resolution of such conflicts (which range from ethnic cleansing and expulsion, at one extreme, to negotiated settlement leading either to redistribution of democratic rights within a single territorial entity, or to a splitting of territories, at the other; see Smith 1997a).

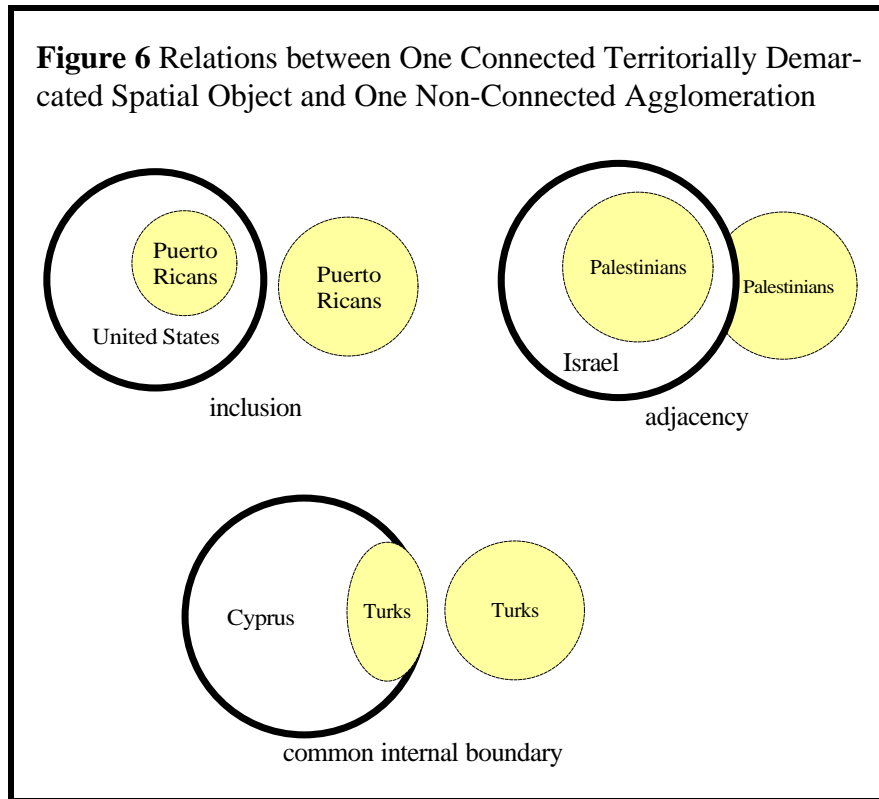
Consider the ways in which geosocial reality is transformed in times of conflict—when, for example, we begin to see the world (correctly or incorrectly) in

Figure 5 Simple Mereotopological Relations between Territorially Demarcated Spatial Objects and Agglomerations



terms of concepts like ‘front’, ‘enemy’, ‘ally’, ‘terrorist’, ‘traitor’, ‘irridentist’, ‘fifth columnist’, ‘secessionist’, or ‘fellow traveler’, and when we encounter the use for rhetorical purposes of mereotopological terms such as ‘partition’, ‘mutilation’, ‘dismemberment of the motherland’, and so on. (Lewin 1917)

Consider, as a further illustration of this type, the mereotopological concept of the *home front*, another creature of wartime political rhetoric. (Consider also: *united front*, *front organization*.) Use of this concept effects on the one hand a dynamic unification



of spatially separated agglomerations into a single whole (comprehending both those who have stayed behind and ‘our brave soldiers out there in the trenches’). But it effects also a dynamic separating of this agglomeration from another, adjacent agglomeration (‘the enemy’), whose boundary is now represented as extending right into our very homes.

Again, more complex cases arise when we consider examples of simple mereotopological relations involving non-connected relata (see Figure 6).

