

Being Without Foundations

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1 Summary

Reality seems to come in layers or levels, some of which are more fundamental than others. It has long been and still is widely taken for granted that the hierarchy of layers or levels is bounded from below – that there is a fundamental level. This prompts the question what the nature of the fundamental level is – indeed, answering that question is then naturally viewed as the ultimate goal of inquiry. Our project questions the assumption, and explores alternatives to it.

The idea that reality has ultimate foundations is shared among world-views that otherwise differ radically. Theism has been the dominant metaphysical world view for most of the history of Western thought. Whatever else they claim, versions of this view hold that there is a being which is the ground of everything else. Materialism is a rival world view, which has enjoyed great popularity within philosophy in recent decades. Its most influential contemporary version holds that a great number of microphysical facts – facts about field values at spacetime points, for example – are themselves ungrounded, and are, jointly, the ground of everything else.

Sometimes, the view that reality has ultimate foundations is adopted because alternatives seem hard to imagine, or downright paradoxical. Arguably, however, modern mathematics has shown such concerns to be misplaced. There is nothing in principle wrong with dependency chains that do not bottom out: for example, sets which contain sets, which in turn contain sets, which themselves contain sets, and so on *ad infinitum*. These lessons of modern mathematics seem to have been insufficiently appreciated by other disciplines.

One of the guiding hypotheses of the present project is that the foundationalist orthodoxy is due to an assumed connection between foundation and explanation, as well as to a certain conception of the latter. Explanation in terms of unexplained ultimate foundations certainly serves as a paradigm for what a good explanation is. This paradigm is also influential in scientific disciplines that aim to explain specific phenomena, rather than reality as a whole. In mathematical logic and formal semantics, meaning is to be explained in a way that is compositional: the meaning of a complex expression is derived from the meanings of its ultimate parts, which do not themselves have any comparable explanation. In physics, macroscopic phenomena are explained in terms of elementary particles and their interaction. In theology, God is assigned the role of anchoring elements of reality (being, meaningfulness, norms) that are supposed to be unable to ‘stand alone’. In philosophy, theories are evaluated for their explanatory potential in terms of the primitives they postulate, where such primitives are taken to resist definition or analysis in more fundamental terms.

On reflection, however, these assumptions all appear questionable. For example, it is now generally considered metaphysically possible that space does not contain points, but is gunky, i.e. every part of it contains smaller parts. The view is also taken seriously in the philosophy of physics. Gunky space complicates our theories and, superficially at least, gives rise to paradoxes concerning common-sense notions such as *contact* and *location*. But this should not be taken to count against its possibility but motivate us to refine and clarify these common-sense notions.

In our view, the situation with the “space of explanations” or “space of reason” is analogous: we should not simply assume that there are unexplained *explanantia*. Rethinking our conception of the world in view of the possibility that it might not have a foundation opens up new, exciting – even potentially revolutionary – avenues of research.

The aim of this project is to examine the credentials of the foundationalist orthodoxy – often expressed by saying that reality is wellfounded – and to ask what might be gained by thinking in different ways.

2 Project Description

2.1 Current State of Research in the Field

It is almost a platitude that inquiry aims at discovering what the world is fundamentally like. This idea seems to presuppose that there is a fundamental level of reality – a presupposition that shapes what sort of questions are being asked.

Typically, this presupposition goes unchallenged. On the face of it, however, there are three different ways in which foundationalism could turn out to be wrong. First, there might be an infinite sequence of ever lower levels; second, the grounding structure might resist stratification into levels altogether, because there are circles of grounding; and third, there might not be such one thing as a determinate reality at all. The project will explore all three options.

The view that there is an infinite sequence of ever lower levels, without an endpoint, is sometimes more colourfully expressed by the slogan there are “turtles all the way down” – deriving from a mytheme, a variant of which is represented in the following anecdote:

A well-known scientist (some say it was Bertrand Russell) once gave a public lecture on astronomy. He described how the earth orbits around the sun and how the sun, in turn, orbits around the center of a vast collection of stars called our galaxy. At the end of the lecture, a little old lady at the back of the room got up and said: “What you have told us is rubbish. The world is really a flat plate supported on the back of a giant tortoise.” The scientist gave a superior smile before replying, “What is the tortoise standing on.” “You’re very clever, young man, very clever,” said the old lady. “But it’s turtles all the way down!” (Hawking, 1988, 3)

The view that there is no fundamental level has its attractions. It may even be seen as suggested by modern physics (cf. e.g. Nobel Prize winner Hans Dehmelt’s 1989, 8618), via the following quasi-inductive argument: atoms turned out to have protons, neutrons and electrons as parts; protons and neutrons turned out to have quarks as parts, and ...?

Yet the coherence of the very idea of bottomless reality has repeatedly been questioned. It is a premise of many versions of the cosmological argument for the existence of God that there cannot be an infinite regress of explanation (cf. Oppy (2013a) for an overview). Jonathan Schaffer coined the memorable phrase that if grounding or explanation were to go back infinitely, “being would be infinitely deferred, but never achieved” (2010c, 62). Acceptance of the regress has been likened to debt evasion: “I have debts but no money in the bank. I write a cheque to clear the debt. The cheque is challenged so I write another cheque to cover the original cheque. I am prepared to do this indefinitely. My procedure may postpone the evil day, but it never meets my debts. . .” (Armstrong, 1974, 196). While such an attitude is widely shared, the arguments that support it have remained elusive.

At least *prima facie*, there might be infinitely descending chains of relations of grounding, foundation, explanation, determination, dependence and causation. Physical space provides an instructive analogy. Philosophers, until almost the end of the last century, have typically assumed that spatial regions have an atomistic mereology, i.e. that spatial (or spatio-temporal) regions are ultimately composed out of points. This ‘pointy’ conception of physical space may be contrasted with a ‘gunky’ conception, according to which every extended region has equally extended proper subregions – hence we have ‘regions all the way down’. It has now been almost universally realised that there are no *a priori* reasons to exclude the gunkiness of physical space. Indeed, it is a respectable scientific hypothesis (Bohm (1957, 139) and Weinberg (1992, 230–240)), and philosophers now standardly assume that what they say about space should be compatible with its gunkiness.¹

¹Cf. e.g. Sider (1993), Hawthorne and Weatherson (2004), Nolan (2004), Arntzenius (2008, 2012), Arntzenius

We hold that the same is true more generally of the space of explanations, or space of reasons. Barring further argument, there is nothing problematic in principle with unbounded explanatory chains.

