

Nominalism and Causal Theories of Reference

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Abstract

According to contemporary nominalism, there are no abstracta. A common way of arguing against the existence of abstracta deploys a causal theory of reference. In short, we have no good reason to believe in what we cannot refer to and, since reference is causal and abstracta are causally isolated, we cannot refer to abstracta. In this paper, I examine just how far this sort of argument takes nominalism.

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Introduction

Contemporary nominalism holds that there are no abstracta, neither abstract objects nor abstract entities of other sorts. What there is is concrete, physical.¹ Some things clearly fall into one category or the other: \aleph_{ω} is abstract if anything is; tables and chairs are certainly concrete. Other things are not so easy to classify: space-time points, for example. In this paper, I will not be overly concerned with providing or sharpening criteria for abstractness or concreteness. Rather, I will consider the effectiveness for nominalist ends of a favorite tool of the contemporary nominalist: causal theories of reference.

Nominalists often try to use causal theories of reference as a wedge to separate various discourses that are *prima facie* about abstracta from the entities they are supposed to be about. The idea is that since abstracta are causally inert and reference proceeds via causal connections, reference to abstracta is impossible. Hence, assuming the correctness of some causal account of reference, no discourse purporting to be about abstracta can actually succeed in being about abstracta. The final step for the nominalist is to point out that there is very little reason to believe in the existence of entities that it is not possible to speak about, viz., abstracta. I think the nominalist pushing this line is too optimistic.

In §1, I state a generic causal theory of reference in the tradition of Kripke (1980) and Putnam (1973, 1975). This theory will serve as the nominalist's stick throughout this paper, and as such it will be as reasonably friendly to nominalism as possible. In §2, I briefly discuss four categories of abstracta, setting the stage for an evaluation of the nominalist's claim that reference to abstracta is incompatible with causal theories of reference. This evaluation takes place in §3, with

¹Distinguishing abstract entities from concrete entities by appeal to the non-physical–physical distinction is contentious. Indeed, whether a principled and unproblematic separation between abstracta and concreta can be made is not at all clear. For discussion of this, see Hale (1988), especially Chapter 3. That said, I shall for present purposes assume that the abstract–concrete distinction is roughly mirrored in the non-physical–physical distinction, as I believe the nominalist would have it.

the causal account from §1 going proxy for causal theories generally. Finally, in §4, I consider an objection the nominalist might raise to what has gone before.

1 A Causal Theory of Reference

A causal theory of reference can be viewed as a two-stage process. Fix a term τ . Stage 1 is a *christening event* (*initial baptism*,² *introducing event*,³ *naming ceremony*⁴), an event which fixes the reference of τ . The reference of a term may be fixed either by demonstrating in some way the object x^τ that is to be the referent of τ or by employing a description either attributively or referentially (in the terminology of Donnellan (1966)). Stage 2 is what we may call *transference*. This is a temporally extended process by which (causal) chains from speakers using τ to the object x^τ are constructed. Unlike christenings, which are single events, transference consists in a sequence of *transfer events* extending into the future for (at least) as long as τ remains in use.⁵ For illustration, let us recall an example discussed by Kripke (1980, n. 33, p. 79).⁶

The planet Neptune was so named by Leverrier, who identified it as the planet causing detected perturbations in the orbit of Uranus. The planet Neptune, then, was christened ‘Neptune’ by Leverrier when he predicted that a yet unknown planet was responsible for the observed disturbances in Uranus’s orbit, and that planet would be called ‘Neptune’. This was stage 1 for ‘Neptune’. Stage 2, transference of the reference of ‘Neptune’, began when ‘Neptune’ made its way into the vocabulary of other speakers as a name for the planet Neptune, i.e., when Leverrier introduced ‘Neptune’ into another person’s vocabulary as the name of the planet causing perturbations in Uranus’s orbit, thereby transferring his ability to use ‘Neptune’ to refer to Neptune to this other speaker. Transference of the reference of ‘Neptune’ continues today, for instance in middle school science classes when our solar system is introduced.

As a first pass at our generic account, we have:

(CTR) A term τ employed in an event e by a speaker S refers to x^τ iff

- (i) e is the christening (by S) of x^τ with τ , or
- (ii) there is a transfer event e' temporally prior to e such that S acquired the reference of τ in e' .

