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Chapter 6

Eternity and Infinity

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6.1 Introduction

When I tell people about an ongoing research project on the infinity of God, many of them will respond: 'Ah, yes, that is about eternity, right?' Then I will usually answer: 'Yes … maybe'.

There seems to be an intuitive grasping of a relation between eternity and infinity. But can it be made explicit? How to conceive of this conceptual relation? That is the question this chapter is devoted to. There is, however, one problem I face right from the outset: 'infinity' and 'eternity' are both used in several different senses. According to some of them, infinity is related to eternity, according to others not, or not in the same way. So my goal can only be a modest one: collecting some kinds of conceptual connections rather than offering a comprehensive view.

6.2 Three Senses of Infinity

In the theological and philosophical tradition, the word 'infinity' is used in different ways. For example, in the sentence 'God may have created infinitely many beings' it denotes a quantity. It is an answer to the question: 'how many?' Call this the quantitative sense of infinity. In the sentence 'God is infinitely good' the word 'infinite' is used in a comparative way following Pseudo-Dionysius' method of *via eminentiae*. God is not called 'good' in the limited or restricted way we human beings could ever be good. When He is called good, He is meant to be good in a very special, a perfect way, exceeding the usual spectrum of meanings of this word. In a sense, He can be said to be not only good, but to be goodness itself.

Besides the quantitative and the comparative sense, there is another meaning of 'infinite' as it is used in the following sentence: 'The infinite God has created the whole universe of finite things'. One may call this the "metaphysical" sense of infinity – although I do not want to deny the metaphysical relevance of the other senses of infinity. I will call it the 'precategorical' sense for the following reason. Used in this way, 'infinity' is to draw a very basic distinction in the realm of

what there is, namely, between finite and infinite things or – speaking theistically – created things and the one uncreated "thing", God. The Aristotelian categories of usual predication apply (in their standard sense) only in the realm of the finite while their use in the context of God, the infinite being, is not intended and may be misleading. So, in his treatise on divine Trinity, Boethius tries to show how the application of the Aristotelian categories has to be modified if they are used in the case of God.[1] As the finite/infinite distinction precedes the usual application of the categories, one might call this use 'precategorical'.

So, there are at least three senses of 'infinity', presented above in the order of decreasing vicinity to quantity or increasing metaphysical content (whatever exactly that is): 'infinite' in the sense of infinitely many, 'infinite' in the sense of unrestricted perfection, and 'infinite' in the precategorical sense. For infinity in the first, the quantitative sense, there are well-established mathematical theories that provide us with a precise way of defining this term. I will return to this later. As to what concerns the second sense, infinite goodness etc., some people tend to reconstruct this sense in terms of the quantitative sense. This can be done in an intensional way, as in the case when 'infinite goodness' is understood as goodness of an infinite degree, or in an extensional way, as in the case when 'infinite knowledge' is taken to be knowledge of an actually infinite set of states of affairs. I am not sure whether reconstructing the second sense of infinity in terms of the quantitative sense is a good thing to do, for what is actually needed here is not so much an infinite quantity of something, but rather some sort of maximality, totality or unsurpassability. (God is the *best* thing; he knows *everything* knowable, etc.) What I am most interested in is the third sense of 'infinity', infinity as a precategorical predicate which is used to draw the most basic metaphysical distinction, even before any category or categorical predicate can be applied. But this is also the sense which is the hardest to get a clear understanding of.

Having discerned these three basic senses of infinity, we may now proceed with examining some connections between infinity and eternity. To this end, it seems most promising to start with the clearest concept, the concept of quantitative infinity, for which there is something like a straightforward connection to (one kind of) eternity.

6.3 Quantitative Infinity and Sempiternality

There is quite a straightforward way in which one may think eternity and infinity are connected: if eternity is conceived of as an infinite amount of time. There is a precise sense in which a time interval can be called 'infinite', namely if it has no upper or lower bound (there is no number such that all numbers of the interval are above or below that number, respectively). Eternity, then, may be conceived of as such an infinite time interval.

[1] See Boethius, *Quomodo trinitas* [1988].

6.3.1 Sempiternalism

This sense of eternity has played an important role in history. Philosophers since the ancient Greeks, up to the time of Kant and Hegel, and especially in the Middle Ages discussed the question whether the world was eternal and whether one could know if it were otherwise.[2] So, for example, Thomas Aquinas wrote a treatise *De aeternitate mundi*, on the eternity of the world. In this book, Aquinas came to the conclusion that an infinite extension of the world backwards in time is not logically or metaphysically impossible, so that the Christian belief in its opposite is proper faith, not knowledge by reason.[3] What was meant by 'eternity' in these contexts was that the time interval that had passed since the beginning of the world was infinite.

This meaning of 'eternity' is also relevant in the discussions about eternity as a divine attribute.[4] A minimal meaning of 'God's eternity' is frequently expressed by the following thesis

(BE) God exists without beginning or end.[5]

In (BE), 'without beginning or end' indicates the relation to infinity. It may be doubted however whether (BE) really provides a *minimal* meaning of 'eternity'. Let us stipulate for a moment that it does. Then there can be different reasons for having no beginning or end: It can be for the reason that God is not in time, does not endure or has no location in time – this account is usually termed 'eternalism' – or it can be for the reason that God is in time, but he exists at each and every time instant, always, everlastingly, etc. – this is usually called 'the everlastingness account' or 'sempiternalism'.