7. Ontology and Epistemology

There is a deeply rooted tendency to conceptualize even widely scattered and rapidly changing agglomerations as compact, stable, homogeneous, thing-like entities, and a no less deeply rooted tendency to conceive the agglomerations in which we humans are involved in terms of simple binary relations (of *us* and *them*, of *Hüben* and *Drüben*, of the *Hegemonic Colonizing Self* and the *Indigenous Colonized Other*). This is in part the reflection of quite general constraints on the degree of complication we can hold in our minds for purposes of comparison. It is in part because of the central role of the logical opposition between positive and negative in human thinking. It is connected also with features of our moral and emotional economy and also with general structural features of co-operative behaviour (for example with the decision-theoretic instability of three-sided conflicts in politics, war, and other spheres). Lakoffians would talk at this point of ‘metaphors’ or of ‘image schemata’. Here, however, we are interested not in the cognition of agglomerations or of other spatial objects for its own sake, but rather in the ontology of the geosocial world, and in the ways in which cognitive factors may bring about *real effects* in social reality. The real effects are most manifest in the evolution of those cultural artifacts we call boundaries, including national boundaries, which are real (but not always physical) parts of the geosocial world. Interestingly such boundaries can be non-connected, as in the case of Indonesia or Denmark (or the United States, or Russia), whose boundaries comprehend into unities spatially separated parts.

Clearly, boundaries alone do not enjoy such integrative power. Rather, it is the underlying beliefs and associated practices which are of crucial importance, as is seen in the fact that analogous real effects, for example the formation of in- and out-groups, can be observed even in the absence of strict territorial demarcations (Schelling 1978). Consider not only the histories of the Jewish, Armenian or Kurdish peoples, which have preserved their identity in spite of spatial separation. Consider also the histories of Poland and Israel, which have been able to preserve their identities even in spite of temporal gaps in the existence of relevant underlying territory.

The real transformative effects of agglomerations of beliefs take hold only under certain very special conditions, determined by political, legal, historical, military and ethnic factors which will vary from case to case. Where they do take effect, however, they may not only transform a plurality of agglomerations into a single unit but also, contrariwise, they may bring an existing agglomerative unity to an end. Consider, again, the way in which the several American colonies were combined together into a single federation, or the way in which old Yugoslavia has been broken down, both at the level of agglomerative groups and at the territorial level, into constituent parts.

Given the existence of such real transformations, it follows that the simplifications in our diagrams above harbour a hitherto unnoticed ontological insight: both agglomerations and territorially demarcated spatial objects may be ontologically unified even in spite of spatial separation, because there exist agglomerations of pertinent beliefs on the part of human subjects which hold them together. Such beliefs may be true or false. Some belief-agglomerations are marked by a special sort of non-accidental truth: the Polish aristocracy exists as a unitary target-agglomeration in part precisely because of widespread beliefs to this effect, beliefs which are *ipso facto* true.

8. Bona Fide vs. Fiat Agglomerations

The world of agglomerations is, it will be clear, affected to a large degree by human beliefs and cognitive practices. There must, however, be some agglomerations which are, in their own right, genuine parts of the causal order of what happens and is the case. This is so, for example, in relation to colonies of single-celled organisms or to shoals of fish. It was on the foundation of belief-independent biological agglomerations of these sorts that beliefs and other higher-order cognitive phenomena first evolved. We shall introduce the term *bona fide agglomeration* to designate agglomerations which exist independently of all human cognition. The term *fiat agglomeration* will designate agglomerations which fall short of bona fide status because they are discriminated from their surroundings as a result of human decision or convention.

The very idea of science as a meaningful enterprise—an idea whose validity is made manifest in successful applications—presupposes the reality of the fiat/bona fide distinction: it presupposes that some, but not all, conceptual distinctions track real divisions in the world. Yet the line between bona fide and fiat agglomerations is a difficult one to draw. This is not least because our very modes of designating even bona fide agglomerations involve the use of concepts which are the products of human cognition and which will thus convey the appearance of cognition-dependence to the objects which they designate. Idealist and relativist doctrines to the effect that everything that exists is the product of human cognition draw their sustenance from this.