CTR is inadequate as it stands; it fails to incorporate speaker intentions. When using τ , a speaker (typically) intends to refer to x^τ . If such intentions of speakers are left out, our account is not be able to handle utterances like

- (1) Church has pushed me to a new level of confusion

²See Kripke (1980).

³See Putnam (1973).

⁴See Devitt (1981).

⁵ Note that in characterizing transference as a *sequence* of transfer events I am deliberately simplifying matters. In actuality, transference is likely typically a more complicated affair involving networks of use over time in linguistic communities of the sort discussed in Putnam (1973, 1975) and Devitt (1981).

⁶The example as presented is historically inaccurate in that Leverrier was not solely responsible for discovering or naming Neptune and Neptune was named after confirmation of its existence, not at the time of Leverrier’s prediction of its existence. Neither of these inaccuracies prevents the example from serving its purpose.

when the speaker of (1) possesses the reference of ‘Church’ both as it applies to the great logician and as it applies to a (contextually specified) religious institution.⁷ Such a speaker would satisfy (ii) with respect to her utterance of (1), and so, according to CTR, she would succeed in referring. The question is to what. Without taking her intentions in uttering (1) into account, there seems to be no way to say from the vantage point of CTR. It would be consistent with CTR that she be referring to both Church the logician and a religious institution; this is unacceptable. With this in mind, let us add to CTR:

(iii) *S* intends to refer to x^τ by her use of τ .

CTR is a good representative of causal theories of reference. However, the nominalist might complain that by allowing reference fixing by description we have given the realist an unfair edge. After all, Kripke at least holds that mathematical entities can be christened with descriptions.⁸ With this in mind, we modify CTR to CTR* by restricting christening events to reference fixings with a significant causal component. This restriction serves to disallow reference fixing by purely descriptive means so that the realist cannot simply help himself to mathematical entities by, e.g., setting the referent of ‘ $\sqrt{2}$ ’ as the least upper bound of the set of positive rationals with square less than 2.

In §3, I assess the nominalist’s claim that, assuming a causal theory of reference is correct, we are in dire straits when it comes to successfully referring to, and hence being able to say anything about, abstracta. I will use CTR* as the nominalist’s causal theory of choice, it being about the best I think the nominalist could expect for her purposes. Furthermore, in light of my comments concerning the importance for the nominalist project of arguing against the possibility of successful christening events for abstracta, I will restrict my attention to christening events in what follows. Before I turn to this, I will say a bit about just what it is that we are supposed by the nominalist to have so much difficulty referring to: abstracta.

2 Abstracta

Normally when the contemporary nominalist’s talk turns to abstracta, what are most at issue are mathematical entities: sets, functions, numbers, etc. Occasionally, things like properties, propositions, and possible worlds are also mentioned. But as Burgess and Rosen (1997) argues, there is a broader range of abstracta than this present in normal discourse (see especially pp. 14–15). Burgess and Rosen separate abstracta into four categories: (a) mathematical entities, (b) metaphysical entities, (c) characters, and (d) miscellaneous. The items in these categories are ranked according to paradigmatic abstractness, not level of abstractness. Thus, it is no surprise to find mathematical entities at the top of the list. What sorts of things are in these categories?

Examples of type-(a) items have already been given. These are various kinds of mathematical entities. An interesting inter-category distinction made by Burgess and Rosen is that between pure and impure mathematical entities. All of the examples of mathematical entities thus far given have been pure; impure mathematical entities, on the other hand, are those that involve mixing mathematical and concrete entities such as sets of concrete objects (e.g., the pair set containing Tarski and Gödel) and numbers-with-units (e.g., five grams).

⁷Possessing the reference of a term is just a matter of having acquired the reference of that term at some point, i.e., of having acquired the ability to successfully use the term to refer to that which most speakers intend to refer when they use the term.

⁸See his discussion of π in Kripke (1980, p. 60).

Type-(b) items include universals (i.e., properties and relations), and also (unactualized) possibilia (i.e., possible worlds and their “inhabitants”). A line of sorts is drawn between these two, the former being thought of as generalizations from commonsense interaction with the world and the latter being more radical and esoteric.

