

Fiat boundaries: how to fictionally carve nature at its joints¹

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Abstract: Boundaries are the outermost parts of objects, with a twofold function: dividing objects from their environment and allowing objects to touch one another.

The task of this paper is to classify and describe the human dependent boundaries, i.e., the so-called fiat boundaries, on the basis of the seminal work by Smith and Varzi. Roughly, a fiat boundary is a marker of discontinuity between two or more objects which relies on a human function assignment, usually called “fiat act”.

In what follows I outline the different ways in which human beings make fiat boundaries out of nature. Along the way I shall give evidence that a theory of fiat boundaries can be useful to take up as a starting point for doing metaphysics and for giving an account of the ontology of both the material and the social world. The chief goal is to shed light on how some objects depend upon human beings: either in a deliberative or non-deliberative way; either a priori or a posteriori; by means of individual or collective act. Eventually, I will investigate the modal profile of fiat boundaries.

Keywords: fiat boundary; metaphysics; social ontology; geography

1. *Introduction*

What are boundaries? Roughly, boundaries are the outermost parts of objects, as already Euclid and Aristotle point out (Varzi 2015).

It is not difficult to provide some examples of boundaries:

1. The point vertex of a cone.
2. The borders of Italy.
3. The coastline of Sardinia.
4. The outermost layer of my body.
5. The end of the football match.
6. The beginning of my life.

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7. The surface of a desk.
8. The horizon.
9. The division between sexes.
10. The limit between sea and sky.

Some of them are zero dimensional, as in 1, 5, and 6, some other are one dimensional, as in 2, 3, 8, and 10, some other are two dimensional, as in 4 and 7. They may be spatial, as in 1, 2, 3, 4, 7, and 10, or temporal, as in 5 and 6, or neither of the two, as in 9. They are ontological dependent upon human beings, as 2, 5, 8, and 10,² the so-called fiat boundaries, or ontological independent, as in 1, 3, 4, 7, the so-called bona fide boundaries, or it is controversial whether they are fiat or bona fide, as 6, or are arguably a mixture of fiat and bona fide components, as in 9.

For the sake of simplicity in what follows I will focus only on spatial boundaries of physical objects, namely boundaries such as 2, 3, 4, 7, 8, 10.

Boundaries like these have a twofold function: to divide objects from their environment and to allow objects to touch one another (e.g., Chisholm 1983: 87; Sorensen 1998: 280-281; Casati and Varzi 1999: 72; Galton 2007: 387).

The paper aims to fill a gap in the literature. There are several useful papers that make good taxonomies and useful descriptions of boundaries, based on all different kinds of criteria, especially geographical (e.g., Galton 2003; Tambassi 2018). The task of this paper is to classify and describe only a subset of all boundaries: the human dependent ones, namely the so-called fiat boundaries as opposed to bona fide boundaries, the human independent ones. Roughly, a fiat boundary is an indicator of discontinuity between two or more objects marked out by a human intervention through a so-called 'fiat act'. A bona fide boundary is instead a discontinuity between two or more objects whose status is independent from human beings. This classification is carried out on the basis of the seminal work by Smith (1994; 1997; 2001) and Smith and Varzi (2000).

The plan of the paper is as follows. I develop in detail a theory of fiat boundaries, i.e. an account of the exact meaning of fiat. More specifically, I explain: (§1) how fiat boundaries depend upon human beings and (§2; §3) how fiat boundaries are created by means of a fiat act. Then, (§4) I classify different kinds of fiat boundaries.

The aim of the paper is to outline the different ways in which human beings make fiat boundaries out of nature highlighting their central role in our

² It may be argued that even 4 is a genuine case of a boundary that ontologically depends on human beings. However, roughly, an object ontologically depends on another object if and only if the former cannot exist unless the latter does. My skin can well exist even though I no longer exist, e.g., my skin can remain in existence after my death.

metaphysical picture of the world. I shall give evidence that the theory of fiat boundaries can serve as a useful starting point for doing metaphysics and for giving an account of the ontology of the material world. Along the way, I will shed light on how some objects depend upon human beings.

Just to take one example, although the border of a nation and the horizon are both fiat boundaries, there are several differences between them. In this paper, I consider both the similarities and the differences between those kinds of fiat boundaries, in order to frame the debate.

Before get started, let me spell out some useful assumptions on boundaries which are inspired by Cartwright (1975). Let p be a variable for every spatial point, r a variable that ranges over region, o a variable that ranges over objects.

- (B1) a point p is a boundary point of r if and only if (henceforth iff) every open sphere about p have a non-null *intersection* with both r and the complement of r .
- (P1) an open sphere about p is a region the members of which are all and only those points that are less than some fixed distance from p .
- (B2) o is an open object iff it is located in a region r and none of the boundary points of the region r is located in a subregion of r .
- (B3) o is a closed object iff it is located in a region r such that the boundary points of r are located in a subregion of r .
- (B4) o is a partially open object iff it is located in a region r such that some boundary points of r are located in a subregion of r .

2. *Bona fide and fiat boundaries*

The dichotomy between bona fide and fiat boundaries was first introduced by Barry Smith in his (1997) and further refined in his (2001). That dichotomy was then employed for solving the problem of contact by Smith and Varzi (2000). However, the idea can be traced back to Stroll (1988: 183-212) who set up a “geometry of ordinary speech” which differentiated between abstract and physical surfaces.³

The intuitive idea behind the dichotomy is that there are some boundaries *in space* that depend on human beings and that do not necessarily take up space,⁴

³ But not everyone likes the distinction, see Boniolo, Faraldo, Saggion 2009 for a different dichotomy.