The other hypothesis that needs to be taken much more serious than it presently is concerns ineliminable circularity. Circular grounding or dependence may well be a live possibility for physics and metaphysics. Kerry McKenzie’s work on the so-called “particle democracy” in 1960s physical theory shows that symmetric grounding among elementary particles was once taken not only to be conceptually, but even physically possible (2011; 2017a; 2017c). More abstractly, the desire to preserve irreflexivity (and, given transitivity, to avoid circles of ground) imposes severe constraints on the individuation of the relata of the grounding relation. In order to count, e.g., the fact that p as a ground for the facts that $p \wedge p$ and that $p \vee p$, we have to distinguish these facts – which in turn seems to make sense only on a conception of ‘conceptual’, not of ‘worldly’ grounding (cf. Correia (2010, 2014, 2015, 2016) and Correia and Schnieder (2012a, 18) for this distinction). So perhaps it is time to question the starting assumption, that explanation never goes in circles.

The third tacit assumption of present philosophising we want to call into question is that what there is forms a definite totality at all. If there is no such thing as ‘the world’, then there is nothing to be ‘generated’ by the fundamental level, there is no unity that would allow for the structure provided by the level-generating relations to get a hold in reality. The problem of totality goes back right to the beginnings of philosophy: from the totalitarianism of Parmenides, and Aristotle’s attempts to make sense of a world that is both bounded and infinite, through the very rich medieval discussions of the so-called ‘doctrine of transcendentals’, to Leibniz’s bold claim that even complete possible worlds contain privations (and thus evil) and the Kantian idea that our urge to complete even only problematically given totalities is the source of transcendental illusion, the question whether the world forms a definite and definable whole has formed a persistent sub-current of philosophical theorising. Its relevance to contemporary philosophy, however, in particular to discussions of different types of monism – so-called ‘existential’ (Joachim, 1901; Bennett, 1991), dependence (Curley, 1969, 1991), truthmaker (Schaffer, 2010b), compositional (Schaffer, 2007), priority (Schaffer, 2010c, 2014; Cameron, 2010), dispositional monism (Bird, 2007; Barker, 2009; Bigaj, 2010) – has not yet been explored.

Our project will explore these connections between questions of non-wellfoundedness of explanation and grounding in four debates in particular: about the cosmological argument, about the relation of grounding and its formal features, so-called ‘infinetism’ in epistemology and about different notions of negativity and totality.

2.1.1 Cosmological arguments

In natural theology, the cosmological argument is one of the best-known arguments for the existence of God.² It is a somewhat loosely defined family of arguments, whose members differ quite significantly from each other. In contrast to ontological arguments, cosmological arguments are not purely a priori. In contrast to teleological arguments, which turn on the putative observation that things have roles or functions, and are remarkably well equipped to fill them, the a posteriori premise of the cosmological argument is rather uncontroversial: typically, a claim to the effect that there are contingent beings.

The further premises are a version of the principle of sufficient reason – roughly, that everything has

and Hawthorne (2005), Russell (2008), Schaffer (2010c, 61–65), Dorr (2011, 156), Giberman (2012), Tallant (2013, 431), Sider (2013, 270), Cotnoir (2013), Leonard (forthcoming).

²Cf. Siniscalchi (forthcoming); Alexander (2008); Oppy (2009); Feser (2013); Oderberg (2013); Pruss and Gale (2005); Reichenbach (2017) for recent overviews, Reichenbach (1972), Rowe (1975), Craig (1980), Swinburne (2004) for classical expositions, Beck (2002) for a bibliographic appraisal and Fakhry (1957) for a discussion in the context of Islamic theology. Davis (1992) is also important.

an explanation³ – and a claim to the effect that there cannot be an infinite regress of explanations.⁴ As the slogan has it, explanation must come to an end. The reason for this is not just that we are finite beings and will run out of time. Rather, it is thought that it lies in the nature of explanation that a good explanation is backed up by an ultimate explanation.

The so-called “argument from contingency” is a version of the cosmological argument typically associated with G.W. Leibniz.⁵ Pruss (2009, 25–26) presents it as follows:

PSR: Every contingent fact has an explanation.

sum: There is a contingent fact that includes all other contingent facts.

∴: Therefore, there is an explanation of this fact.

nec: This explanation must involve a necessary being.

def: This necessary being is God.

In the contemporary discussion, most of the attention has focussed on the **PSR**. The other premises, however, certainly also deserve scrutiny: The plausibility of **sum** depends on our conception of totality⁶ and **nec** is typically motivated by some kind of no-circularity condition on explanation (cf. e.g. (Rowe, 1997)).⁷ In yet another version of the argument, what is known as the *kalām* cosmological argument (Craig, 1979),⁸ a regress of causes stretching back infinitely is ruled out. Here, a very strong premise is used: that an actual (as opposed to potential) infinity is impossible.⁹

The debate about the cosmological argument shows us that for different relations whose non-wellfoundedness is in question, different arguments apply; and it provides us with a wealth of such relations and arguments.

³According to van Inwagen (1983, 203), the ban on self-explanatory propositions is an essential feature of the concept of a sufficient reason. The literature on the PSR is vast, some examples are: Anscombe (1974); Barwell and Lennon (1982); Baumgarten (2011, 2013); Belot (2001); Billouet, Gaubert, Robinet and Stanguennec (2006); Bliss (undated); Carraud (1997); Crusius (1743, 1744); Dasgupta (2016); Della Rocca (2003, 2010, 2012); Deshpande (1977); Feser (2014); Frankel (1986); Fremont (2001a,b); Gontier (2001); Griffiths (1976); Gurr (1959); Hamlyn (1971); Hanfling (1981); Hicks (2013); Hill (1982); Hitchcock (2007); Jacqueline (1992); Kleinschmidt (2013); Longuenesse (2001); Melamed and Lin (2016); O’Connor (2013); Oppy (2013b); Pruss (2006, 2007, 2017); Roinila (2013); Ross (2013); Rougier (1917); Schlesinger (1991, 1995); Schopenhauer (1847, 2015); Sleigh (1983); Smith (1993, 1994a,b, 1995b,a); Tausch (1926); Vollmer (2007); Walker (1997); Wroński (2014).