Included in category (c) are some of the more familiar, less-worrisome abstracta. ‘Character’ means something like ‘what the members of a collection of entities have in common in virtue of which they are all the same kind of thing’. A more common synonym is ‘type’, as used in connection with the type–token distinction. So, for example, biological species and similar geometric shapes fall into category (c). Likewise linguistic entities such as intensions and word (letter, sentence, etc.) types fall into category (c).⁹

Items of the final category are left largely unspecified by Burgess and Rosen. What they do cite are institutions, both formal and informal, by which I take them to mean things like corporations, various types of political bodies (parties, parliaments, etc.), clubs, and religious organizations. As Burgess and Rosen note, an institution is not generally identifiable with either those people that participate in it or its physical resources and belongings. Consider, for example, the Republican party. No member of Lincoln’s Republican party is alive today, the party membership has undergone at least one complete change; yet it is still the same Republican party to which Lincoln belonged. Similarly, if IBM sells all its current property holdings and moves into a monstrous complex in Washington state that it leases from Bill Gates, it does not cease to be IBM. In the case of an institution, there seems to be some unifying organizational structure beyond the people and physical facilities in virtue of which it is an institution (of the sort that it is).¹⁰

The present classification of abstracta has relied almost entirely on apparently clear examples, paradigm cases, from each category. The class of abstracta is commonly demarcated in this way, and it indicates how difficult it is to provide firm criteria for abstractness. For if we had such criteria we could mark off different categories of abstracta in terms of how fully those criteria were met, demanding that an entity meet a minimal number of the criteria to qualify as abstract and classifying entities by how well or how many of the criteria were met. Such a classification could conceivably provide an ordering of abstracta according to level or degree of abstractness. The problem of course is in coming up with appropriate criteria; while several such criteria (e.g., location in space-time, causal inertness, non-physicality, and multiple contemporaneous

⁹Presumably, though Burgess and Rosen are mute on this point, propositions also belong in this category, perhaps as a strain of intension.

¹⁰One conspicuous absence from these categories of abstracta is concepts. Under which heading should they fall? The answer to this question seems to depend on what one takes concepts to be. If one takes a Fregean line, considering concepts as functions from objects to truth values, then perhaps they should come under mathematicalialia. This seems reasonable insofar as one considers all functions at bottom mathematical. But one might take concepts as somehow more basic than mathematicalialia, even on a Fregean reading. Considering concepts as (second-order) logical notions seems to support this approach. However, since it is not clear into which category, if any, logical notions might fall, this does not appear to be much help. Are concepts a brand of metaphysicalialia? Not obviously, though they have been pressed into service as surrogates for properties in the past (by conceptualists); but this, of course, is not enough to make them universals. Concepts are sometimes taken to be intensions of predicates like ‘is ϕ ’. Such a predicate is sometimes said to express the concept of being ϕ . So perhaps concepts should go into category (c) with intensions. It seems that a case could be made for including concepts in every category save (d), and I will not decide the matter here. Suffice it to say that a nominalistic reconstrual of discourse about abstracta, in particular about mathematicalialia, in terms of concepts, Fregean or otherwise, does not clearly exorcise that discourse of apparent reference to abstracta.

instantiability) have been and continue to be employed by nominalists and realists alike, none clearly do the job for which they are intended.¹¹

3 CTR* and Abstracta

As abstracta, the entities falling into categories (a)–(d) are what the nominalist claims no causal theory of reference will allow us to access via reference. In this section, I consider whether or not reference to items in these categories is possible under CTR*. In particular, I address the question of whether or not there can be successful christening events involving abstracta, beginning with category (d).

Institutions seem pretty clearly to admit the possibility of causal christening events. In fact, the naming of the Republican party appears to provide an example of an actual christening of an institution compatible with CTR*. Responding to passage of the Kansas–Nebraska Act of 1854, which allowed expansion of slavery into the western territories of the United States, a group of abolitionist Free Soilers, Democrats, and Whigs began protesting. For historical reasons, they decided to call themselves Republicans; the name was formally adopted at a state convention on July 6, 1854. I submit that this formal adoption was a christening event.