So, sempiternalists understand God's eternity as everlastingness. Their main thesis is thus:

(Semp) God exists at every point of time.[6]

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[2] See, for example, Schönberger's introduction to Schönberger and Nickl, *Bonaventura, Thomas von Aquin, Boethius von Dacien* [2000], pp. VII–XXXII.

[3] See Aquinas, Thomas: *De aeternitate mundi / Die Ewigkeit der Welt*, in: Schönberger and Nickl, *Bonaventura, Thomas von Aquin, Boethius von Dacien* [2000], pp. 82–103. Boethius, who has provided the generations after him with the most famous definition of eternity, spoke occasionally about 'going through the infinite spaces of eternity' (*Consolatio Philosophiae II*), but this passage remains unclear as it may be read as refering to spatial spaces. Later, to be sure, Boethius made clear that infinite duration is not really a kind of eternity, for it does not comprise the whole life at once, but is subdued to the 'no more' and the 'not yet'.

[4] For the sake of simplicity, I simply speak of divine attributes, ignoring that one may discern between predicates proper, modifiers of predicates, etc. For the everlastingness account of divine eternity see, for instance, Wolterstorff, *God is 'everlasting'* [2000].

[5] See, for the formulation, *Eternity* [2003], p. 73, for its characterization as a minimal meaning of eternity, *Divine Eternity* [2009], p. 145.

[6] I do not want to enter the discussion about whether there really are *points* of time. Suffice it to say that at least according to our best available scientific theories, time has the structure of the real numbers.

If sempiternalists want to provide an explication of God's eternity as it is determined by (BE), as we have stipulated for a moment, they face a certain tension between (BE) and (Semp), noticed for example by Brian Leftow.[7] In case there is only a finite time interval, the sempiternalist seems to claim that God's existence in time would have a beginning and an end, just for the reason that the interval is finite. But that would contradict the minimal understanding of eternity according to (BE). Leftow's conclusion is that the sempiternalist is committed to the thesis that there is an infinite amount of time and that God exists at all times of this infinite amount. So, according to Leftow, the sempiternalist is committed to a thesis much stronger than just that God exists always. I think, however, that this is not the only solution available to the sempiternalist, and, therefore, a charitable interpreter should not impute such a strong thesis to the sempiternalist, in particular if he sets out to criticize him as Leftow does.

Let us suppose there is only a finite interval of time. Then, there are at least two ways of defining what it means to have a beginning in time (or an end, *mutatis mutandis*):

(Beginning$_1$) s has a beginning$_1$ in time iff there is a point of time "before s", i. e., there is a point t_0 at which s exists and there is a point $t < t_0$ at which s does not exist.

(Beginning$_2$) s has a beginning$_2$ in time iff there is a first point of s's existence in time, i. e., there is a point t_0 at which s does exist and for all points $t < t_0$ s does not exist.

The first definition does not lead to any problems for the sempiternalist. Since there are no points at which God does not exist, there are *a fortiori* no points to the left of an arbitrary t_0 at which God does not exist. So, with respect to beginning$_1$, the sempiternalist's thesis (Semp) secures (BE).

This is not the case if one holds on to the second definition of 'beginning' as having a first point of existence in time. In this case it depends on whether the finite interval of time is open or closed. To be closed means that the interval comprises its end points, while to be open means that it does not. If the time interval is open, then (Semp) likewise secures (BE), for in this case there is for every point of time an earlier point of time and since God exists at all points of time (Semp), for every possible t_0 there is an earlier point t at which God does exist. Hence, in case time is an open interval, a sempiternal God cannot have a beginning$_2$ in time. The situation is different however if the time interval is closed. For then, there is a first point in time (the left border of the interval), and this first point is also the first point of God's existence: At all earlier points it is true that God does not exist, simply because there are no earlier points. Hence, in case time is a closed interval, a sempiternal God has a beginning$_2$ in time.

The preceding analysis has shown that there is one case in which the sempiternalist's thesis (Semp) does not imply the minimal understanding of eternity (BE), namely when the second definition of beginning/end is applied and (created) time

[7] See *Eternity and Immutability* [2005], pp. 49–52.

is taken to form a closed finite interval. So, under certain circumstances, Leftow's view that the sempiternalist may be committed to more than (Semp) hints in the right direction. But the sempiternalist has more resorts than Leftow suggests: with respect to the interval formed by all points of time, he may argue that the interval is infinite in both directions, that it is finite but open, that the second definition of beginning/end has to be replaced by the first or a third one, or that (BE) does not provide a minimal meaning of eternity.

6.3.2 Finiteness and Embeddings

If one is interested in the infinity assumptions of a particular philosophical position with respect to time, one has not only to deal with the macrostructure of time – the question whether time extends over a finite or an infinite interval – but also with its microstructure. This can be seen by the following consideration.