⁴ An object takes up space iff it is material and necessarily, it is the only occupant of a given kind of the region it actually occupies. The first clause states that an object has to be made of some material in order to occupy a region of space. The second clause, which relies on the so-called Locke’s Law (Fine 2000), states that each region of space can host at most one guest of a given kind, e.g., a region

such as a national border, and some other that instead are human independent and necessarily take up space, such as the surface of a table. More accurately, the difference between the two kinds of boundaries is threefold. It regards (i) the relation between objects and human beings; (ii) the relation between boundaries and boundary markers; (iii) the causal efficacy. Therefore, we have three criteria for distinguishing bona fide boundaries from fiat boundaries.

The first distinction is that a bona fide boundary belongs to the furniture of the world, whereas a fiat boundary owes its existence to the human ways of representing, conceptualizing, describing, and perceiving the world (Smith and Varzi 2000: 402). In other terms, a bona fide boundary is human independent and a fiat boundary is human dependent. Human dependence is a particular case of ontological dependence. Usually, it is said that an object ontologically depends on human beings iff it cannot exist unless human beings do (Correia 2008: 1014). I am going to explain more in depth how human beings necessitate boundaries in the next pages.⁵

The second criterion rests on the relation between boundaries and boundary-markers. A bona fide boundary takes up space by marking a discontinuity between an object and its surrounding, e.g., the boundary of *o* marks the region in which the world stops to be *o* and begins to be something else. That is, the world behind the boundary is somehow homogeneous, the world beyond the boundary is somehow different. Instead, a fiat boundary is not necessarily a discontinuity in space, it can arise where there is a spatial continuity between two objects, e.g. between two administrative areas that both lay on a flat land. In this case the boundary marks a discontinuity without any spatial marker. To put it in other words: a fiat boundary is a human projection onto space and thus it does not necessarily correspond to a discontinuity that takes up space, whereas a bona fide boundary is an object in space, whose role is to be the boundary of a further, bigger object.

The third criterion is that a bona fide boundary is causally efficacious, whereas a fiat boundary is not (Smith and Varzi 2000: 402). A bona fide boundary enables that every operation which it undergoes was inherited also by the whole object it bounds, e.g., scratching a table entails that the table is scratched

table-shaped can host at most one table.

⁵ Meanwhile, it should be noted that even if the boundary of an object is of the fiat sort, this does not entail that the whole object is fiat too. Let us consider a closed three-dimensional object *o*. The boundary of *o* may be either bona fide or fiat. Its boundary allows us to speak about “this” object as *o* and *o* owns its individuality due to its boundary. Otherwise it turns out to be epistemologically and ontologically impossible to discern *o* from its complement, since it would not be defined where one begins and the other ends. Nonetheless, the stuff of which the object is made of can be fiat or bona fide regardless of the status of its boundary.

since one of its part is so. Instead, a fiat boundary cannot be causally efficacious since it is not, strictly speaking, in space. Thus, a bona fide boundary behaves as every other object in space, whereas a fiat boundary is a representation that we pretend that behaves as a boundary in space. In that sense fiat boundaries fictionally carve nature at its joints.

We can explain the difference between bona fide and fiat boundaries in a nutshell by summing up the three criteria as follows:

- Human Dependence criterion (DC): bona fide boundaries are human independent, whereas fiat boundaries are human dependent.
- Heterogeneity criterion (HC): a bona fide boundary occupies and is located in space, whereas a fiat boundary is only located in space. That is, a bona fide boundary has to coincide to a discontinuity in space, a fiat boundary may or may not coincide to a discontinuity in space.
- Causal criterion (CC): a bona fide boundary has to be causally efficacious.

The CC criterion needs an explanation since it is the more controversial one. Let me just remark that I do not hereafter assume that every object in space has to be causally efficacious, but only what I have already said: a boundary has to be causally efficacious, otherwise it would lose some of its peculiarities.

Let us consider a three-dimensional object *o*. Let us take whatever possible operation that can be performed upon the surface of *o*, i.e. its boundary. Accordingly, each of those possible operations is also performed upon *o*. Instances may be: painting, scratching, polishing, cleaning, seeing, touching, and so forth.

The converse clearly does not hold. Indeed, since *o* has one dimension more than its surface, it may be subject to more operations than its surface: rolling, bouncing, cruising by, and so forth.

Although it seems obvious, Stroll (1988: 21) set forth an important constraint to it. He claims that not every operation performed upon a surface is an operation performed upon the whole object. For instance, certain intensional activities such as admiring the surface of *o* are not performed upon the whole *o* but only upon its surface. Suppose Stroll is right. Then, there would be a possible way of admiring the surface of *o*, without admiring *o*. According to the notion of boundary I set up, the boundary of *o* is a part of *o*. Assume it is the case. So, when we admire the boundary of *o* we are admiring a part of *o*, perhaps regardless the remainder. However, *o* is in a certain sense admired: it is admired in one of its parts and since *o* is every one of its parts jointly taken whatever principle of composition you prefer, *o* is admired. Indeed, if we detach the surface of *o*, every new operation after the detachment is not performed upon the surface of *o* anymore, but upon a two-dimensional object

that was the surface of o . Therefore, every operation, even if intensional, is performed upon o .

At any rate, the reader may not accept CC and, nevertheless, she may accept DC and HC. The three criteria are quite independent, although objects which occupy space are usually causally efficacious and human independent. Nevertheless, I can drop CC here due to its relative independence. I concentrate only on DC and HC to make a definition of fiat boundary:

- Fiat Boundary: x is a fiat boundary iff (i) it is a boundary and (ii) it necessarily is human dependent and (iii) it possibly does not correspond to any discontinuity in space.