One might object that because the name was applied to the founders of the Republican party prior to the July 6 adoption, that event could not be the christening. I think this is mistaken. For it seems that until the formal adoption of the name, it was being used to refer collectively to those people who would found the Republican party, not to the party itself, whereas after the July 6 adoption the name applied to the party itself. However, even if I am wrong about this it does not affect my main point. The name was applied to (certain core members of) the group that on July 6, 1854 formally adopted it, and some such application was the first one. If the name was indeed being used to refer to the Republican party prior to its formal adoption, then that event wherein the name was first applied was the christening of the Republican party. In any case, a successful christening event for the Republican party occurred in 1854. That it was a genuine christening event, in the sense of there being a significant causal component to the connection between those doing the naming and that being named, seems clear. For those doing the naming were causally interacting with various parts of what was being named—in particular, each other. So it seems that CTR* does not globally deny referential access to abstracta, since it allows reference to institutions. What about other categories of abstracta? Could there be successful genuine christening events for characters?

Consider as a representative character the biological species *Panthera tigris* (tiger). I do not know exactly how this species was named, but it might have happened something like this. A certain number of tigers had been observed in the wild—hunting, mating, raising young, etc.—so that when taxonomists came around to the genus *Panthera*, they said something like, “Call those things and others of the same kind ‘*Panthera tigris*’, ‘tiger’ for short.”

Now it seems that it was not the particular specimens of the species that were named in this event.¹² For if that were the case, then every novel specimen would require its own christening;

¹¹The interested reader is referred to Hale (1988), especially Chapter 3, and Burgess and Rosen (1997), especially pp. 16–25, for further discussion.

¹²I take it for granted that *something* was (would be) named, mainly because I take it that evolutionary biologists, zoologists, etc. are talking about something in their work (*prima facie*) involving species. There are radical nominalistic positions which might deny this, which eschew not only more traditional abstracta but also theoretical entities such as biological species and electrons. Bas van Fraassen’s Constructive Empiricism is one such position.

but this is not the case. Rather, when a new specimen appears it is just said that there is another tiger, another token of the type *Panthera tigris*. Thus, the event described would be a christening of the species itself, not the members of the species that motivated the naming. Would it be a genuine christening, in the sense required by CTR*? I believe so. The question, of course, is whether or not there would be a causal connection between the taxonomists and the species in the scenario described. On the (unproblematic) assumption that the taxonomists had had first-hand experience of tigers, I contend that there would be a causal connection of the appropriate sort in virtue of the obviously causal connection between the taxonomists and the tigers. This strategy will also secure reference to other characters under CTR*, considered as abstract types, in virtue of causal interaction with their tokens. Before moving on to type-(b) metaphysicalia, let us consider a pair of replies the nominalist might make to what has been just said concerning institutions and characters.

First, the nominalist might deny that when speaking of the Republican party, say, one is speaking of anything more than its members, albeit in an abbreviated fashion. Similarly for characters such as biological species: talk of *Panthera tigris* is taken as just abbreviated talk of the collection of individual specimens of the species, i.e., individual tigers. An obvious response asks which members or specimens are at issue. For instance, in an utterance of

(2) The Republican party is pro-life,

which members of the Republican party should (2) be taken as involving? It cannot be all of them since (2) is true and not every Republican is pro-life. So it must be some select subset of members of the Republican party each of which (2) claims is pro-life. But which subset? One suggestion is the subset consisting of all and only pro-life Republicans; (2) would surely come out true on this reading. Unfortunately, it would also come out valid and uninformative. For on the suggested reading, (2) abbreviates

(3) Every pro-life Republican is pro-life.

But (2) is neither valid nor uninformative. So (3) cannot be a correct rendering of (2). I do not see what reading of (2) as an abbreviation for a related statement about a subset of members of the Republican party would yield something which is both true and informative. Since (2) is both, this nominalistic approach fails.

Second, the nominalist might invoke some sort of similarity relation in an attempt to avoid the above conclusion that in christening via specimens of a species it is in fact the species itself, a kind or type (character), which is christened. The idea is that talk of specimens being of the same kind can be eliminated in favor of talk of specimens being similar in the right way(s). The classic response to this sort of move is given in Russell (1912/1997, Chapter IX). There Russell argues that relations as well as properties are universals, hence, similarity (resemblance) is a universal, and so nominalism is committed to at least one universal after all. While I tend to agree with Russell on this point, no consensus on the success of his argument has yet emerged. Nevertheless, he seems to have correctly located the problem with the nominalist's response. What is this supposedly nominalistically innocent conception of similarity?