One can smoothly transform finite open intervals into infinite ones and *vice versa*. Consider the following example: if x is in the open time interval (t_1, t_2), one may, in a first step, transform this into the interval $(0,1)$ by mapping x onto $x' = \frac{x-t_1}{t_2-t_1}$. In a second step, one may further transform the interval $(0,1)$ into the interval $\left(-\frac{\pi}{2}, +\frac{\pi}{2}\right)$ by mapping x' onto $x'' = \pi \cdot x' - \frac{\pi}{2}$. And in a last step one can transform the interval $\left(-\frac{\pi}{2}, +\frac{\pi}{2}\right)$ into the whole range of real numbers by using the tangent function mapping x'' onto $x''' = tan(x'')$. Putting all three steps together leads to the function $f : x \mapsto x''' = tan\left(\pi \cdot \frac{x-t_1}{t_2-t_1} - \frac{\pi}{2}\right)$, which maps the arbitrary finite open interval (t_1, t_2) one–one onto the whole range of real numbers.

Therefore, in a certain sense, it is mathematically equivalent to speak about an infinite interval or an open finite interval. If we consider only the interval of time as such, the tangent transformation shows that there is no relevant difference between the infinitely extended and the finitely extended case if the metric of the finite interval is suitably adjusted.[8]

Things change, however, if one takes the embedding in the full line of real numbers into consideration. (And this embedding is presupposed in the above definition of 'finite intervals' as having no bounds.) Then it makes a difference whether the interval is finite or not. Firstly, one then has the metric on the finite interval induced by the embedding into the real numbers, and this metric is not equivalent to the one induced by the inverse of the tangent function above. Secondly, then there are real numbers farther left than the first point of God's existence in time. But these points are by definition not points of time. This may also explain why many people think that the question of what God did 'before time' makes sense. And it may explain the fact that most people do not see that in case of a finite open interval, something existing at every point in that interval does not have a beginning or end according to the second definition.

[8] Therefore, it is not true that an allpowerful God can shrink space to a finite volume only if space is not infinitely extended (Lowe, *Metaphysics* [2009], p. 255).

Note, that all these considerations depend on two important assumptions that one may discuss: that it is open intervals that matters and that time has the microstructure of real numbers. It may be interesting to note also that the transformability depends of course on infinity assumptions lying at the foundations of the real numbers. That the line of real numbers is in a sense 'continuous' means that there is, so to speak, enough room for smoothly squeezing the whole number line into a finitely extended interval. Temporal infinity in the sense of interval extension is intimately connected with the microstructure of time.[9] This fact will play an important role in the following considerations.

6.4 Infinity *via eminentiae*

From a Christian point of view, the sempiternalist account seems to have some advantages over the eternalist account. The temporal conception of God[10] seems to fit better to what the Bible and the other traditions of the Church tell us about God: that He created the world, led the people of Israel through the desert, spoke, revealed Himself, saved, was incarnated in Jesus Christ, resurrected him, sent the Holy Spirit, etc. In a word: Christian faith believes in a God who is acting in history. Conceptually, it is much harder to see how a completely timeless God could act in history than in case of a temporal God (albeit, it is nevertheless quite hard to understand how God as a non-spatial being can act in spacetime in any usual sense of 'acting' as derived from the context of human actors). Many philosophers even think that personhood in general is tied to time. Maybe, a temporal God is also more appropriate to our religious experience, our feelings, our prayers, and our lives. So from these points of view, the conception of a temporal God seems more appropriate to Christian faith.

But being close to the biblical scriptures and being close to our religious experience comes at a certain price: how to secure the divinity of God? The temporalist faces the danger of putting Him on the level of worldly entities. He, therefore, sometimes tries a certain move in order to keep up the difference between creator and creatures. Paul Helm reports it as the conception that God's 'powers of thought and action are infinitely more powerful than any human being's'.[11]

Such descriptions have a long history in the philosophico-theological tradition. They make use of infinity in order to heighten or increase the usual, mundane

[9] The argument mentioned before is only an approximation. In reality, things are much more complex. So, intuitively one would suppose that if the world has a beginning, then it must have been the starting point of the time interval of our universe's history. But then the interval would probably be closed (not open) on, at least, one side. Then, the argument I presented must be modified, perhaps by compactifying the real number line by an infinitely distant point, etc.

[10] I understand 'the temporal conception' always in the sense of the possibility of divine properties changing through time. That does not, of course, mean that *all* properties of God are variable. For this clarification, see Kreiner, *Das wahre Antlitz Gottes* [2006], p. 413.

[11] Helm, *Eternality* [1998], p. 78.

positive properties. Those properties are to be freed from all earthly limitations (especially from anthropological connotations) by saying that God possesses them in an infinite degree/intensity or that the degree in which God possesses them exceeds all creaturely degrees infinitely. So God is called 'infinitely more powerful' than we are, or His goodness is called 'infinite goodness', etc. In traditional theology, this method is known as '*via eminentiae*'. It is firmly grounded in the tradition. But it makes some assumptions that are by far not unproblematic, and it is disputable whether it really makes infinity assumptions.