⁴Cf. particularly Rowe (1968); Craighead (1975); Crawford (1980); Sklar (1989); Koons (1997); Almeida and Judisch (2002); Reichenbach (2004); Koons (2008); Goldschmidt (2011). On the connection between causal regressions and the cosmological argument, cf. also Owens (1962); Brown (1966); Wolfe (1971); Craig (1977); Sadowsky (1980); Miller (1982); Day (1987a); Sadowsky (2000). Worries about infinite causal regressions have their analogues with time, in particular the question of the timelessness of creation: cf. eg. Craig (1980); Conway (1983); Kelly (1984); Wolfe (1985); Kabay (2005); Morrison (2010); Cohoe (2013). The literature on God and time is enormous. Cf., among others, Blount (2002); Craig (1998, 2001); Hasker (1983, 2002); Helm (1988, 2010); Jevons (1906); Kneale (1960); Kretzmann (1985, 1997, 1999); McArthur (1977); Mullins (2016); Naylor (1980); Pattison (2015); Senor (2002); Smith (1995c); Stump and Kretzmann (1981, 1987, 1991, 1998); Sutherland (1979); Zimmerman (2002); Craig (1996).

⁵Cf. in particular Miller (1970), Miller (1992) and Taylor (1991, 84–94) for concise presentations and Rasmussen (2010) and Heil (2013) for overviews.

⁶van Inwagen (1983, 202–204) has argued that **sum** is impossible, as the conjunctive fact would have to contain, and explain, itself.

⁷Cf. also Hamri (2018), and Bøhn (forthcoming a) for rather scathing criticism.

⁸Cf. Craig (1984, 1993, 2011, 2006, 1999, 1979, 2013); Goetz (1989); Guminski (2002); Mackie (1982); Morrison (2013, 2002); Nowacki (2007); Oderberg (2001, 2002); Oppy (1991, 2001, 2002); Park (2016) for just a sample of the literature. Craig’s arguments have been criticised by Löffler (2004); on the *quarta via*, cf. also Löffler (1998).

⁹Meyer (1987) argues that if God exists, he could make the infinitely many choices to guarantee the truth of the axiom. So God’s existence and the Axiom of Choice are equivalent – an equivalence that had not been noted in the famous Rubin and Rubin (1963, 1985).

2.1.2 Non-wellfoundedness and grounding

A number of authors, e.g. Cameron (2008b,a), Orilia (2009), Schaffer (2009b, 2010c), have been tempted by the view that a regress is vicious if (and perhaps even only if) it is a grounding regress.¹⁰

This account appeals to the notion of grounding, which has been studied extensively in the last fifteen years.¹¹ In that literature, one kind of non-wellfoundedness, involving circles or even self-grounding, is almost universally ruled out by stipulation. The *prima facie* possibility that there might be grounding chains that do not bottom out is sometimes mentioned, but typically not discussed in any detail.¹² Among early contributions, Schaffer (2010c) and Brzozowski (2008) deserve mention: the latter offers a detailed but somewhat neglected argument against infinite descent (considering the special case: the location of wholes as grounded in the location of parts), while the former deploys the premise that there cannot be infinite descent in a pivotal role in an argument for metaphysical monism. Metaphysical infinitism, as characterised by Morganti (2009, 2014, 2015) and Bliss (2012, 2013, 2014, undated), deserves more study.¹³

As laid out below, interesting connections arise with the newly popular view of ‘generalism’ (sometimes called ‘nihilism’ or ‘qualitativism’), the view that fundamentally, there are no things.¹⁴

Early work on grounding tended to discuss infinite descent in somewhat generic terms. But in two recent important papers, Scott Dixon’s “What is the wellfoundedness of Grounding” (2016) – who makes use of some conceptual tools articulated in Leuenberger’s 2014a (acknowledged in sct. 7), which develops a supervenience constraint on grounding that is compatible with infinite descent – and Brian Rabern and Gabriel Rabin’s “Well-Founding Grounding Grounding” (2016), various different more specific versions of the claim that reality is wellfounded are distinguished.

2.1.3 Epistemic Infinitism

Classical foundationalism in epistemology is typically motivated by regress considerations: if justification cannot go on forever nor be circular, it has to stop with something that is not itself in need of justification.¹⁵ “All justification must eventually terminate with some epistemologically basic beliefs that do not require independent justification.” (Pollock, 1974, 29) Otherwise, “...justification could never even get started and hence that no belief would ever be genuinely

¹⁰On the general question when regresses are vicious, cf. Day (1987b); Clark (1988); Black (1996); Nolan (2001); Maurin (2007); Gratton (2010); Maurin (2013); Wieland (2013, 2014); Taşdelen (2014).

¹¹Papers by Kit Fine (2012a), Gideon Rosen (2010) and Jonathan Schaffer (2009b) are the standard references, and in many ways the most influential contributions. In a very short time, the literature has become enormous: the philpapers.org category now (as of March 22, 2018) includes already 214 entries, with 259 in the closely related category “Fundamentality”. Introductions to contemporary discussions of grounding are Clark and Liggins (2012), Correia and Schnieder (2012a), Trogdon (2013), Hovda and Cross (2013), Bliss and Trogdon (2014) and Raven (2015). Two Geneva PhD theses (Correia (2002), book publication: 2005; and Schnieder (2003), book publication: 2004) were the first to give to metaphysical explanation the centre of the stage. For introductions to dependence, cf. Correia (2008), Koslicki (2013). In addition to those cited below, non-wellfounded grounding is also discussed in Bøhn (forthcoming b), circularity in particular in Nolan (forthcoming), Barnes (forthcoming), Thompson (2016, forthcoming), symmetric grounding in Zylstra (forthcoming) and self-grounding in Paseau (2010), Jenkins (2011), Bliss (forthcoming), Cameron (forthcoming) and Kovacs (forthcoming).

¹²The lack of arguments on either side is also noted by Raven (2013, 2015).