(For an illuminating discussion of van Fraassen's position, see Rosen (1994).) The argument in the paper will not apply to these views. There may be similar arguments, ones in which the role of theoretical entities is played by the most remote "observable" entity countenanced by the view, that would make the same point against radical nominalistic positions. However, I will not pursue the question here. Rather, it should be understood that the nominalist with which I am concerned in the text is one that holds that science is a generally trustworthy source for information about the unobservable world.

The nominalist would have us take similarity as basic, relying on the intuition that we can (most of the time) unproblematically say when two (hence, more than two) things are similar and when they are not. However, there is a natural analysis of similarity which calls into question taking the notion as basic. Given a novel specimen of *Panthera tigris*, we can pretty reliably identify it as similar to known specimens of the species and from this similarity conclude that it is of the same species as the original specimens. How does such a judgment of similarity proceed? Visual inspection is clearly insufficient to determine similarity. Gold/iron pyrites and jadeite/nephrite examples are enough to establish this. So there must be some more involved process which enables us at its end to conclude that two things are similar. This process appears to be a matter of comparing salient features of the objects in question, where salient features are those that are characteristic, or stereotypical (to borrow from Putnam), of the objects being considered.¹³ If there is a sufficiently high level of overlap between the salient features of the two objects, then they are similar. Bracketing the question of what ‘sufficiently high’ should mean here, how is the overlap of salient features between objects to be determined? Presumably, it comes down to sharing some salient features, i.e., to having some of the same salient features. So given two objects x and y , the former with salient features ϕ_0 and ϕ_1 and the latter with salient features ϕ_1 and ϕ_2 , x and y overlap in their salient features due to their both having ϕ_1 as a salient feature.

I assume that features of things, salient and otherwise, can be both complex and simple, where by ‘complex’ I mean roughly ‘owing to some further feature(s)’ and by ‘simple’ I mean ‘not complex’. So, for example, if x and y were tigers and ϕ_1 were having stripes, then ϕ_1 would be a complex (salient) feature (since tigers’ stripes are a result of patterns of hair growth and hair color). If, on the other hand, ϕ_1 were (inertial) mass, then (regardless of what x and y might be) it would be a simple (salient) feature.

Now consider x and y as above, and suppose that ϕ_1 is a simple salient feature, say mass. Then x and y have equal mass. Mass is a measurement of resistance to acceleration and is measured in kilograms. So in asserting that x and y have equal mass we are asserting that some number of kilograms is equal to some number of kilograms; in particular, we are asserting that $r_x kg = r_y kg$, for some real numbers r_x and r_y . Recall that numbers-with-units such as $r_x kg$ and $r_y kg$ are impure mathematical entities. Hence, asserting sameness of mass is asserting identity between impure mathematical entities. But so doing *prima facie* commits one to the impure mathematical entities involved. Thus, it seems that by invoking similarity the nominalist ultimately commits himself to impure mathematical entities, and this is at least as undesirable as the conclusion that similarity was brought in to undermine.

I see no reason why the approach outlined for type-(c) metaphysicalia should not generalize to encompass universals as well. Consider an archetypal universal: color. In 1949, Binney and Smith, Inc., makers of Crayola crayons, introduced several new colors of crayon, among them one called ‘Prussian blue’. Suppose that Jones, a worker in the Department of Color at Binney and Smith, gave the name ‘Prussian blue’ to a hue of blue on a color chip, and it was the color on this color chip which all the Prussian blue crayons matched. In the same way that the taxonomists naming of *Panthera tigris* was a naming of the species rather than of a collection of specimens of the species, so was Jones’s naming of Prussian blue a naming of the color rather than of a specimen of the color, viz., that on the color chip. For if this were not so, then, similar to the case

¹³Delving much further into what makes a feature of an object salient in the present context would take us too far afield. But we might think of such features intuitively as those that are not (obviously) accidental to the object.

of new tigers, every Prussian blue crayon would have had to have been individually dubbed with ‘Prussian blue’; but no such thing was required. Indeed, in 1958, Prussian blue was renamed ‘midnight blue’. Did all of the Prussian blue crayons in circulation at that point become mislabeled? Of course not, they were still the same color, viz., Prussian blue; it was just that after the renaming that same color had another name, and all of those Prussian blue crayons were also then midnight blue crayons. Furthermore, the christening of Prussian blue by Jones was causal in virtue of his causal interaction with the hue of blue on the color chip, i.e., in virtue of his causal contact with a tokening, or instantiation, of Prussian blue.