Matters are further complicated by the fact that many agglomerations comprehend a mixture of both bona fide and fiat determinations. For our present purposes, it is sufficient to point to a continuum of cases between agglomerations which are to a high degree bona fide at one extreme and agglomerations which exhibit a pronouncedly fiat (or ‘arbitrary’ or ‘artefactual’) character at the other. In this respect it is important to bear in mind that any given spatial region in the domain of geosocial phenomena will typically be overlain by many different agglomerations. Agglomerations are in this respect analogous to geological strata or to map layers. A typical human being will be part of, or involved in, a rich lasagna of, distinct physical, biological, psychological, social, cultural, religious, linguistic, professional and political agglomeration layers, representing a variety of distinct combinations of fiat and bona fide demarcations. Each society thus comprehends its individual members in a multiplicity of ways according to the many agglomerations in which its members are involved through their various social affiliations. For each society is composed not merely of individuals but also of families, of social classes, of unions and professional organizations, of boroughs, churches, etc., and to each of these there correspond different orders of agglomerations to which we owe allegiance or in relation to which we situate ourselves as friend or foe, as participant or non-participant.

Agglomeration layers are bound to each other via dependence-relations among their respective members or participants (see Smith (ed.) 1982, Fine 1995). The agglomeration called language is in this sense one-sidedly dependent upon the agglomeration called humanity; the agglomeration called philosophy (an aggregate of

beliefs, attitudes, speech acts, practices of certain sorts) is one-sidedly dependent upon the agglomeration called language.

9. Races, Nations, Ethnicities

Even agglomerations of a pronouncedly fiat sort, for example the totality of school inspectors living in the Tropic of Capricorn, are not fictitious entities. They are parts of reality which may grow and develop, and this in such a way as to preserve their identity. They may over time acquire features which imply that they partake to some degree of bona fide character.

Assume, for the sake of argument, that there are no physical or biological or other bona fide differences between two groups—say: Srbs and Crts—who live on opposite sides of a great river. The Srb and Crt populations would then constitute agglomerations which are of a pronouncedly fiat character in the sense explained. Assume also, however, that the Srbs and Crts themselves are convinced that such physical or biological differences do indeed exist (Eriksen 1993). Over time, because of what we know about the effects of geographic separation, we could expect such differences to make themselves manifest in intrinsic physical differences between the two populations.

It is somewhere about here that the phenomena of race and racism find their place. The starting point of these phenomena, ontologically, is a certain agglomeration: the totality of human beings. This totality can be divided into sub-agglomerations along a variety of different axes. Some of these axes track more or less bona fide boundary lines, some are exclusively or primarily the product of fiat.

A candidate example of a pronouncedly fiat partition is provided by the division of the human species into Americans and non-Americans. Americans themselves are divided along various further fiat axes, for example into ‘Hispanics’ and ‘non-Hispanics’. In some such cases what begins as a fiat partition may acquire a degree of reality through the workings of topography, war, politics, culture, and other factors.

We have argued that mereotopology can provide a general framework within which the most basic relationships between agglomerations—separation, adjacency, overlap, inclusion, co-location interpenetration—can be represented. We can now see that these basic relationships exist in at least two forms: first, as *spatial* relationships holding directly between agglomerations themselves; second, as relationships holding between given target agglomerations not spatially but *ontologically*, as a result of correlated agglomerations of beliefs on behalf of responsible subjects, beliefs which bring about real transformations within the geosocial realm.