One problem is the presupposition that all these properties come in objective degrees, that these degrees are objectively comparable, that there exists not only a maximum degree, but also an infinite one, etc. This seems to commit Christian faith to a certain extent to platonic-neoplatonic metaphysics. Furthermore, one sometimes finds problematic attempts to explain the eminency of predicates: to be infinitely good is explained as just the non-creaturely mode of being good, the mode in which God is said to be good. But that explanation is either circular, making use of what it was intended to explain, or it presupposes another, probably pre-categorical, concept of infinity that I will deal with in the next section. But it should be noted right here that in this case, the problem of the inscrutable mechanism becomes even more pressing. Generally, the suspicion may rise that the initial plausibility of the conception *via eminentiae* is due to its unclear status between the quantitative and the precategorical use. The concept of an unrestricted expansion lives on quantitative infinity while the idea of keeping the difference between creator and creation seems to require the precatgorical concept. Another problem is that it is not entirely clear what the meaning of infinity is in this context and how the mechanism is to work which is first of all merely *intended* as surpassing mundane properties '*via eminentiae*'.

But is it really infinity that is needed here? The concept in need must secure that God's perfections can never be reached by a creature. But creatures like us can increase their skills more and more. So, in order to secure the creator/creature difference, infinity seems to be necessary, for all finite degrees would stand in danger of being approached or even reached by creatures.

I do not want to assume that perfections and other properties come in quantifiable degrees, but let us pretend that they would do for the sake of the following argument. One may think that one could also do without infinity in this case, namely by using the inverse of the tangent function discussed above. The whole range of finite degrees would be mapped to a finite (half-) open interval, say, the interval $[0,1)$. Creatures could be said to be capable of increasing their skills from 0.9 to 0.99, from 0.99 to 0.999, etc. without end, but without ever reaching the skills of God at level 1. Would this not show that infinite degrees are not necessary in order to secure the creator/creation difference? I think that one cannot get rid of infinity in this context so easily. For this argument veils the fact that even in this situation we have infinity assumptions in the play. They are hidden in what was called 'microstructure' of the real numbers before: the possibility of infinitely ascending $(0.9, 0.99, 0.999, \ldots)$ while staying finite in terms of absolute values (below 1).

6.5 The Metaphysical Sense of Infinity and Its Connection to Eternity According to Thomas Aquinas

Let me now turn to the precategorical or metaphysical sense of 'infinity'. In order to grasp this sense, I want to search a little deeper into the systematic thought of Thomas Aquinas who is not only one of the greatest philosopher-theologians, but also a "friend of infinity". He decisively makes use of this concept in the framework of a systematically structured thinking which is oriented towards arguments and clear concepts. These points suggest his suitability for an investigation of the third sense of infinity.

6.5.1 God's Infinity

According to Thomas Aquinas, God is to be considered as *actus purus*, as pure actuality. On this basis, Aquinas develops the complicated doctrine of the identity of *esse et essentia*, of essence and being in God. Being pure actuality, His essence consists in nothing but His existence, so He is the *ipsum esse subsistens*, the subsistent being-self. In God, one cannot find the divide between the principles of *materia* and *forma*, for He has no material side in the sense of no (unactualized) potentiality. He is pure form. And as pure form, He is infinite in that he is not limited in the way that matter usually limits a form in making it the form of this and that *concretum*. In contrast, creatures are always "composed" from *materia* and *forma*, where 'to be composed' must not be understood in the sense of putting two material things together. It is to be taken in the way that in each and every concrete being one can find two principles in action by virtue of which the concrete thing is: the principle by which it is what it is (form) and the principle by which it is this one, and not another individual of that species (matter, *materia signata*, as *principium individuationis*). To discern these two principles is not to discern two things that could exist separated from each other.[12]

In short, Aquinas' way is: God is *ipsum esse*, pure actuality, therefore the *maximum formale*, the entity (if 'entity' is to be used here) with the least material part possible, so to speak, namely, without any materiality. Therefore, God does not suffer from the limitations matter brings with it in the hylomorphism. That is what Aquinas means when he calls God 'infinite': As pure actuality, He does not suffer the limitations imposed by matter in composed beings.

Now, creatures may, according to the Thomist standpoint, have a qualified infinity, an *infinitas secundum quid*, infinity in a certain respect. This infinity may be privative as in the case of matter – matter is indeterminate with respect to forms so that matter *lacks* the determinateness or finiteness of a concrete thing – or it may be positive, like the form of angels which is unrestricted and therefore unlimited, and that is infinite. But creatures 'cannot be infinite in their *esse*'.[13] So, God is the only thing that is essentially infinite. Why?

[12] So, Aquinas is not a universal realist like a Platonist.

[13] Shanley, *The Thomist Tradition* [2002], p. 190.

Aquinas provides us with an interesting argument here (*STh* p. 1 q. 7 a. 2). He subscribes to a principle from Aristotle's natural philosophy, namely, that there cannot be essentially infinite effects in nature.[14] Hence, if something besides God were infinite, it could not have been created by God for then it would be an infinite effect of God as its (primary) cause.

Contrary to what some people hold, this argument does not show that, except in God's case, actual infinity is *per se* impossible. For the argument is completely dependent on Aristotle's principle of no infinite effects – a principle that can be made plausible, if at all, only as a principle in the domain of natural things, not as a general metaphysical principle. And even in the realm of natural things, the argument can be disputed, for it departs from assumptions that have been challenged by the development of modern mathematics.[15] At any rate, the argument shows that Aquinas holds a very broad conception of creation according to which God created everything, He created the world '*ex nihilo*'.