The point (i) is the straightforward clause that has to avoid that every arbitrary object can count as a boundary even when it does not have the necessary features. The clause (ii) is HD with the modal strength of necessity and the clause (iii) is HC with the modal strength of possibility.⁶ The two different modalities should convey that only an outcome of a human being can be a fiat boundary and a human being is free to determine where to give rise a new fiat boundary. By means of the same but opportunely modified constraints we can also obtain the notion of bona fide boundary.

- Bona fide Boundary: x is a bona fide boundary iff (i) it is a boundary and (ii) it necessarily is not human dependent and (iii) it necessarily corresponds to a discontinuity in space.

The clause (i) is trivial as in the former definition. The clause (ii) states that a bona fide boundary must not depend on human beings for its existence. The clause (iii) states that it has to correspond to a discontinuity in space.

3. *Human dependence*

Consider the boundary between Morocco and Libya. In the region between them there is no spatial discontinuity, no barrier or natural or artefactual border. Nevertheless, there is a line in the maps of that region, i.e., the boundary between them. Although that boundary is not spatially present, it exists as long as international treaties recognize it. It is a human creation more akin to an

⁶ As an anonymous referee pointed out that the clause (iii) requires that a fiat boundary b could have not corresponded to any discontinuity in space and hence the correspondence to a discontinuity in space is a contingent feature of b . That is, there is a possible scenario in which the northern boundary of Italy does not correspond to Alps. I think that it is precisely one of the main features of fiat boundaries: the possibility to not correspond to spatial object, such as the southern boundary of Libya.

institution, such as a church, than a physical artifact, such as a wall. Boundaries like this are made by human beings without manipulating the space, i.e., without an interference in a spatial causal chain, but instead by outlining and recognizing them within institutional frameworks, such as treaties, collective beliefs, tales, memories and so on. And those boundaries depend on human beings insofar as they would disappear if they were erased from human representations. The classic treatment of this kind of human dependence was developed by Searle (1995: 156), whose claim can be stated as follows:

- HDS (human dependence according to Searle): Necessarily, x is human dependent iff it is a priori dependent on human beings' concepts.

An object a priori depends on human beings' concept when its identity criteria are conceptually fixed before it is brought into being. Namely, there is a concept, or a set of concepts, that fix the identity criteria of such object before the object itself exists. Such concepts dictate what features an object must have in order to be a boundary, e.g., the thickness, the color, the spatial coordinate, and so on. A dependence relation like this yields the epistemic advantage to have a full knowledge of the dependent object, unlike the natural object that should be discovered.

However, as Borghini (2014) claims, not every fiat boundary responds to such kind of a priori dependence. Consider a dancer who is playing *The Nutcracker*. The boundary of her dance holds all the required features to be of a fiat sort: it is a boundary, it is not marked by a discontinuity in space, it is human dependent. The boundary of a dance is drawn by the dancer with her body's movement within an interval of time. Such movement has to follow a precise script: with which foot to start, how to move on the stage, how to interact with other dancers, how to sway to the music, and so forth. We have then a situation like this: the body of a dancer occupies a certain volume of space in a fixed interval of time. Once a dancer moved through space from one region to another she defines the boundary of her dance without leaving any physical marker in her wake. Hence the boundary of her dance does not correspond to any discontinuity in space. That is, the full trajectory of the dancer movement is not wholly occupied by the dancer's body but just outlined by her, who can at least occupy one region at a time and not the set of all her dance movements all at once. Nevertheless, the dance boundary is not just the one of the dancer's body, it is instead the whole boundary of her trajectory, which is not completely physically marked by her body but it is made out of thin air.

Although the boundary of the dance is not material, it is necessarily needed in order to evaluate whether the dance is correctly performed: namely, whether the dancer abides by the script that states how that dance has to be

performed. Clearly, the correct performance of the dance can be evaluated only once it is over for a number of reasons. For instance, since every stage where a dance is performed is different, on every different stage a different performance is carried out. Furthermore, the body of each dancer has a different volume and her movement may differ due to a wide range of reasons. Thus, there would not be an a priori alignment between the boundary of a performed dance and the rules that dictate how that dance should be performed. The alignment can be evaluated only a posteriori, namely only once the dance is performed. This because the boundary of a specific dance is drawn only once the dance is performed. Hence, the identity criteria of a dance can be fixed only a posteriori. Therefore, the fiat boundary of a dance cannot depend a priori on human beings. Surely, however, it depends on human beings a posteriori, since it is carried out by a human being who tries to adhere to a script.

The same can be said for many spatial fiat boundaries. Let me put forward another example with a more familiar boundary, namely the geographical border between Italy and Austria on the Alps. It seems a suitable candidate for the kind of a priori dependence described at the outset of the paragraph, since it is a line that exists only on the maps and hence it should be fixed a priori. Nevertheless, even this border is fixed a posteriori. Part of this border lies on the Alpine watershed line and every year it flows at few meters, due to the global warming and shrinking glaciers. The border is tracked once every two hours in order to update its position on the maps.⁷ Therefore, even what should be a paradigmatic case of a priori boundary, is instead an a posteriori one.

At the end of the day, what I claim is that a priori dependence is a too narrow constraint on general human dependence for the case of boundaries. Consider the following argument that should undermine the a priori dependence:

1. Boundaries of a dance are drawn a posteriori (A).
2. Fiat boundaries are drawn a priori (HDS).
3. Boundaries of a dance are not of the fiat sort (from 1 and 2).