¹³Tahko (forthcoming) also discusses non-wellfoundedness of grounding and “metaphysical infinitism” more generally – and even says that Tahko (2014) is a “philosophical study of Dehmet’s model” (fn.19)!

¹⁴Cf. Hawthorne and Cortens (1995) for the first use of the ‘feature-placing language’ of Strawson (1959) for this purpose, and Dasgupta (2009, 2017); Turner (2011, 2017); Korman (2015, 2016); Russell (2016, forthcoming); Diehl (2017b,a); Bacon (forthcoming) for a sample of the current literature.

¹⁵It has always been difficult, however, to articulate a conception of something that is both unjustified and confers justification. The problems of the *causa sui* re-appear with respect to self-justifying beliefs (cf. e.g. Saunders, 1965; Alston, 1976). Sextus Empiricus famously concluded from the regress problem that we do not know anything (PH I: 166–169). Cf. Oakley (1976) for a more contemporary use of the regress argument on behalf of skepticism and Klein (2010) for discussion. Fogelin (1994, 114) calls it the “Agrippa problem” and also takes it to force skepticism upon us.

justified” (BonJour, 1976, 282).¹⁶

So-called ‘infinetists’ in epistemology try to make sense of infinite justification chains,¹⁷ typically claiming that the infinity involved is only potential, not actual. Of particular importance in this debate is the question how the relation putatively generating the regress is to be understood: is it simply a type of grounding (as Beddor (2015) would have it), a ‘because’ relation of explanation (Harman, 1973, 130), a relation of evidential support (Conee and Feldman, 2008, 83), a relation of dependence (Dauer, 1981), a causal relation (Harman, 1970; Goldman, 1979; Swain, 1979; Alston, 1988; Moser, 1989; Huemer, 2001; Wedgwood, 2006; Schlosser, 2007) or a relation of ‘making probable’ (Cornman, 1979) (cf. Korcz (1997, 2015) and Neta (2011) for overviews)? Is it underwritten by some meta-belief (Longino, 1978; Alston, 1986; Leite, 2008) or perhaps even based on it (Korcz, 2000), giving rise to the possibility of a de-basing demon (Schaffer, 2010a)? Different answers to these questions will give different alternatives to a picture of justification according to which it is “like a house of cards: the edifice of justification stands because of the way in which the parts fit and support each other” (Lehrer, 1974, 15). They will also give rise to different types of regresses.¹⁸

2.1.4 The problem of totality

Whenever we specify how things are, we do so merely partially. If I tell you that grass is green, I have not thereby settled all questions: I have left open what shade of green grass is, for example, or what the shape of apples is. Once I have tell you that, there will still be further questions left open. On what is arguably the orthodox view, the fact that we cannot fully specify the world is due to how enormously complex reality is, and how limited our cognitive resources are. In particular, we are finite beings, with only finitely many brain cells, using only finitary languages, while physics suggests that reality does not allow for a finite specification. In principle, there is a total representation of reality.

This assumption is in effect hard-wired into the semantic framework that dominates much of philosophy and linguistic semantics, namely possible worlds semantics. The actual world, and indeed any world, is a *complete* possibility, deciding every question. Since propositions correspond to classes of worlds, in that framework, the unit class of the actual world corresponds to a complete representation of reality.

This assumption is incompatible with certain versions of the hypothesis that reality fails to be well-founded. If we think of an infinite descent of levels as forming a *completed* totality, then reality might still be fully specificable in principle, by a description that encodes information about infinitely many different levels. But if the descent is potentially infinite, there is a sense in which reality is not fully determinate. The appropriate semantic framework would then be a version of “possibility semantics”, where possibilities are not assumed to be maximal and settling every question (Humberstone, 1981; Hale, 2013; Holliday, 2018).¹⁹

¹⁶Cf. also Foley (1978, 316) and Chisholm (1982, 132) for very similar claims. Armstrong (1973, 153) reports that “Gregory O’Hair has attempted, in unpublished work, to classify all the various philosophers’ analyses or accounts of knowledge as different reactions to the threatened regress.”

¹⁷The view is ascribed to Peirce by Harker (1984) (Armstrong (1973, 155) mentions Peirce (1868)), while Pollock (1974, 26) says that he is uncertain whether anyone ever held this view. Nowadays, the most prominent epistemological infinitist is Peter Klein (cf. his 1999; 2000; 2003; 2005a; 2005b; 2007b; 2007a; 2011; 2014), who found some allies in Scott Aikin (2005, 2010a,b, 2014b,a), Jeanne Peijnenburg (2007) and John Turri (2010, 2011, 2013). Cf. also the recent collection Turri and Klein (2014).

¹⁸It will be useful, for a start, to distinguish between what Deutscher (1973, 4) calls ‘internal’ and ‘dialectical’ regresses on the one hand and ‘factual’ regresses on the other, the former arising from the need to ascertain a reason given *as a reason*, the latter stemming from what makes an ideal subject have a belief of a certain kind; this may correspond to the question whether epistemic ‘basing’ should provide doxastic or propositional warrant (cf. Firth (1978), Bergmann (2007) for an application to infinitism). Related questions concern the relata of the regress-inducing relation: are they mental events or states (Swain, 1979; Pappas, 1979a; Davidson, 1983; Pollock, 1986; Pryor, 2007; Turri, 2009) or facts (Unger, 1975; McDowell, 1994; Collins, 1997; Hyman, 1999; Dancy, 2000)?

¹⁹A rival framework for worldly indeterminacy works with possible worlds, but designates a set of worlds rather than a single world as actual, and then applies supervaluationist techniques (cf. Barnes and Williams (2011) and

2.2 State of our own research

The corresponding applicant, Philipp Blum is currently working at the Faculty of Theology of the University of Lucerne, where he founded *ousia*, a Centre for the Philosophy and Theology of Being. He has investigated grounding in his PhD (2007a) and the problem of totality in particular in (2007b; 2009). During the SNSF project “A World of Perspectives” (147788), he developed a conception of perspectivalism according to which there are competing complete alternative descriptions of reality, sketching a theory of ‘qua-objects’. Over the last years, he has worked mostly on the problem of relations, in particular on the question in what sense building relations such as grounding and causation are founded in the intrinsic natures of their relata (2017c; 2018), and on regress arguments in the history of philosophy, mostly in Aristotle, Leibniz and Kant. In “Everything is Positive” (2017b), he defends a conception of totality facts as transcendently ideal, and in “Being, Totality and the Transcendentals” (2017a) he makes use of the rich ancient and medieval discussion of the interrelation of the so-called transcendental (universal) properties of being and unity to articulate a sense in which reality is both one and many. He is currently completing a ‘Habilitation’ project at the University of Fribourg on the problem of representation, where justification chains such as those in sct. 2.1.3 are discussed very prominently.