Possibilia seem to be another matter entirely, and whether or not such a strategy as I have lately been employing will work to secure reference under CTR* appears to depend heavily on one’s conception of the possibilia in question. If one takes Kripke’s line on possible worlds, that they are stipulated “around” actual objects,¹⁴ then at least some “inhabitants” of possible worlds will be such as to enter into causal relations. If on the other hand, one embraces modal realism à la David Lewis,¹⁵ this will not be so. As to possible worlds themselves, it is not clear even on Kripke’s view that causal connections are possible. One might take it that the role of counterfactuals in decision-making indicates some sort of causal role for possible worlds, but that this would be causality fit for use in christening events is not obvious. So it seems that here is the first real threat of reference to abstracta breaking down under CTR*. Notice, however, that until the notions of possible world and possible object have been made more precise this will remain undecided.

The situation with respect to mathematical entities is in many ways like that of possibilia. Concerning impure mathematical entities, arguments offered by Penelope Maddy, if correct, provide reason for thinking that successful christening events for sets of concrete objects are possible.¹⁶ However, as in the case of possibilia, it is not clear that pure mathematical entities are such that successful christenings are possible for them. Before I discuss this difficulty, I will briefly sketch Maddy’s arguments.

Maddy argues that cognitive processes similar to those that enable us to form perceptual beliefs about physical objects enable us to form perceptual beliefs about (impure) sets. She summarizes the physical object portion of the view as follows:

Crudely put, human beings develop neural object-detectors which allow them to perceive independent, continuing physical objects. It is these complex cell-assemblies that bridge the gap between what is interacted with and what is perceived. The object that I perceive on a given occasion, or more precisely, the front side of a time slice of that object, is causally responsible only for the pattern of retinal stimulations, while the unifying concept of a familiar physical object is contributed by my physical object-detector. The presence of the object-detector, in turn, is partly the result of the structure of my brain at birth (conditioned by the evolutionary pressures of the environment on my ancestors) and partly the result of my childhood experiences with physical objects. All this, while undeniably complex, is still naturalistic, and causal. (Maddy 1990, p. 58)

Maddy then argues that this generalizes to sets, concluding:

¹⁴See Kripke (1980), especially pp. 43–53.

¹⁵See Lewis (1973), pp. 84–91.

¹⁶See Maddy (1990), Chapter 2, §2, especially pp. 58–67. Maddy no longer endorses these arguments, but that should not deter us from considering what follows from them.

In the case of sets, just as in the case of physical objects, it is the presence of a complex neural development that bridges the gap between what is causally interacted with and what is perceived. (Maddy 1990, p. 66)

The idea is this. When we perceive a physical object x at time t , what we are actually in causal contact with is nothing more than a partial time slice of x , viz., that part of the time slice of x at t that is facing us. Yet the perceptual beliefs we form about x on the basis of our perceiving it at t concern the whole of x , with which we did not have (direct) causal contact. Somehow, we in some sense perceive x in its entirety. How is this gap between what we perceive and what we causally interact with bridged?

Utilizing research on theories of learning and perception,¹⁷ Maddy contends that over time, and in response to repeated x -stimuli, cell-assemblies for “detecting” develop in the brain. It is the formation of these cell-assemblies that allows us to move from a causal encounter with a front-side time-slice of an x to a full-blooded perception of that x , on the basis of which we can then form beliefs about x .

The situation is analogous for sets of physical objects. Over time, and in response to repeated stimulation by sets of physical objects, we form cell-assemblies in our brains that act as “set-detectors” and it is in virtue of these cell-assemblies that we are able to perceive sets of physical objects. Moreover, such perceptions are causal in the normal way that visual perceptions are because they proceed via the objects which belong to the set being perceived. So what we end up with is an argument that causal perceptual contact with impure sets is at least possible, if not actual. If Maddy’s arguments are successful, it follows that genuine christening events for impure sets, hence, for impure mathematical objects, are possible.