6.5.2 God's Eternity

As to what concerns the conceptual relation between infinity and eternity, Aquinas gives some hints in his commentary on the Sentences. There he explains the famous definition of Boethius' that eternity is '*interminabilis vitae tota simul et perfecta possessio*', the complete and perfect possession of illimitable life at once. And this explanation is interesting for, albeit it does not mention infinity explicitly, it explains eternity in quite a similar way: '*aeternitas dicitur quasi ens extra terminos*'. So, eternity is something like being 'outside the limits'. Aquinas distinguishes three senses in which 'outside the limits' can be meant:

- concerning the complete duration (of an event),
- concerning the succession of parts,
- concerning the limitation of received being.

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[14] Aristotle's argument is: everything is either an *arche* or it is from an *arche* (*ex arches*). But the infinite cannot have an *arche*, for such an *arche* of the infinite would be a limit to the unlimited. Therefore, the infinite must be an *arche*, i. e., it cannot be an effect of something else (*Physics* l. 3 c. 4, 203b). It seems, however, that there is a systematic ambiguity in this *arche*-talk. If *arche* means something like cause, then the *tertium non datur*-like premise in Aristotle's argument is plausible but I cannot see that being caused directly (i. e., without recourse to perfection, simplicity or the like) imposes a limitation. If, on the other hand, *arche* means something like a beginning or a principle, then it seems comprehensible that having an *arche* means a limitation, but then the *tertium non datur*-like premise becomes doubtful. It may be interesting to note that Thomas Aquinas was well aware of a similar ambiguity, saying that Aristotle uses *arche*/*principium* equivocally, for being from a *principium* means a principle of origin (*principium originis*) while the contradiction to infinity comes only from the infinity of quantities or sizes (*quantitatis vel magnitudinis*; *In Physicorum* [1954], L. III, l. vi, p. 166).

[15] For instance, the impossibility of actually infinite numbers or the necessary finitude of everything countable. See, for example, Cantor, *Gesammelte Abhandlungen* [1932], pp. 370–439; see also my *Georg Cantor's Theory of Sets* [2005], pp. 161–2, and *Kardinalität und Kardinäle* [2005], pp. 90–99.

By bringing the elements of Boethius' definition in a one-one correspondence with these three senses of being 'outside the limits', Aquinas shows that there is no redundancy in Boethius' definition. '*Interminabilis vita*', 'illimitable life', excludes that the life of God – which, for Aquinas, is identical to His being – has ever had a beginning or an end (cf. the thesis (BE) above). '*Tota simul*', being completely at once, excludes the second sense, the succession of temporal parts. '*Perfecta*', being 'perfect', excludes the limitations of being that is received in something else and is thereby limited.

The first two aspects that are ruled out by the Boethian definition are well known in the contemporary discussion in the philosophy of religion. Brian Leftow, for instance, discerns inner and outer limits of life.[16] Outer limits are beginning and end of a life, inner limits the boundaries between different sections of a life, like between one's first and one's second year, or between what is past and what is future for a certain being at a certain time. Leftow points out that the inner limits are as real as the outer ones. Now, if God is conceived of as a perfect being, lacking the typical creaturely constraints we experience every day (for example, when rising in the morning makes manifest all the heavy burdens of life), then He must not suffer from these two limitations. That He has no *outer* limits is what (BE) says: His life has neither beginning nor end. But having no *inner* limits precludes God from being in time like we are: He cannot have past and future for that would mean that He would suffer inner limits that become manifest in losing parts of His life to the deep oceans of the past. To this end, by the way, Leftow adds a speculative argument according to which the worth balance of God's life in total must be positive every day, so losing a day would mean losing something positive, decreasing perfection – which is impossible for a perfect being.

In Aquinas' view, being thus without inner and outer limits stands in connection to the concept of '*aevum*': Being in the sense of *aevum* or, say, sempiternality is distinct from God's eternity for it is a creaturely mode of being. Sempiternal entities like angels or heaven are creatures. They participate in the being of God and do not have their act of being in themselves. Hence, their being is limited by their essence. As Leftow puts it: 'The writers of Scripture see God as unlimited, free from creaturely constraints.'[17] This being free from constraints is what is usually termed 'infinite'.

6.5.3 Eternity and Infinity

For Aquinas this basic metaphysical sense of infinity is closely linked to eternity. Although this link is hardly ever made explicit, one can read it off from many passages in which infinity and eternity are treated separately but strikingly parallel. So, for example, in the *Summa theologiae*, Aquinas describes an infinite being as a being having '*esse non receptum*', something that has its act of being not received

[16] See Leftow, *Eternity* [2003], p. 74.
[17] See Leftow, *Eternity* [2003], p. 74.

from something else. In the commentary to the Sentences, in turn, it is eternity that is described this way. As was the third point in the explanation of Boethius' definition, eternity precludes the inner and the outer limits of life and the limits imposed by the creaturely mode of received being.