As coordinator and funding manager first of *eidōs* and then of *ousia*, Blum has much experience in managing and coordinating research projects, having held primary responsibility for the large SNSF postdoc project “Properties and Relations” (2007–9) and taking an active part in the management of the ERC Marie-Curie Initial Training Network PETAF and the SNSF Sinergia project “Intentionality is the Mark of the Mental”. For the SNSF/*swissuniversities* graduate program in philosophy, he has organised 62 multi-day workshops since 2003. As founder and vice-president of www.philosophie.ch, the Swiss Portal for Philosophy, he is well-placed to undertake the outreach activities described in sct. 2.5.

Stephan Leuenberger’s work is primarily in metaphysics and philosophical logic, particularly modality, grounding, and supervenience. Infinity and infinite descent are a recurrent theme in his work. In his (2006b), he used an observation about the syntax of infinitary languages to raise an objection against a proposal for an ontologically parsimonious construal of possible-worlds discourse, while in (2014a), he investigated how the idea that the grounded facts supervene on what grounds them can be formulated once infinitary descending chains of grounding are allowed. In (2014b), he showed, *inter alia*, that it is due to the possibility of infinitely descending chains of worlds under the relevant accessibility relation (called “outstripping” in the context of the logic of totality) that totality operators are not interdefinable with the box and diamond operators familiar from modal logic. In “Global Supervenience without Definability”, currently under review, he uses certain wellfounded relations to show that global supervenience does not entail definability even when the background logic is infinitary. As a Principal Investigator on the project “The Whole Truth”, funded by the UK Arts and Humanities Research Council, and previously on the project “Emergence”, Leuenberger has gained experience of leading teams of researchers. In addition, he has also been involved in supervising four PhD theses to completion, either as primary or secondary supervisor, and is currently acting as a primary supervisor for two PhD students.

Leuenberger is working on a book to be called *The Whole Truth* (11), synthesising the results of the eponymous project just mentioned, and a previous article (2014b). The book investigates logical and metaphysical issues raised by the distinction between a partial and a total description of the world. He argues that a total theory of the world only needs to entail all the positive truths. A so-called “totality” or “that’s-it” operator can then be attached to that theory, to deal with negative truths. But “that’s-it”-truths do not increase our ontological commitment. Accordingly, Leuenberger rejects Russell’s case for negative facts, and Armstrong’s case for totality states of affairs. He also brings the logic of totality to bear on the debate about physicalism, drawing on his previous work (2006a; 2008).²⁰

Barnes (2010a,b, 2013, 2014)). We think that possibility semantics is more illuminating for the present application.

²⁰In 2014b, Leuenberger used a semantic framework for totality operators that builds in the assumption that

2.3 Detailed research plan

2.3.1 Varieties of Wellfoundedness

Is reality wellfounded? This is a question about the structure of the world. More specifically, it is a question about a variety of relations that give order and structure to reality – relations such as temporal precedence, causation, and grounding. For each of them, we can distinguish a “forward” or “upward” direction – from earlier to later, from cause to effect, and from the ground to the grounded – and a “backward” or “downward” direction. Once these directions are identified, we can ask whether the relation is wellfounded: whether it rules out infinite chains in the “downward” or “backward” direction.

The distinction between wellfounded and non-wellfounded structures is related to the difference between infinite and finite structures. Nonetheless, the distinctions do not coincide. Finite structures need not be wellfounded, for among the infinitely descending chains ruled out by wellfoundedness, there are also chains whose members are not all distinct. In the limiting case, a chain may consist of one and the same element repeated infinitely many times. Conversely, wellfounded structures may be infinite. The sequence of natural numbers provides the paradigmatic example: taking any number as the starting point, there are only finite chains in the “backward” or “downward” direction, while there are plenty of infinite chains going “forward” or “upward”.

Our question whether reality is well-founded divides into more specific questions, along two dimensions. Firstly, the question arises separately for the various relations that give reality its structure. Second, the question may receive different answers depending what notion of well-foundedness is in play. Only by considering these ramifications over our overarching question will we attain a rounded understanding of the foundationalist paradigm, and of what might be at stake in moving beyond it.

To illustrate, consider the variety in conceptions of wellfoundedness. The difference between these conceptions tend to seem subtle at first sight, requiring a modicum of logical and mathematical machinery to articulate. However, these different conditions correspond to significantly different metaphysical conceptions of reality.

The term “wellfounded” has a settled meaning in the context of set theory. There, wellfoundedness is taken to be a property of partial orders: asymmetric and transitive binary relations.²¹ Such a partial order R on some set counts as wellfounded if every non-empty subset of the set contains an element x that is minimal, i.e. such that nothing stands in that relation to x . This is equivalent to there being no infinite sequence x_1, x_2, \dots such that for every n , $x_{n+1}Rx_n$.

But in metaphysics there are distinct understandings of the notion that yield distinct understandings of our question, many of which raise importantly different issues. Consider three types of chains of some relation that forms a total order (asymmetric, transitive, and connected):²²

- Backwards-finite chain: there is a first thing x , and for every other thing y there is a natural number n such that y is reached in n forward steps from x .
- ω -chain: there is no first thing, but there are only finitely many steps between any two points.
- ω' -chain: there is a first thing, with no immediate successor, followed by an ω -chain.

The labels “ ω ” and “ ω' ” are chosen not just because they evoke Revelation 21:6, but also because they represent the first infinite ordinal – the set of all natural numbers, according to the standard

there is, in principle, a total description of the world (which may of course not be knowable or expressible be human beings). But this assumption is called into question once we allow that reality may not be well-founded (2.1.4). During our proposed project, Leuenberger would thus generalise the framework.