10. Force Dynamic Agglomerations

The most obvious and enduring examples of such transformations occur, once again, in the field of national boundaries, particularly those national boundaries which unify distinct communities into a single whole even in spite of spatial separation. But there are also no less real effects which are of a more ephemeral nature. Consider, the boundaries between the British, French, Dutch, Spanish and Indian spheres of influence

in the North-American continent in, say, 1670, or the boundaries between neighbouring communities of Protestants and Catholics in Northern Ireland in 1990, or of Romanians and Hungarians in Transylvania in 1980, or of Italian- and German-speakers in the South Tyrol in 1970. These are boundaries, often fragmented in character (see Figure 4), which are determined by the actual or potential dynamic interactions of the agglomerations comprehended by the respective bounded objects. They are what we might call *force dynamic boundaries*, boundaries having a certain intrinsic elasticity and a certain dispositional character. The agglomerations which they bound we shall call *force dynamic agglomerations*.

Some force dynamic borders will shift very rapidly. Consider the problem of modern warfare against rebels: during the day, the army can hold the cities and the road, at night only the cities. This means that the area under government control changes between night and day. Or consider the territories on the football field subject in rotation to the control of the two opposing teams.

We take over the terminology of force dynamics from Talmy (1988), but we transpose it into a realist context: force dynamic boundaries, like many other sorts of boundaries, are dependent for their existence upon people's beliefs and attitudes; but they do not exist in people's heads—rather, they exist out there in the world, for example in the zone separating Serbs and Kosovar Albanians. For Talmy, force dynamic boundaries exist in the realm of what he calls 'cognitive structure', and they are always fictitious (or, in another terminology, 'metaphorical'). For us, in contrast, the most important force dynamic boundaries are constituents of reality (some of which arise through the reciprocal interaction between human groups, some of which exist independently of human cognition and action, for example in the phenomena of animal territoriality: see Taylor 1988). Indeed we should argue that it is only because some real force dynamic boundaries are salient in our experience and relevant to our survival, that we acquire the capacity to manipulate force dynamic structures also in fictitious or metaphorical ways.

11. Conclusion

There are some, for example anthropologists of a postmodern stripe, who will argue that any talk of what we are here calling agglomerations as unities and as identities through time is illegitimate. There are, they will claim, no 'societies' or 'cultures', because the human world is a seamless fabric of zones of interpenetration and interinfluence that is marked by endless hybridization. The world of agglomerations does indeed exhibit a lower degree of mereotopological tidiness than do the worlds of sovereign political objects and of political and administrative and ecclesiastical subdivisions. It is a world marked commonly by continuous rather than discrete transitions, by border zones rather than border lines, a world that is pervasively subject to interpenetrating diasporas and archipelagos.

But we should not draw the wrong conclusions from all of this. For consider the analogous argument to the effect that, because (1) two opposing armies are such as to interpenetrate spatially at points of conflict, are divided by constantly shifting border zones and harbour pockets of fifth columnists and deserters, then it follows that (2) there

are not two opposing armies at all, but rather a single undifferentiated mass that has been subjected to a ‘metaphorical’ narrative of ‘oppositional discourse’. The correct response to such confusions is not to abandon the task of understanding geosocial phenomena in a genuinely realist fashion; it is to develop an ontological theory of societies, cultures, populations, languages, religions, and armies, which will do justice to these phenomena in their full agglomerative complexity.

Acknowledgments: This paper is a part of Research Initiative 21, “Formal Models of Common-Sense Geographic Worlds,” of the National Center for Geographic Information and Analysis, supported by a grant from the National Science Foundation (SBR-8810917); support by NSF and by the University at Buffalo Multidisciplinary Pilot Program is gratefully acknowledged.