It is interesting to take a closer look at how Aquinas deals with the question whether one could not define eternity in a different way. For questions like that usually show something about the systematic links in a thinker's 'web of concepts'. Aquinas deals with an objection to Boethius' definition. The objection is: '*interminabilis*' is a negative expression, it involves a negation. Therefore it should be avoided in definitions of concepts which are intimately related to the nature of God, the most perfect being.[18]

This argument makes use of a basic distinction between positive and negative properties I find hard to understand, especially in a logical perspective. To start with a predicate P and form a negated atomic sentence like $\neg Px$, or to start with the dual predicate P' and form an unnegated atomic sentence like $P'x$ seems not to make any significant difference from a logical point of view. But maybe there is a meaningful ontological distinction between positive and negative properties which is simply not reflected in the logical behaviour of the respective predicates.[19] Aquinas himself takes this distinction for granted, as he answers to this objection in a different way. First he refers to his general method of negative theology he has inherited from Pseudo-Dionysius. Our intellect cannot perfectly understand divine being, so it has to feel its way forward by the *via negativa*. That being pointed out, Aquinas also gives a systematic reason why one cannot get rid of the negation: Eternity, he says, is intimately tied to unity. And unity means undividedness, so it necessarily includes a negation.[20]

I have already pointed out that there are only very few passages in Thomas Aquinas' works in which eternity and infinity are explicitly linked. One of them is *Summa contra Gentiles* lib. 2, ch. 80, no. 4. By discussing it, I come back to the first connection of eternity and infinity: the eternity of the world.[21] Aquinas considers (and wants to disprove) arguments against the possibility of the existence of human souls, independent of the decaying corpse. For philosophers holding to the eternity of the world, he says, it seems completely impossible that souls can survive bodily death, for then, generation has started infinitely long ago, so that infinitely many human beings have died before us. But then an infinite number of souls must be actual right now, and that is – according to Aristotle's natural

[18] See *In Sent.*, lib. 1 d. 8 q. 2 a. 1.

[19] See, for example, Plantinga, *Warranted Christian Belief* [2000], pp. 52–5.

[20] A similar point is touched by Eleonore Stump in her chapter on *Eternity, Simplicity, and Presence*, p. 29ff.

[21] Another one is *In Sent.*, lib. 2 d. 1 q. 1 a. 5. There, Aquinas discusses the eternity of the world (*utrum mundus sit aeternus*) and presents an argument of 'the commentator', i. e., Averroes. In that article, there are many arguments dealing with infinity. For lack of space, they cannot be discussed here.

philosophy – impossible. Therefore it seems that souls without bodies cannot exist, at least not in the same number as before death, when the world is eternal.

I find it interesting to note that Aquinas completely subscribes to Aristotle's proof of the impossibility of an actually infinite number in nature.[22] But, he says, from all that stuff no difficulties follow for the catholic believers, for they do not hold the thesis of the eternity of the world. – An easy way out.

Why, then, mention this argument? One can see here, that Aquinas uses 'eternity' not only in the sense that one usually ascribes to him (the Boethian sense), but also in the sense of actually infinite amounts of time, for only if the 'eternal world' means that the world exists for an actually infinite number of days or years or whatever, eternity may be thought to imply the existence of an actually infinite number of souls.

6.6 An Analogy: Quantitative Infinity and God

As to what concerns the quantitative notion of infinity, I do not see how it can be used in connection with God in a literal or direct way – except for a sempiternalist's conception of eternity as discussed above. In my eyes, it is hardly convincing to use the quantitative concept of infinity in the case of other divine predicates, so, for example, if one conceives of 'omnipotence' as infinite power in the sense of having the power to bring about an infinite number of states of affairs, or 'omniscience' as infinite knowledge, i. e., that the number of propositions God knows is infinite. It appears doubtful to me whether those infinitarian concepts do really capture what traditional doctrine wanted to express by 'infinite power' or 'infinite knowledge' or, say, 'infinite goodness'. As I said before, in those cases a conception of maximality or unsurpassability is needed, not so much a conception of a certain infinite quantity.[23]

But maybe one can make use of it in an analogy or a mathematical metaphor for talking about God. In the mathematical definition, a set is called 'infinite' if it has proper subsets being equinumerous or, say, equivalent to the whole set. If one tries to connect this to the metaphysical way of talking about God, one may think of God's intrinsic properties as proper parts of God's nature. According to the classical doctrine, every essential property of God already coincides with his essence – a coincidence which is traditionally conceived of as part of the doctrine of divine simplicity. In a strong reading, God is simple not only in that He has no spatio-temporal parts, but also in that He has no *materia* and *forma* parts and no essence as distinct from His existence. This is one way in which Aquinas conceives of God's infinity (being pure form without matter). Hence, one might say that

[22] Cf. Aquinas' response to the argument in no. 10 of *SCG* II, 80.

[23] Another point is that one may also say that human beings know infinitely many propositions; for example, for every known proposition p we also know $p \wedge p$, $p \wedge p \wedge p$ etc., and for every natural number n we know, in a sense, the sentence 'n is a natural number'. A theory of knowledge from which it does not follow that we know $p \wedge p$ if we know p would have to use a theory of the individuation of properties I would be keen to learn more about.

this kind of theological infinity consists in that a proper part of God's nature (one of his essential properties) is, in a sense, equivalent to his nature. In conclusion, equivalence of a whole and some of its proper parts seems to be a very abstract feature that mathematical and theological senses of infinity have in common.