²¹A relation R is asymmetric if one never has both xRy and yRx . It is transitive if xRy and yRz implies xRz .

²² R is connected if for any distinct x and y , xRy or yRx .

von Neumann conception – and its successor, the set of all natural numbers as well as ω .

For each type of chain, we can ask whether it is wellfounded. There can be no doubt in the case of a backwards-finite chain: such a structure is paradigmatically wellfounded. Likewise, there can be no doubt in the case of an ω -chain: it is clearly not wellfounded. This suggests a template for using the claim that such-and-such relation is wellfounded in arriving at a conclusion about the world. The template is best exemplified with a particularly simple version of what is known as the “cosmological argument” for the existence of God.

Let the relation in question be generation, and say that the *ancestry* of a given thing is the class of all its generators.

1. Everything has a wellfounded ancestry.
2. Anything that is not generated is identical to God.
3. God exists.

From premise (1), it follows that there is an ungenerated thing. (For simplicity, we assume that all chains are of one of the three types introduced above.) Premise (2) then tells us that this ungenerated thing is unique, and is God.

Many variations of the above argument have been discussed, some of which are considerably more sophisticated than the simple version just presented. What has been far less discussed is that the atheist can turn the tables at this point, and use wellfoundedness as a premise in an argument *against* the existence of God – given a certain empirical assumption.²³ The idea is to shift focus from what we have called the “ancestry” of a given entity – the class of its generators – to its *heritage*, defined as the class of entities generated by it. It is rather plausible that what someone produces needs to have a wellfounded structure. If you are going to write books, for example, there will need to be a *first* book that you write! This thought motivates premise (2) in the following argument:

1. Some things have an ancestry that includes an ω -chain.
2. Everything has a wellfounded heritage.
3. If God exists, then He generates everything (else).
4. God does not exist.

Premise (3) is often a component of traditional conceptions of God. Premise (1) is not thought to be something that we accept on purely philosophical grounds, but the sort of thing that we might have evidence for. For example, Aristotelian cosmology embodied the assumption that the chain of causes goes back infinitely in time, hence the concern of certain medieval philosophers, for example, that Aristotelianism was incompatible with theism (see note 23 and sect. 2.3.3). We should note that premise (1) does not say that the complete ancestry of a point is an ω -chain. For all it says, it might be an ω' -chain.

To see that the argument is valid, suppose for *reductio* that God exists, and consider an ancestry that includes an ω -chain (such ancestries exist by (1)). By (3), God cannot belong to this chain (since He would then be generated by ‘earlier’ members of the chain, which is impossible by (3) together with the fact that generation is anti-symmetric). But then God’s heritage must *be* an ω -chain, contradicting (2).

The two arguments just considered did not depend on whether an ω' -chain counts as wellfounded. It seems natural to say that they are wellfounded in one sense but not in another. As we mentioned, set theory takes wellfoundedness to entail the absence of infinitely descending chains. On such a

²³There is a clear echo here of the debate between al-Ghazali and Averroës over whether it is coherent to maintain that the world is eternal yet created (cf. 1954, fourth discussion). The argument to follow can be seen as a way of defending the claim that this combination is not coherent (i.e. the position of al-Ghazali). Aquinas’ doctrine of *creatio ab aeterno* will be discussed below in sect. 2.3.3.

conception, ω' -chains do not count as wellfounded. Suppose we use more relaxed criteria, perhaps considering having a first element to be the crucial condition. Then there is another twist in the above plot, with the theist turning the tables once more.

Suppose we accept that there is a chain of generation going back indefinitely, for Aristotle's or for other reasons. Above, we motivated the thought that something's heritage must be wellfounded, by appealing to intuitions about us as agents, about what we can and what we cannot do. We did not present an argument for the conceptual impossibility of something's having a heritage that is not wellfounded. The theist could argue that it is not impossible, but that only a being that has some of the traditional attributes of God could accomplish such a feat. Arguably, only an infinite or transcendent being – one that is somehow “outside” the causal or temporal sequence, as God is often taken to be, or as it were intervening “from the side” – could push over an infinite number of dominoes at once.

The argument just sketched can be put as follows:

1. Some things have an ancestry that includes an ω -chain.
2. Everything has a wellfounded ancestry.
3. If something has a heritage that is not wellfounded, it is identical to God.
4. God exists.

The main advantage of this version of the cosmological argument over the first one is that the premise giving a sufficient condition for being identical with God is much more plausible. Many philosophers have not found it plausible that being ungenerated entails any of the traditional divine attributes. It is much more plausible that having a heritage that is not wellfounded entails them.

In the extant literature, the motivations behind different wellfoundedness conditions on things' ancestry – in particular, the strong version ruling out ω' -chains and the weak version allowing them – have been discussed. Scott Dixon (2016) and Rabin and Rabern (2016) have distinguished various different nonwellfoundedness conditions (cf. also Litland, 2016). The three most important are those (in the terminology of Rabern and Rabin):

- Reality is finitely grounded: there is no infinite descending grounding chain.
- Reality is bounded from below: for every grounding chain, there is something that fully grounds each one of its members (except any that themselves belong to the chain).
- Reality has a foundation: every fact is fully grounded by fundamental facts (i.e. facts that are not themselves fully grounded).

The second thesis, boundedness from below, allows infinitely descending grounding chains, as long as there is something that grounds the whole chain – our ω' -chains. The third thesis, that reality has a foundation, allows that there is an unbounded infinite descending chain below some fact, as long as there is also a bounded one.

The motivations behind different wellfoundedness conditions on things' heritage are under-explored. When we focus on ancestry, ω' -chains but not ω -chains may seem to be fine. When we focus on heritage, it seems the other way round. We conjecture that whether either constraint is plausible will depend on exactly what relation is under discussion. The versions of the cosmological arguments given above testify to the fruitfulness of distinguishing various wellfoundedness conditions – as including or excluding ω' -chains, and as conditions on ancestry or on heritage.