The conclusion 3 is at odds with the definition of fiat and bona fide boundaries. The definition claims that a fiat boundary possibly does not correspond to any spatial discontinuity. In the case of a dance, there is a boundary and no spatial discontinuity. Thus, either there is no boundary, and that is contradictory with the assumption that a dance has a boundary, or it is bona fide, but

⁷ See the project Italian Limes by the design and research studio Folder and the Italian Glaciological Committee <<http://www.italianlimes.net/index.html>>.

that contradicts the notion that a bona fide boundary must correspond to a discontinuity in space. If we accept that there is a boundary of a dance and that boundary is of the fiat sort, then we have to reject HDS.

Thus, the first point against HDS is that a human dependent object does not necessarily depend on human beings a priori.

Furthermore, there is a second reason why HDS is not a good characterization of human dependence. HDS states that since a dependent object depends on concepts, such dependence has to be deliberative, i.e. human beings should know what objects depend on them. That position has two corollaries:

1. Human beings always know what they necessitate;
2. Human beings choose what they necessitate.

The corollaries seem to fit our intuitions, nevertheless the study of boundary teaches us that the two corollaries contravene some other intuitions.⁸

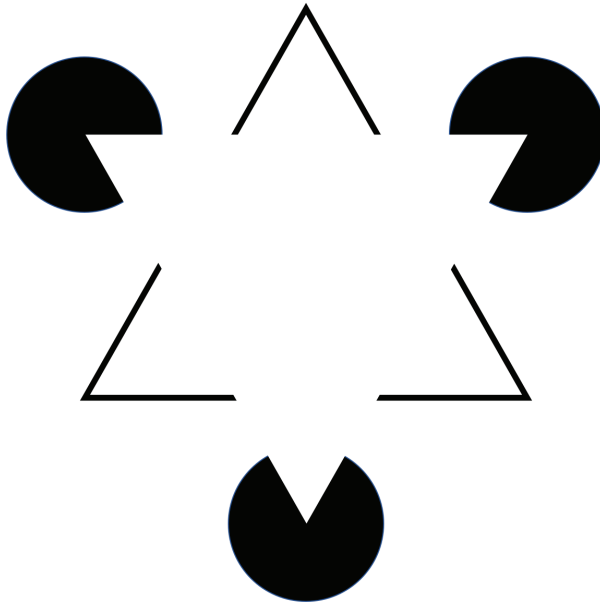
Consider the first corollary. It is easily provable: since every dependent object is the outcome of concept and a concept presupposes the knowledge of it (e.g., Searle 1995: 137-139), every dependent object is known. I added «always» since a definition has to be trivially known over every instant of time of which it is known.

Consider the boundary of the Mont Blanc and the valley around. The distinction between the two may be considered as human dependent since there is no spatial discontinuity in between. In this case it seems that the first corollary is false: not everyone is aware that the distinction between the two is human dependent. Clearly, a supporter of SHD can rebut, saying that there are some people that know that the boundary between Mont Blanc and the valley is human dependent. Nevertheless, it seems that even people aware of it lack the knowledge about where the boundary is. That is, such boundary is not in a precise region, rather it is vague, and it is unlikely that there will be a convention that fixes precisely where such boundary should be located. Even if such location was fixed by a convention, it would turn out to be a posteriori in respect of the boundary itself. Perhaps it would be fixed according to certain empirical evidences, or to pragmatic purposes, or by chance, and, thus, not on the basis of purely a priori facts. Thus, it cannot be said that people always know what they necessitate.

Consider now the second corollary. It says that people chose what they necessitate. For instance, when a national border is fixed, there is an agreement among politicians and, thus, politicians chose to stipulate an agreement.

⁸ Also economic recessions, racism, and sexism show that not every human dependent object is conscious and voluntary, as Tuomela (2003: 161) and Thomasson (2018: 541) argue.

Nevertheless, such possibility of choice about dependence cannot be generalizable. Consider the famous Kanizsa Triangle. We see in the picture two triangles. We correctly see the boundary of one of the two since it has a black perimeter. But we illusorily see the boundary of the other one although it does not have a drawn perimeter. We know that this second perimeter is the product of our perceptual system and, thus, such boundary is not in space. Nonetheless, we cannot choose to move that boundary to a new region by an agreement or by another kind of act.



Furthermore, we cannot decide a priori anything about the nature of such boundary, since it is an effect of our way of perceiving the world. This is also true of a wide range of boundaries. Consider the boundary between the zone inhabited by Catholics and the one inhabited by Protestants in Belfast. That boundary is clearly fiat, since there is no discontinuity in space that marks it. And it is not chosen since it is the value of a function that calculates the progressive decrease in one population.⁹

The very problem of SHD is that it is too narrow and it cannot encompass all the ways in which boundaries depend on human beings.

⁹ The example is inspired by Thomasson 2001: 152-153.

Thus, we need a new characterization of human dependence made just for boundary. I propose the following one:

HD: Necessarily, a boundary is human dependent iff necessarily, its location is fixed by a fiat act.

HD states that a given boundary depends upon human beings if its location, i.e. the region or the sum of the regions it occupies, is fixed by a fiat act. For instance, the location of the boundary of a mountain and the valley around it is fixed by our not so fine-grained sight. That is, we fix the boundary of the mountain where we perceive the difference between the mountain itself and its surroundings, although there is no such difference.

A further clarification is needed of the right-hand side of the biconditional. First, the reason for the modal strength. Second, what «fiat act» means.

The modal strength is needed here since it rules out the possibility that the location of a boundary is fixed by non-human factors. For instance, consider a table: the location of its surface is fixed not only by a human act, but even by a large variety of non-human events, such as the gravitational pull, the texture of the wood, and so on. Thus, the surface's location is not human dependent.