I do not want to elaborate on this analogy here, but present some considerations about the alleged impossibility of a third way. What follows is, admittedly, a little experimental in character.

6.7 The Alleged Impossibility of a Third Way

A timeless God seems quite remote from the believer and hard to be reconciled with Scripture's image of a God who acts in history. A temporal God, by contrast, seems hard to be conceived of as the creator of all, including time. Therefore, one may want to look for a third way combining the advantages of both, the sempiternalist and the eternalist account. Why not conceive of God as becoming temporal with creation, having been atemporal "before"?

6.7.1 Time and Ordering Relations

When Brian Leftow analyzed such a conception he came to a negative result: he has found 'that there is no coherent thought here to express'.[24] In my eyes, this conclusion goes beyond what is supported by his analysis. His analysis starts by saying that 'God becomes temporal' means that God's life has first a timeless and then a temporal part. But, Leftow says,

> God cannot first be timeless, then later be temporal. For then God's timeless phase is earlier than His temporal phase, and whatever is earlier than something else is in time.[25]

I do not find this argument fully convincing because of a systematic ambiguity concerning the use of 'phase' in it. If a phase is by definition something temporal, then the inference from the premise that one phase is earlier than another phase to the conclusion that both phases are in time seems perfectly valid. But then the premise is non-charitably formulated as it imputes the contradictory concept of a timeless *phase* to the criticized opponent. If, to the contrary, a phase is not necessarily something temporal, then the use of 'phase' is unproblematic here, while I have some doubts concerning the other premise that 'earlier than' can be used sensibly only as a relation between points or intervals of time. In my eyes, there are only two possible positions concerning talking of 'before' with respect to the beginning of time and world: either such talk of 'before' is completely senseless or it must be understood in a way different from, but not opposed to our usual understanding of 'before' as a relation between points of time. To be sure, usually with 'before', 'after', and 'earlier' we refer to relations in time. But when we talk

[24] Leftow, *Eternity* [2003], p. 75.
[25] Leftow, *Eternity* [2010], p. 280.

about creation and the beginning of time or about eschatology and the "time after death", we can of course not mean exactly the same as in our everyday usage of these words.[26] With these terms, we might refer to an ordering relation that extends the usual ordering of points of time to the topological environment into which the interval of time is embedded (see also section 6.3.2 above). Just as an example, one might think of time as the open interval $(0,1)$, and conceive of its natural embedding into the full real number line (such that there were infinitely many points "before" time) or into the closed interval $[0,1]$ (such that there were only one point "before" time, and one "after").

One might complain that this is not the literal meaning of 'before' and 'after', so that we use these words only figuratively or metaphorically. Well, probably this is true. But this is also true in many other cases, for example in a hard-core eternalist position which aims at being in line with the biblical tradition of a God who remembers, forgets, regrets, waits, foreknows, creates and sustains, incarnates and redeems, saves and salvages, listens and hears, understands and reacts, promises and fulfills, etc. All such predicates are temporal predicates not only because they are applied to temporal beings but also because they include a temporal component in their meanings. If we use these predicates in the case of an eternal, unchangeable God, something severe must happen to their meanings, for what is said in temporal terms is then said about something entirely atemporal. So, one frequently argues, sentences in which these predicates are used to talk about God are literally false, and can be found true only by means of taking them as metaphorical or symbolic language. Others, especially in the medieval tradition of Christian philosophy, tried to save as much of their meaning as possible within an eternalist framework, for example by developing theories that say that causes of temporal events do not have to be in time. It be necessary only to believe that the effects of God's action are in time, whereas He as their agent cause does not need to be in time. In my opinion, this interpretation does not help us with our problem, for it simply moves the problems from the realm of God's acting in time to the realm of a causal agent outside of time. So, even in the eternalist framework, there are lots of non-literal or metaphorical use of language in play.[27]

And the same holds also in natural sciences. In astronomy, for example, we call certain clouds of gas 'hot', although one may never experience them as hot. And this is not for the mere reason that one may not reach them. The thing is that the density of those clouds is so low that they consist only of some few atoms per cubic meter, these atoms having a very high average speed. So, according to the physical definition of heat (the average kinetic energy of atoms), the cloud is hot, but if one

[26] Eschatological considerations are an important motivation for me in trying to keep the possibility of a coherent talk about 'before' and 'after' open with respect to an extension of our earthly time to point(s) 'before' creation and 'after'/'on' the Last Day. See my *Joseph Ratzinger on Resurrection Identity* [2010].

[27] Something similar holds also with respect to Kant's *Dinge an sich* which are non-temporal (for time is an *Anschauungsform*), but which are said to affect us (*affizieren*). I am indebted to Christian Weidemann for pointing this parallel out to me.

would ever touch it, it would probably feel very, very cold – if there were anything to be "felt" in a near vacuum situation at all. So even in science we use our usual words for some phenomena in a non-literal way, redefining them appropriately for needs of fruitful and uniform theories. Why not do the same when talking about cosmogony and the limits of time? Why not say that in these circumstances we use a different order relation, or better: an extension of the usual order relation time induces, extending the relation 'before' to a realm of eternal life of God "before" creation?