References

- Casati, R. and Varzi, A. C. 1999 *Parts and Places: The Structures of Spatial Representation*, Cambridge, MA, and London: MIT Press (Bradford Books).
- Cohn, Anthony G., Bennett, Brandon, Gooday, John and Gotts, Nicholas Mark 1997 “Qualitative Spatial Representation and Reasoning with the Region Connection Calculus”, *Geoinformatica*, 1, 1–44.
- Damuth, J., 1985, ‘Selection among “Species”: A Formulation in Terms of Natural Functional Units’, *Evolution* 39, 1132–46.
- Eriksen, Thomas Hylland 1993 *Ethnicity and Nationalism. Anthropological Perspectives*, London: Pluto Press.
- Fine, Kit 1995 “Part Whole,” in: Barry Smith and David W. Smith (eds.), *The Cambridge Companion to Husserl*, Cambridge and New York: Cambridge University Press, 463–485.
- Hornsby, Kathleen and Egenhofer, Max 1997 “Qualitative Representation of Change”, in Stephen C. Hirtle and Andrew U. Frank (eds.), *Spatial Information Theory. A Theoretical Basis for GIS* (International Conference COSIT ’97, Laurel Highlands, Pennsylvania, October 1997), Springer Lecture Notes in Computer Science 1329, 15–33.
- Hornsby, Kathleen and Egenhofer, Max 1998 “Identity-Based Change Operations for Composite Objects”, *SDH ’98. Proceedings of the 8th International Symposium on Spatial Data Handling*, T. K. Poiker and N. Chrisman, eds., Vancouver: International Geographic Union, 202–213.
- Lewin, Kurt 1917 “Kriegslandschaft”, *Zeitschrift für angewandte Psychologie*, 12, 440–447.
- Randell, D. A., Cui, Z. and Cohn, A. G. 1992 “A Spatial Logic based on Regions and Connection”, *Proceedings of the 3rd International Conference on Knowledge Representation and Reasoning*, Boston, October 1992 (<http://www.scs.leeds.ac.uk/spacenet/publications.html>).

- Rugg, R., Egenhofer, M. and Kuhn, W. 1997 "Formalizing Behavior of Geographic Feature Types," *Geographical Systems*, 4 (2), 159-179 (<http://www.spatial.maine.edu/~max/RJ24.html>).
- Schelling, Thomas 1978 *Micromotives and Macrobehavior*, New York/London: Norton.
- Searle, John R. 1995 *The Construction of Social Reality*, New York: Free Press.
- Smith, Barry 1991 "Relevance, Relatedness and Restricted Set Theory", in G. Schurz and G. J. W. Dorn, eds., *Advances in Scientific Philosophy*, Amsterdam/Atlanta: Rodopi, 45–56.
- Smith, Barry 1994 "Fiat Objects," in N. Guarino, S. Pribbenow, and L. Vieu (eds.), *Parts and Wholes: Conceptual Part-Whole Relations and Formal Mereology. Proceedings of the ECAI94 Workshop*, Amsterdam: ECCAI, 15–23.
- Smith, Barry 1995 "On Drawing Lines on a Map," in A. U. Frank and W. Kuhn (eds.), *Spatial Information Theory. A Theoretical Basis for GIS*, Berlin and Heidelberg: Springer-Verlag, 475–84 (<http://wings.buffalo.edu/philosophy/faculty/smith/articles/drawing.html>).
- Smith, Barry 1995a "More Things in Heaven and Earth", *Grazer Philosophische Studien*, 50, 187–201 (<http://wings.buffalo.edu/philosophy/faculty/smith/articles/meinong.html>).
- Smith, Barry 1996 "Mereotopology: A Theory of Parts and Boundaries," *Data and Knowledge Engineering* 20, 1996, 287–304.
- Smith, Barry 1997a "The Cognitive Geometry of War", in Peter Koller and Klaus Puhl (eds.), *Current Issues in Political Philosophy: Justice in Society and World Order*, Vienna: Hölder-Pichler-Tempsky, 394–403 (<http://wings.buffalo.edu/philosophy/faculty/smith/articles/bosnia.html>).
- Smith, Barry (ed.) 1982 *Parts and Moments. Studies in Logic and Formal Ontology*, Munich: Philosophia.
- Taylor, R. B. 1988 *Human Territorial Functioning. An Empirical, Evolutionary Perspective on Individual and Small Group Territorial Cognitions, Behaviors and Consequences*, Cambridge: Cambridge University Press.
- Talmy, Leonard 1988 "Force Dynamics in Language and Cognition", *Cognitive Science*, 12, 49-100.