Let us now turn the notion of fiat act. That notion was already employed by Smith in his aforementioned works on fiat objects. Unfortunately, he did not explain what he meant. He said only that a fiat act is a human act. But manufacturing a table is also a human act, nevertheless it is clearly different from what we need in this context. We have to rule out every attempt to identify each act carried out by a human being with the fiat ones because in that case, the notion would collapse in a broader one. Furthermore, as noted at the very beginning of the paragraph, we are speaking about something that is not causal in space and some human acts are so.

A fiat act may be either a primitive notion that encompasses every act that is human and non-causal in space, or a complex notion liable to analysis.

I give up the first possibility, since even if it seems difficult to find a suitable definition of fiat act, I think there is at least a resemblance among the various kinds of acts it denotes.

4. *Fiat acts and non-heterogeneity*

As noted, a fiat act confers a special status on some stuff without any causal interaction with it. Moreover, I also argued that a purely a priori approach is too narrow and it does not include some cases, such as perceptions or actions. What is then to confer a special status on some stuff? The narrower problem

here is to understand what confers on a certain hunk of stuff the particular status of boundary. That is, what I called a fiat act.

Let us begin with the received view of such kinds of acts, proposed by Searle (1995). He stated the following rule:

«*x* counts as *y* in *c*»

This means that a certain object counts as a certain other object within a context. For instance, a certain region of space counts as the boundary between two nations within the context of an international treaty. As stressed above, Searle thinks that such status is conferred by that act because it is led by a collective intention. As I have already argued, such a claim rules out some important fiat acts, such as the individual ones and the non-deliberative ones. I want, then, a broader criterion that also includes those two kinds of act. I think the following one may be a good solution:

- Fiat Act: *x* is a fiat act iff (i) it is a human act; (ii) it is not causally efficacious in space; (iii) it is causally efficacious in a representation of space.

The clause (i) states that a fiat act is a human act. It rules out the possibility that certain animals' acts may be included here.¹⁰ The clause (ii) stipulates that such an act does not have any causal efficacy in space; otherwise such a definition would also include acts such as manufacturing or other human acts that are rather causally efficacious in space. The last clause rules out from the list of possible acts the pure imaginative ones, such as creating a fictional character in a novel or proving a theorem.¹¹

One can argue that a fictional character may be in a certain representation of space, e.g. Sherlock Holmes was located in the representation of Victorian London. Hence, arguably, such a definition of fiat act also covers the act of creating a novel. Yet I need to rule out such a possibility since I think that the representation of space in a novel and the representation of space as assumed in the definition – henceforth referred to as RS – own very different features. I suppose that those features are to be tracked down in the reasons why RSs come into being, in consistency with some non-human dependent laws, and in the components of representations. Indeed, an RS involves among its motivations some pragmatic aims as a matter of essence, e.g., a tourist map of London is helpful for moving with a greater ease in the city. Instead, a novel may be helpful for human beings,

¹⁰ It is worth noting that I do not endorse the view that animals are not capable of fiat acts but just that such acts are beyond the scope of the definition.

¹¹ I am not assuming here any ontological thesis about the nature of mathematical entities. I just assume that such entities are located outside space and time.

e.g., by representing the right topological structure of a city, but it also may not be so. Clearly, an RS may fail to be helpful but nevertheless helpfulness is one of its essential dispositional features, that in turn may never be actualized.

Moreover, an RS has to follow not only its internal and human dependent rules. It also has to respect several human independent laws and some human independent facts. For instance, the perceptual representation of the boundary of the coast, i.e. the shoreline, has to follow the physical laws that govern the refraction of light. Whereas a shoreline within a novel may not follow such laws. Consider a map: the position of the shoreline is clearly posited by a fiat act, since there is not an object like that in space: a shoreline has not a precise position due to the movements of the sea, whereas its representation does. Moreover, a shoreline, as a matter of fact, it is not a spatial discontinuity. Nevertheless, its position is calculated within an interval and the media of that interval is the location drawn on the map. Thus, it is not in space but it follows some laws that are not human dependent.

Eventually, an RS has to include representations of bona fide reality among its components. My perceptual representation of the shoreline includes, beyond fiat boundaries, an amount of stuff, which is bona fide. The map of an island roughly represents the stuff of which the island is made and not only its fiat boundaries. Rather, a novel may clearly include among its components, even representations of bona fide reality, but it does not have to include them as a matter of essence. A novel set outside space and time may be very nice.

Hence, an RS has to have three features that differentiate it from a general representation:

- pragmatic reasons;
- consistency with human independent rules;
- representations of some bona fide components.

Let me sum up: a portion of bona fide stuff is appointed by the status of fiat boundary by means of a fiat act. To put it in other words: a fiat boundary is the outcome of a fiat act. Paraphrasing a well-known expression: fiat acts fictionally carve nature at its joints. Fictionally here means that these boundaries are featured by a representation. How? Let us consider a chunk of stuff and suppose we want to use it as a boundary for a certain portion of reality. We merely need to represent it through representation as a boundary, e.g., a map, a mental representation, and so on. It is exactly what we do every day when we mentally divide the room into two halves, or when we perceive the outermost surface of a wall, or when we draw a line on a map. All of them are fiat boundaries. And yet it seems that all these boundaries I just mentioned are somehow different.