If all of that is true, i. e., if there is no necessity to restrict the talk of 'before', 'after', or 'earlier than' to time, then 'God becomes temporal' need not be an empty self-contradiction. It might point to a third way somehow between eternalism and sempiternalism. I am not sure whether there is such a way that is viable, but I do not see that it were necessarily not.

6.7.2 God and Change

There is another argument against a third way I want to discuss. It goes approximately like this: if God is timeless, he cannot change. Therefore it is impossible that "before creation" God had no relation to temporal events and that after the world has been created God has a relation to temporal events. For first lacking a relation one later has would mean a change a timeless God cannot undergo.

A partial response to that problem, frequently given in tradition, was that it is not God who changes but only His relation to us. While these relations change, they leave Him completely untouched. In more recent terms, only God's extrinsic properties change while his intrinsic properties are changeless. This answer is only a partial answer, for it stays behind what religious language intends to express when talking about divine love and compassion, for example.[28] Is it true love and compassion if it leaves the loving one more or less untouched, unchanged?

What I want to call into question instead is the intimate relation between timelessness and impossibility of change. This relation is usually considered a conceptual relation, i. e., allegedly one cannot even think about change without thinking time. This goes back at least to Aristotle's influential natural philosophy with its famous description of time as the measure of change. But is it necessary to tie change to time? In Aristotelian terms: Is it necessary that time is the only measure of change, or may one think about other measures?

In our natural world, all changes need time. Think about one of the easiest digital systems we have, the light switch. If light is on and we switch it off, this action takes a little while, maybe half a second or so. Then, leave everything out of account that has to do with the lameness of my finger touching the switch, just take the time the switch needs from 'on' to 'off'. This is not something instantaneous, but it takes a very short amount of time, say 1/10 of a second. This seems always to be the case.

[28] See, among others, Geach, *God and the Soul* [1969]; Lewis, *Extrinsic Properties* [1986]; Weatherson, *Intrinsic vs. Extrinsic Properties* [2006].

Things do not happen instantaneously, but they need an, if short, amount of time. But is this necessarily so? In more abstract a perspective, what we have is a system with two possible states, and change taking place means that the one state is left and the other is taken. So, there must be two situations, one called 'before', and one 'after', and there is some quite simple predicate, namely 'on' or 'off', the truth value of which with respect to the light switch changes between 'before' and 'after'. Do I necessarily rely on time when talking about the two situations by using the words 'before' and 'after'?

In a similar fashion as above one may argue that I do not. What I am committed to is an ordering relation that allows distinguishing the two situations. This ordering relation usually is time or derived from time, but can we not conceive of others?

To be more precise, my point is that change does not conceptually presuppose duration, although processes of change in our natural world always do. Just consider two different (temporal) slices in spacetime, both point-thin but in finite (temporal) distance. Could change happen between the two? When, for example, one slice is this morning at 9 a.m., the other one is yesterday morning at 9 a.m., in the first I wear a grey t-shirt and in the second a blue t-shirt; is that not change? If it is, then one can conceive of change without duration. But maybe there is an ambiguity in talking about 'change' here, for it can mean both: a *result of comparing* two situations and the *process between* the two situations. I would agree that there are no processes without duration/time, but 'change' in the first sense could also be applied in cases where there is no duration between two situations. Change as a result of comparison presupposes an ordering relation according to which we can at least distinguish two states in at least two situations. In nature, to be sure, this ordering relation is time (or somehow derived from time).

Turning back to the eternity of God, that means it is not necessary that change in God is precluded by taking His eternity to mean timelessness. Maybe God's timelessness can be conceived of exactly in the way Leftow makes use of in his speculative argument mentioned above: that God is not into the 'before' and 'after' in the sense we are, in the sense in which we can be said to lose the past. Maybe this sort of timelessness is a viable way to understand the '*totum simul*' of Boethius. Maybe it does not exclude change and '*interminabilis vita*', illimitable life, from Him. And maybe it would make it possible to understand some quite intransparent formulations from theological tradition, as when Boethius says it is fundamental for Christian belief that the Trinitarian God with His interpersonal relations existed even 'before' creation, 'from eternity, that is, *before* time and world were constituted' ('*ex aeterno, id est* ante *mundi constitutionem*').

6.8 Summary

The aim of this chapter was to seek some traces of conceptual relations between infinity and eternity. A first relation was found in the debate about the eternity of the world in which 'infinity' is used in a quantitative sense. In the same sense, temporalists are sometimes said to make infinity assumptions about the time during

which God exists. I argued (1) that it is unfair to presume that temporalists make such strong an assumption, and (2) that the issue of the infinite macrostructure of time is mathematically intertwined with the issue of the microstructure of time – a problem that is not specific to the temporalist. Then I switched to Thomas Aquinas as a famous exponent of an eternalist standpoint. In his explanation of Boethius' definition a threefold sense of eternity showed up: no outer limits, no inner limits, and no limits of received act of being – the last point corresponding to his precategorical usage of 'infinity'. Eternity and infinity are explained by Aquinas in a similar way: as being outside of limits and as non-received acts of being. In a last section of my chapter I then proposed that a third way between temporalism and eternalism cannot be ruled out too easily, for it can be argued (1) that talking about 'before' the beginning of time refers to an ordering relation that is not necessarily time, and (2) that the connection between change and duration is not a conceptual one.