In an article tentatively entitled “Infinite descent: a guide” (12), Stephan Leuenberger will offer a taxonomy of different formal notions of wellfoundedness for grounding. It will build on the work by Dixon, Rabern, and Rabin, distinguish between conditions on ancestry and on heritage, and dispense with the assumptions that grounding is a strict partial order – it will thus consider grounding structures in which asymmetry or transitivity fails – and that partial grounds are parts

of full grounds.²⁴

‘Reality structuring’ relations such as causal production / generation, dependence, temporal precedence, grounding, providing a sufficient reason for and metaphysical explanation are typically not taken to be binary, unlike generation in our toy model, but to be many-one.²⁵ This requires a certain generalization of the notion of wellfoundedness, and there are a number of different ways this may go. Further interesting questions arise when we consider the interaction of the various structuring relations. A theist response to the atheist argument sketched above might claim that God’s heritage is wellfounded, properly understood: He generates the whole ω -sequence as a unit, and only derivatively its individual members.²⁶ The wellfoundedness condition as characterized here may be violated, but its spirit is preserved – a conjecture to be explored by the Lucerne NN post-doc **(n1)**.

Both ω -chains and ω' -chains, which we have found to violate some wellfoundedness conditions but not others, feature infinite descent. But as mentioned at the beginning of sct. 2.1, cycles are another threat to wellfoundedness.

In many discussions in both theology and philosophy, the idea that reality may be circular, as it were, gets given even shorter shrift than that of infinite descent. In the contemporary literature on metaphysical grounding, it is immediately ruled out by stipulations to the effect that grounding is irreflexive and transitive. In theology, the situation is more complex. Circular dependency is a prominent theme in eastern religions. While the term “*causa sui*” has some currency in western theology, it has come in for scorn:

The *causa sui* is the best self-contradiction that has ever been conceived, a type of logical [violation] and abomination. . . . [It is the desire for], with a courage greater than Münchhausen’s, pulling yourself by the hair from the swamp of nothingness up into existence. (sct. 21 of Nietzsche (1886), translated in 2002, 21)

The meaning of “*causa sui*” is a matter of dispute, and it may just mean something whose existence does not depend on anything else (Taylor, 1963, 63). According to one influential interpretation, a *causa sui* is a being whose essence entails its existence, a conception of God that claims a rich medieval pedigree and has recently regained some currency.²⁷ In “Self-Grounding: Essence and Existence” **(b1)**, Blum will argue that the most plausible candidates for self-grounding are to be found among non-substantial, so-called ‘lesser’ entities.

In contemporary work on causation, the most prominent theory (Lewis, 1973) does allow for events to cause themselves. Yet the kind of self-causation is arguably not of either the Münchhausen variety nor the essential-existence variety. It always results from a cycle of counterfactual dependence involving more than one event, and the definition of causation as the transitive closure of counterfactual dependence (cf. Postscript E, “Self-Causation” in 1986b, 212–213). The motivation for allowing this comes from time-travel scenarios, i.e. from ‘causal loops’. It is now widely held that time-travel need not involve any logical contradictions, and indeed that it may even be compatible with the laws of our universe (cf. Earman, Wüthrich and Manchak, 2016). Rennick’s research will focus on what she calls “*C-E-N*” loops: those involving objects or information created *ex nihilo*, with no identifiable causal origin. Such loops have received limited philosophical attention outside three specific niches: the philosophy of time travel, the literature on divine providence, and in the context of foreknowledge (Goldman, 1968). Where *C-E-N* loops are explored more frequently – thereby providing fertile ground for engagement – is in fiction: self-fulfilling prophecies where

²⁴In unpublished work, Leuenberger argues that there is a notion of partial ground that is not be defined in terms of full grounding.

²⁵Cf. Fine (2012a,b). Dasgupta (2016) takes grounding even to be many-many.

²⁶The gambit to consider the whole sequence of contingent events as a unit is prominent in certain early modern versions of the cosmological argument (e.g. Clarke, Leibniz).

²⁷Cf. Vallicella (2000, 2002), Zylstra (2014), and Kerr (2015) and Aquinas’s proof ‘from the distinction of being and essence’ in *De Ente et Essentia*, ch. 4 (Ventimiglia, 2012, 2014, 2015, 2016b,c,a).

characters perform an action because they know they will (and know they will because they do), or time travel scenarios where characters father themselves etc. Should such loops be possible, they call into question the plausibility of wellfoundedness: there is no fundamental level, no first cause, in a loop.

In “From the General to the Individual” (**d1**), Diehl will consider a different sort of non-wellfounded chain: one in which individual-involving facts are grounded in facts that do not involve individuals. According to a newly popular view in metaphysics, it is such non-individual (also called ‘general’) facts that stand at the source of chains of ontological dependence. Such views posit that object dependence is non-wellfounded in a specific sense: by grounding the obtaining of individual-containing facts in facts that lack individuals, they claim that there is no objectual foundation for being. Diehl will explicitly connect the generalist position she develops to the mathematics and metaphysics of non-wellfounded chains, employing the formal resources developed in other parts of the project.

2.3.2 Creation and Causation

Another very recent development that the project will draw on is the study of the relationship between grounding and causation. Early theorists of grounding took it for granted that grounding is different from causation. But Karen Bennett (2011), Jonathan Schaffer (2016b,a,c, 2017) and Alistair Wilson (forthcoming) argued, respectively, that causation belongs to the same genus as grounding, that it is importantly analogous to grounding, and that causation simply is grounding (cf. Bernstein (2016) and Koslicki (2016) for criticism). This bears on the question of wellfoundedness in a direct way: an infinite regress of causes is not generally thought to be problematic.

Causal loops, on the contrary, are seen as extraordinary, improbable, and even inexplicable. Yet they are not limited to time travel scenarios: certain types of foreknowledge seem to give rise to them, as does the possibility of divine providence (e.g. Hunt, 1993, 2004). Hanley (2004, 134) writes:

Consider that one cosmological conjecture, taken very seriously, is that the entire universe is a causal loop. . . In cosmology, this doesn’t particularly count against the conjecture, partly, I suppose, because all the alternatives have oddities of their own. Yet it would be specious reasoning to reject the very possibility of local loops on grounds that apply equally to the admitted possibility of a global one.