5. *Taxonomies of fiat boundaries*

Fiat acts can very differ in their nature. A first taxonomy can be made based on which human act they are carried out:

- perceptual activity, e.g. perceiving the boundary of a figure against a ground;
- linguistic activity, e.g. grouping discrete things in a single thing, such as cows in a flock;
- conventional activity, e.g. drawing the border of a nation;
- conceptual activity, e.g. singling out a kiss as a continuous event by the concept “kiss”;
- proprioceptional activity, i.e., detecting the position of the her own body in space.¹²

Each of the above acts has something in common, namely, they are project the boundaries onto space even though they are not in space, namely they do not correspond to a spatial discontinuity. Even if this taxonomy may turn out to be very explicative, I think there is at least another possible taxonomy based on the relationship between human beings and the fiat act itself without further specification and regardless the skill that is used as a proxy to make up boundaries. Let me put forward a tentative list of fiat acts that may give rise to fiat boundaries:

- Deliberative / Non-Deliberative (Smith 2001: 133-137; Smith and Varzi 2000: 405; Thomasson 2001: 152).
- A Priori / A Posteriori (Borghini 2014).¹³
- Individual / Collective (Smith 2001: 137-138; Smith and Varzi 2000: 402).
- Strong / Weak.

Note that the above criterion can be combined with the ones in the former list amounting to forty possible combinations, e.g., a deliberative conventional boundary. Moreover, they can be combined with each other and with the ones in the former list for composing a three-place relation, e.g., a deliberative individual conventional boundary.

In the last parts of the paper I shall explain how each criterion works and leave the reader free to classify her favorite boundaries according to the above criteria.

¹² The first four instances are already explored in Smith 2001.

¹³ The first two were already mentioned in order to develop a better concept of human dependence in 2.

5.1. Deliberative and non-deliberative boundaries

The first alternative is to list boundaries in a taxonomy that consider the relations they have with the awareness of the human beings who produce them. Indeed, some boundaries are created by a deliberative fiat act, e.g. national borders, whereas there are some boundaries that do not depend on a deliberative act but, instead, are an outcome of a non-deliberative act. Consider the already mentioned illusory triangle by Kanizsa: the illusory boundary of the triangle is there since our perception represents it in such a region, even though that representation is not the outcome of a deliberative act, but rather is imposed by the structure of our perception itself. We do not choose where such a boundary lies but nevertheless the region in which it lies depends upon us. We cannot change the region it occupies, and, nevertheless, its position in space depends upon us.

There are other interesting cases of non-deliberative boundaries that are not related to perception. Consider again the case of the boundary between Catholics and Protestants in the city of Belfast in 2001. Such boundary depends upon human beings and so does its position in space. Nevertheless, such dependence is non-deliberative inasmuch as the position of human beings are not always the direct outcome of a deliberation on their part. In fact, the lines that divide the areas inhabited by Catholics from the areas inhabited by Protestants are clearly dependent upon a fiat act: the act of drawing lines on maps based on (i) certain technical competences; (ii) certain beliefs. And, thus, we necessitate where the line has to lie and nevertheless we do not necessitate it in a deliberate way. In other words, the line is there due to us but we cannot choose where the line has to be located.

We can then define the non-deliberative and deliberative boundaries according to the following definition:

A fiat boundary is a deliberative boundary iff it depends upon a deliberative fiat act.

By “deliberative fiat act” I mean a fiat act that is explicitly chosen by a human being. It is surely difficult to distinguish deliberative and non-deliberative acts. Nevertheless, there are certain patent cases, such as perception, which is non-deliberative, whereas convention is deliberative since it needs an explicit or implicit agreement.

To sum up, a fiat boundary may be either deliberative, or non-deliberative based on the awareness of the human being that set it up.

5.2. Individual and collective boundaries

The second way to list boundaries is on the basis of how many people are committed to the fiat act that produces such boundaries. Consider the case of a purely mental division of a room in sections in prevision of a new design of the room itself. Someone who mentally divides the room traces some boundaries in space according to the future disposition of the furniture. In this case the boundaries are clearly individual in the relevant sense, since just one person is committed to them and just one person acts to create them.

Now consider the case of national borders. In this case, there are many people committed to both their creation and their existence: politicians, geographers, common people. Indeed, many people are needed in order for such boundaries to exist.

There are also cases that are difficult to classify within the dichotomy. Consider the boundaries projected by our sight into the world, say, the boundary of a mountain. Arguably, every human being projects the same boundary in the same region and, nevertheless, this act is not shared with others as in the case of national borders.

To solve the problem, I propose to classify that boundary on the basis of the agreement among people necessary for the existence of such boundary. In fact, arguably the boundary of a mountain needs just one person who perceives it, whereas the boundary of a nation needs at least two persons who agree about it. Then, we can classify such boundaries using the following definition that we can use alternatively as criteria for the taxonomy:

- x is an individual boundary iff there is only one person committed to it.
- x is a collective boundary iff there are more than one person committed to it.

In the first case, a boundary either is a private object made by some personal aim, e.g., the division of a room in two halves, or it stems from a commonly perceptual apparatus, such as sight. In the second case, a boundary yields from the so-called collective intentionality, and hence by the joint action of a group.

5.3. A priori and a posteriori boundaries

As stressed in in §2, not every boundary is drawn a priori, as concepts or also some conventions are. There are some boundaries that are fiat and nevertheless are drawn just after having experience of them.