One might object at this stage that even if one accepts the arguments I have been giving for indirect causal contact with abstracta via direct causal contact with concreta bearing certain relations to those abstracta, one need not accept that the same sort of argument will work when it comes to concreta and sets. One can deny that the membership relation (\in) has whatever nice property that, say, the relation holding between tigers and *Panthera tigris* does in virtue of which direct causal contact with tigers yields indirect causal contact with the species *Panthera tigris*. Such a position would be consistent with a moderate form of nominalism, for instance.

Satisfactorily answering this worry would require a full accounting not only of the relations between an institution (e.g., a political party) and its members, types (e.g., biological species and linguistic entities) and their tokens, and universals (e.g., colors) and their instantiations but also of \in itself. However, the confines of this paper do not allow for the undertaking of such a project. Consequently, the following programmatic remarks will have to suffice.

First, the relation that holds between an institution, say a political party, and its members appears to be some variety of part-whole relation. Clearly mereological essentialism is not in play since a political party has none of its members necessarily; i.e., every member of a given political party might have been a member of a different party or of no party at all. What seems to be important about the relation between a political party and its members is that the members fill certain roles in a functional structure which helps define the party. A political party has certain offices and positions with which are associated certain responsibilities integral to the functioning of the party; and it is members that occupy these offices and positions, thus collectively realizing the abstract functional structure of the party. The relation between members and a political party

¹⁷For references, see Maddy (1990), Chapter 2, §2, especially pp. 58–67.

(and institutions, general) is not merely the former constituting the latter, but the former constituting the latter in a special, functionally significant way.

Second, the relation that holds between a type, say the species *Panthera tigris*, and its tokens does not seem to be of the same sort as that outlined in the previous paragraph. Individual tigers are not parts of the species *Panthera tigris*. Rather, they are specimens of the species: examples or representatives of it that each “exhibit” all of the identifying traits of the species. In this sense, the relation of token to type is much more like that of universal to instantiation than that of institution to member.

Third is the relation between a universal, say a particular shade of blue, and its instantiations. As just noted, this relation is not unlike that between a type and its tokens. The way in which it is different seems to me to be that an instantiation of a universal is an example or representative of a single feature, property, or trait; a specific patch of a particular shade of blue is an example of, exhibits the single trait of being, the particular shade of blue in question. But a token of a type (generally) exhibits multiple features, those by which the type is identified. So in some sense the relation between universals and their instantiations can be seen as a pristine or dedicated version of the relation between types and their tokens.

Where does this put us with respect to \in ? I think that \in can be considered a hybrid of the sort of relation that holds between institutions and their members and the sort of relation that holds between universals and their instantiations. With the former, \in shares a part-whole aspect. The members of a set constitute it in a way akin to the way parts constitute a whole. Much has been written in efforts to make precise just how tight this connection is,¹⁸ but it seems relatively uncontroversial that there is some substantive connection. Like the latter, \in is dedicated to a single purpose, viz., relating an entire entity to another entity (a set) rather than a number of entities to another entity (as in the case of members being related to an institution) or multiple features of one entity to another (as in the case of specimens being related to a species). While ‘ $a \in X$ ’ might be explicable in terms of multiple features of a or a itself might have a number of members, grasping that a is \in -related to X does not require consideration of any of this. This is due simply to the extensional nature of sets. If this assessment of \in is correct, then \in is similar to the relations that hold between institutions and their members and universals and their instances in ways that suggest indirect causal with sets of concreta via direct causal contact with their members is as plausible as indirect causal contact with institutions and universals via *is*. It then becomes less clear that moderate nominalism remains an option.

We are left with only pure mathematicalialia to address. Given the traditionally assumed nature of pure mathematicalialia as not only causally inert, but non-instantiable as well, it is hard to see what sort of line might reasonably convince us of the possibility of christening events with a significant causal component for these entities. Short of Gödelian mathematical intuition, there appears to be no causal connection to mathematicalialia in the offing. Indeed, it is not obvious that even Gödelian intuition would yield a causal connection. In the words of Burgess and Rosen: “Numbers are not agents or patients; they make nothing and do nothing; they are made by nothing and suffer nothing” (1997, p. 21).