Consider the example proposed by Borghini (2014) of cutting meat in the religious context of Hebraism. The *menakker*, i.e. the butcher expert in *kosher* tradition, has to cut the meat according to certain holy rules. Such cutting,

called *nikkur*, has to divide the parts of the beast that can be eaten from the forbidden ones. If the *menakker* does the wrong cut the whole piece of meat has to be discarded. His job consists in cutting the beast following certain rules, drawing with the knife the line that takes apart the allowed parts from the forbidden ones. Beyond the difficulty of the task, Borghini rightly claims that the outcome of the operation can be evaluated only once the cutting is done. That is, the boundary between the allowed parts and the forbidden ones arises only once the boundary itself is drawn by means of the knife. It means that such a boundary is not a priori since it is drawn during the experience. Consider by contrast the boundary of a cadastral parcel located at a new not yet build zone. Its boundary is fixed before any action and it is still the same after any action, for instance the construction of a building.

Whereas, the boundary between the right and the wrong, as in the case of *nikkur*, can be tracked down only once it is carried out.

Clearly, there are also often cases of mixed boundaries, as the case of the border between Austria and Italy in paragraph 2. Nevertheless, such a distinction can be useful employed for understanding what actions have their roots in experience and what actions have their roots in concepts when human beings draw and track down boundaries.

5.4. Strong and weak fiat boundaries

It might be argued that sometimes we should avoid a language committed to the existence of fiat boundaries, for the purposes of ontological or ideological parsimony. Someone wants to avoid a boundary commitment for political, religious or ethical reasons, for example who does not want to take a stance on the boundary's location between Palestine and Israel. Hence, we should come up with a fiat boundaryless paraphrase of natural language. For instance, instead of saying "the border between the Israel and Palestine" we can say "the region of space where the Israel meets Palestine".¹⁴

Sometimes a decommitted language is able to substitute each occurrence of 'fiat boundaries' as in the aforementioned case. However, boundaries such as

¹⁴ Another possibility of wholes lacking boundaries is given by free-points topology, namely a topology that does not include points among the things of its domain and nevertheless includes wholes. It seems customary that points are necessary in order to have boundaries. That is because boundaries have one dimension less than the whole they bound. For instance, the boundary of a three-dimensional whole is a two-dimensional thing, i.e. surface. A boundary of a surface is a one-dimensional thing, i.e. a line. A boundary of a line is a zero-dimensional thing, i.e. a point. Hence, without points, there are no boundaries. Consider the standard model for free points topology, namely the one originally formulated by Whitehead (1920) and later formalized by Clarks (1981). According to them, in order to distinguish two different wholes, it is necessary that there is at least a two-dimensional empty region between them, as restated by Zimmerman 1996: 15.

a border are necessary in certain contexts of utterance, for instance when we say, “the border between the Netherlands and France stops the opportunity of buying soft drugs”.

Consider again the border between the Netherlands and France. Such a line can obstruct the actions of a law. Indeed, only an administrative division can stop the effects of certain law. Clearly, a wall can be built where such a line is drawn or such a line can be drawn where there is a wall, but it is the line on a map that officially divides the two zones, i.e. it is the line that confers the status of two different zones.

As it turns out, what is disputed is not the existence of those boundaries or their features but instead their location. Some boundaries seem to be necessarily located in a region, whereas some others are just possibly located in a certain region.

In order to stress such a distinction, I propose a dichotomy between strong and weak boundaries where strong boundaries recall modal strength of necessity, whereas weak boundaries recall the modal strength of possibility. I allow the two classical readings of the modal operators: *de dicto*¹⁵ and *de re*. Accordingly, two variants may be adopted:

De dicto reading:

- Necessity: it is necessary that there exists something which is a boundary and is in a certain location.
- Possibility: it is possible that that there exists something which is a boundary and is in a certain location.

De re reading:

- Necessity: there exists something which is a boundary and necessarily is in a certain location.
- Possibility: there exists something which is a boundary and possibly is in a certain location.

The modal strength and the *de re/de dicto* readings depend on the general context in which boundaries are employed. This means that within a context, a boundary we assume or speak about is either possible or necessary as we describe it either according to the rules of the context, or in order to lead to certain conclusion in a context. We have, then, two general kinds of fiat boundaries that are distinguished within a context just according to their modal strength in that context. In order to avoid further technicalities, I set here aside the difference between the two readings and I spell out a very easy

¹⁵ The interpretation of fiat boundaries as an application of *de dicto* modality was already mentioned but not further developed by Varzi in some of his papers, see, *inter alia*, Varzi 2014: 16-31.

modal semantics for taking into account of the difference between strong and weak fiat boundaries.¹⁶ Here the list of the ingredients:

- a modal structure (V, W, I, f) , where V is the vocabulary, W the set of all possible worlds, I the set of individuals, and f the reference function that maps the words to the individual to which they refer.

The vocabulary V is the following ordered tuple of words:

(“Nation”, “my sight”, “the border-at-R”, “limit of my visual fields”)

The worlds are listed in the following set:

$\{w1, w2, w3\}$

The set of individuals:

$\{N, S, B, L\}$

- two boundary predicates: (i) weak fiat boundary and (ii) strong fiat boundary.

In more detail:

- (i) A fiat boundary is a weak boundary of I iff it possibly confines I .

That is, the boundary weakly confines I .

- (ii) A fiat boundary is a strong boundary of I iff it necessarily confines I .

That is, the boundary strongly confines I .

Let me show how my model works. Consider the border of a nation. It could be very different if the things had been different, e.g., different international treaties, different legacies of wars, and so on. That is, the border actually located at a region r , could have been located at $r1$. Hence, since the border of a nation could be different at different worlds it is a weak boundary. So, within my model we have the Nation1 at $w1, w2, w3$ given f and which has the border-at- r B at just some words and hence:

“The border-at-R weakly confines Nation1” at w given $f =$ (for some world v) (The border-at- r confines Nation1) = “The border-at- r confines Nation1” is true at either $w1$, or $w2$, or $w3$ given $f =$ false.

However, the limits of my sight could not be different even if the things had been different, since I am a human being and human beings must have a certain visual field, or so I shall assume.¹⁷ So, within my model we have my sight at $w1, w2, w3$ given f and which have the limit of the visual field at all worlds. Hence:

¹⁶ In what follows I employ the standard Kripke modal semantics as set up by Steinhart 2009: 86-99.

¹⁷ The limit of my visual field has always the same extension in spite of its content varies in regard on where my sight points.

“The limit of the visual field strongly confines my sight” at w given $f =$ (for all worlds v) (The limit of the visual field confines my sight) = “The limit of the visual field confines my sight” is true at $w1, w2, w3$ given $f =$ true.

The model is intended to show how and how much the location of a fiat boundary can count for defining an object. When it is strong it is necessarily needed for defining an object, whereas when it is weak its location can vary without altering the relevant object identity.

6. Conclusion

The paper showed how the metaphysical picture of our world depends for a large part on us. Many of the so-called natural joints are drawn and tracked down by our representations and our fiat acts. Many of the seemingly natural joints that surround us are fiat boundaries, since they depend upon us in an important and yet scarcely investigated way. They are not fixed only by our concepts, nor only by our perception. In spite of the variety of their origins, all of those boundaries share the same aim: to make the world easier to grasp by dividing it in discrete parcels.

The paper tried to investigate this variety and this common aim, while making some progress toward a precise classification of the acts that originate such boundaries.

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References

- Boniolo, G., Faraldo, S. and Saggian, A., 2009, “On spatial and temporal extrinsic boundaries”, in *Foundation of Science*, 14: 181-193.
- Borghini, A., 2014, “I confini di un taglio”, in *Isonomia-Epistemologica*, 4: 13-22.
- Cartwright, R., 1975, “Scattered objects”, in K. Lehrer, ed., *Analysis and Metaphysics*, Reidel 1, Dordrecht : 53-171.
- Casati, R. and Varzi, A.C., 1995, *Holes and other Superficialities*, MIT Press, Cambridge.
- Casati, R. and Varzi, A.C. (1999). *Parts and Places. The Structure of Spatial Representation*, Cambridge (MA), MIT University Press.
- Chisholm, R. M., 1983, “Boundaries as dependent particulars”, in *Grazer Philosophische Studien*, 10: 87-95.

- Clark, B.L.,1981, "A calculus of individuals based on connection", in *Notre Dame Journal of Formal Logic*, 22: 204-218.
- Correia, F., 2010, "Ontological dependence", in *Philosophy Compass*, 3: 1013-1032.
- Fine, K., 2000, "A Counter-example to Locke's thesis", in *The Monist*, 83, 3: 357-361.
- Galton, A., 2003, "On the ontological status of geographical boundaries", in M. Duckham, M.G. Goodchild, M.F. Worboys, eds., *Foundation of Geographic Information Science*, Taylor & Francis, London - New York: 151-171.
- Searle, J.,1995, *The Construction of Social Reality*, Free Press, New York.
- Smith, B.,1994, "Fiat objects", in N. Guarino, L. Vieu and S. Pribbenow, eds., *Parts and Wholes: Conceptual Part-Whole Relations and Formal Mereology*, 11th European Conference on Artificial Intelligence, Amsterdam, 8 August 1994, European Coordinating Committee for Artificial Intelligence, Amsterdam: 15-22.
- Smith, B., 1997, "Boundaries: an essay in mereotopology", in L., Hahn, ed., *The Philosophy of Roderick Chisholm (Library of Living Philosophers)*, Open Court, La Salle: 534-561.
- Smith, B., 2001, "Fiat objects", in *The Monist*, 20: 131-148.
- Smith, B. and Varzi, A.C., 2000, "Fiat and bona fide boundaries", in *Philosophy and Phenomenological Research*, 60, 2: 401-420.
- Sorensen, R.,1998), "Sharp boundaries for blobs", in *Philosophical Studies*, 91: 275-295.
- Steinhart, E., 2009, *More Precisely. The Math You Need to do Philosophy*, Broadview, Peterborough.
- Stroll, A., 1988, *Surfaces*, University of Minnesota Press, Minneapolis.
- Tambassi, T., 2018, "From geographical lines to cultural boundaries. Mapping the ontological debate", in *Rivista di Estetica*, 67: 150-164.
- Thomasson, A. L., 2001, "Geographic objects and the science of geography", in *Topoi*, 20: 149-159.
- Thomasson, A. L., 2009, "Social Entities", in R. Le Poidevin *et al.*, eds., *Routledge Companion to Metaphysics*, Routledge, London: 545-554.
- Tuomela, R., 2003, "Collective acceptance, social institutions, and social reality", in *American Journal of Economics and Sociology*, 63 (1): 123-165.
- Varzi, A.C., 2014, "Realism in the desert", in F. Bacchini, F., S. Caputo, M. Dell'Utri, eds., *Metaphysics and Ontology without Myths*, Cambridge Scholars, Newcastle: 16-31.
- Varzi, A.C., 2015, "Boundary", in E.N. Zalta, ed., *The Stanford Encyclopedia of Philosophy*, <<https://plato.stanford.edu/archives/win2015/entries/boundary/>>.
- Whitehead, A.N., 1920, *The Concept of Nature*, Cambridge University Press, Cambridge.
- Zimmerman, D.W., 1996, "Could extended objects be made out of simple parts? an argument for 'atomless gunk'" in *Philosophy and Phenomenological Research*, 56: 1-29.