Thus, it looks like CTR* is compatible with reference to all but two types of abstracta: possibilia and pure mathematicalialia. In addition, reference to possibilia might ultimately be found compatible with CTR* depending on how possibility is cashed out. Though the realist is not able

¹⁸See, e.g., Lewis (1991).

to maintain all that she would like in the face of CTR*, the nominalist has to give up much more than he likely initially thought he would. To the extent that the nominalist intended to use a causal theory of reference to argue that discourse on all abstracta is impossible, he has been foiled. However, I believe that the nominalist might be unsatisfied with the prevailing form of argument employed above, viz., that causal contact with abstracta can be secured indirectly via specimens (e.g., as with *Panthera tigris*) or instances (e.g., as with Prussian blue). In the next, and final, section, I address this objection.

4 The Nominalist's Dilemma

We have already seen the precarious state of the nominalist's position if he accepts that causal connections sufficient for genuine christening events of abstracta can be secured indirectly via specimens or instances. In particular, we have seen that such acceptance results in a general ineffectiveness of causal theories of reference in denying the realist access to all but the most extreme varieties of abstracta. This would essentially render causal theories of reference all but useless for nominalistic aims. But there might be independent reasons for the nominalist to reject indirect causal interaction. What would result from such a rejection?

Consider the means by which we have come to know about, and be able to refer to, theoretical entities—for definiteness, say, electrons. Few nominalists would deny that our interactions with electrons are causal.¹⁹ Are they direct? I do not think so; at least, they certainly seem no more direct than our interactions with, for instance, biological species.

When Sir Joseph Thomson christened electrons in 1897, he did so after “observing” collections of electrons in the form of cathode rays. His observation of the particles to which he gave the name ‘electron’ was indirect in that it came only via reactions of cathode rays to electric and magnetic stimuli. What Thomson directly observed was the interaction of cathode rays with electric and magnetic forces, i.e., the behavior of physical manifestations of streams of electrons. Moreover, since Thomson's detection of electrons required not only a stream of electrons but also its interaction with other matter, what was being christened was less determinately individuated than even what was purportedly (or what would have been) christened in the hypothetical tiger-christening scenario given in §3.

The point is this. The nominalist is not claiming that causal theories of reference make it impossible for us to speak about theoretical entities like electrons because it is impossible that the right sort of christening event ever occur due to the indirect nature of our access to theoretical entities. Yet if the nominalist denies that reference to various sorts of characters (types) is possible under CTR* due to the indirect nature of our access to these kinds of entities, then, by parity, he must also reject the possibility of referring to theoretical entities under CTR*. Hence, reference to characters is consistent with CTR*. Furthermore, once this is allowed it is simply arbitrary to deny the possibility of referring to universals under CTR*, as well. For, as we saw in §3, the indirectness involved in christening events for characters differed from that involved in christening events of universals only (perhaps) in degree, not in kind.²⁰

¹⁹But see n. 12.

²⁰One might object that I'm conflating referential and epistemic access here. The idea is that, though characters, etc. and theoretical entities may be on a par with respect to referential access, they're not obviously on a par with respect to epistemic access. By conflating these two types of access, I'm obscuring this problem. So goes the objection. Recall, however, that for the nominalist we are considering, referential access is necessary for epistemic access: we can know that there are ϕ 's only if we can refer to ϕ 's. The nominalist's denial of epistemic access, which

So the nominalist is faced with a dilemma. If he accepts that indirect causal connections are sufficient for christening events, then the stick of causal theories of reference is much too forgiving to be very useful in his attack on abstracta. On the other hand, if he rejects that indirect causal connections are sufficient for christening events, then he is pushed into broader skepticism about reference (and consequently about knowledge); in particular, he is forced to give up that theoretical entities such as electrons can be successfully christened. Neither of these results favors nominalism. One might take this as motivation for attempting to look beyond purely causal constraints on reference fixing, but of course this would not make the nominalist's desire to eliminate apparent reference to abstracta any easier to satisfy. So much the worse for nominalism.²¹

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underwrites his denial of the existence of abstracta, depends on his denial of referential access. I'm arguing that his denial of referential access to abstracta is much more limited than he thinks, so that his denial of abstracta on the grounds of lack of epistemic access is significantly restricted. So while we can in principle distinguish epistemic access from referential access, this is beside the point as far as my argument is concerned.

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