Thinking seriously about loops requires us to interrogate the idea of explanation, and consider whether it comes apart from causation. Causal loops cause themselves (in a sense), but whether they explain themselves (and what that would mean) is a different matter. Some loops – thought to be particularly pernicious, and thus frequently summarily dismissed without discussion – involve objects, information, or even people, ‘from nowhere’, i.e. with no identifiable causal origin (outside of the loop). If the metaphysical default is that entities have a ‘first cause’, then such loops violate this expectation.²⁸

Rennick will explore such ramifications in a monograph on causal loops (**r1**): this would be the first work of its kind, tying together the disparate literature on *C-E-N* loops in philosophy of religion, metaphysics and epistemology, and considering both explanations and entities created ‘from nowhere’. In addition, she will explore *C-E-N* loops of three particular, unexplored varieties: (i) self-fulfilling prophecies (**r2**), where foreknowledge of (or beliefs pertaining to) an event has a causal feedback on those events; (ii) ‘object loops’ (**r3**), where an object’s existence consists of, or

²⁸Should causal loops prove metaphysically impossible, then backwards causation (and thus most time travel scenarios, and many foreknowledge scenarios) may too prove impossible. Advocates and opponents of time travel alike have raised the possibility that causal loops might be an inevitable consequence of backwards causation (most famously, Hugh Mellor (1981, 1998)).

at least contains, a causal loop (and in particular, ‘person loops’, a possibility alluded to by Hanley (cf. his 2004; 2014); (iii) ‘information loops’ (r4), where information, confidence or intentions seem to come from nowhere.

Blum and Leuenberger will jointly write a paper (1b) exploring an intriguing argument by Barry Miller (1982).²⁹ Miller allows that a series of causes can stretch back indefinitely, but he thinks that one particular kind of series needs to terminate: a series where the cause is “unfolded” into further causes on which it depends. So it may be true that *a* is caused by *b*, and that *a* is caused by (*b* insofar as *b* is caused by *c*), and that *a* is caused by (*b* insofar as *b* is caused by (*c* insofar as *c* is caused by *d*)), and so on. Such a series, Miller argues, has to terminate, because we would otherwise have what he calls an “open sentence”. While it seems to us that Miller is onto something, his explanation why such a series is impossible is unsatisfactory. From the point of view of logic, we can make perspicuous sense of such series. First, we will use Kit Fine’s theory of qua-objects (Fine, 1982, 1999) and Jason Turner’s regimentation of Donald Baxter’s theory of aspects (Turner, 2014) to give a perspicuous account of the nested “insofar as” locutions in the series. Second, we will draw on work in infinitary logic. While standard infinitary logics (Dickmann, 1975) do not countenance sentences resulting from applying formation rules infinitely many times – in this sense validating Miller’s suspicions – non-standard infinitary languages that allow that have been constructed (cf. Hintikka and Rantala (1976) and Leuenberger (2006b, sect. IV)). *Pace* Miller, we will argue that it is not a logical but a substantive metaphysical question whether such a series is possible. The paper will bring together Blum’s expertise on the theory of aspects and qua-objects, and Leuenberger’s expertise on the logic of infinitary languages.

2.3.3 Temporal precedence, infinite regresses and the existence of God

The demonstration of God’s existence based on the impossibility of an infinite regress has always been of particular relevance to philosophy of religion. As mentioned above, three of Aquinas’ ‘Five Ways’ use it, while the fifth relies on a certain notion of ‘causa sui’ (*Sum. Theol.*, I q. 2, a. 3). Often, the regress is considered both as a temporal and as a logical/ontological one, which in turn led to a lively and rich debate on God’s “timelessness”.³⁰ Thomas Aquinas himself had shown doubts about the temporal sense of the regression (cf. Kretzmann (1997, 1999)). For God is not, according to him, “before” the world, for at least two reasons: i) Even if the world was eternal (*creatio ab aeterno*, as in Aristotle), God would in any case exist; ii) God’s eternity is not simply a time longer than worldly time but a qualitatively different time: his creation is not a *creatio de nihilo*, but a *creatio ab initio temporis*. But how is a temporal act of creation compatible with the atemporality or other-temporality of its agent? The Lucerne PhD student will be encouraged to work on this question, taking full advantage of the work of the other project members on other types of regresses, while the NN post-doc will explore the connection between the arguments for the timelessness of God and the traditional cosmological arguments based on the PSR (n2).

2.3.4 Explanation and the “because” connective

What is objectionable about infinite regresses? We believe that the answer depends, in part, on the way in which the regress-generating relation is supposed to be “explanatory”. It is a plausible hypothesis that the harmlessness of the truth-regress (from *p* to “it is true that *p*” to “it is true that it is true that *p*” and so on) is due to the ‘deflationary’ nature of truth, the fact that it is not

²⁹Cf. also his 1992, 96–113, where the argument is included under the heading “Why existence? The *ultimate* answer” (his italics).

³⁰As Mullins (2016, xv) says, “[i]t is important to get clear on what the debate between divine timelessness and divine temporality amounts to”, in part because “an alarming number of contemporary evangelical theologians [he cites Frame (2013, 367), Lister (2013, 226–230) and Ware (2008, 89)] continue to propagate the notion that God is timeless and temporal as He relates to creation and the unfolding of the plan of redemption”.

an explanatory notion.³¹

If truth depends on truthmaking and the latter is given an explanatory role to play, however, this situation may change. This question, we believe, is relevant to recent attempts of ‘deriving’ truthmaking from (some versions of) the principle of sufficient reason and to trivialist truthmaking, as it is now understood within Fine’s “truthmaker semantics” (cf. e.g. 2014; 2015c; 2016b; 2016a; 2017a; 2017b; 2015d; 2015a; 2015b). Fine’s operationalist conception, Blum will argue in **(b2)**, is not able to do justice to the idea that truthmaking is a form of explanation.

The question of whether explanatory chains must be wellfounded has a complex relation to the PSR. At first sight, this principle is compatible with both infinitely descending chains and with explanatory loops. Many have thought, however, that a strong version of the PSR requires chains that bottom out into self-explanatory states. The intuition behind this seems to be that non-wellfounded explanatory chains would violate the demand for complete explanations. If each step in the chain required a further explanation, then there would never been a total explanation for any state, where a total explanation is one in which the *explanans* itself is fully explained. This might be thought to offend against the sufficiency of an explanation. In two articles, “The Principle of Sufficient Reason and Non-Wellfounded Explanatory Chains” (**d2**) and “Must Explanations Bottom Out?” (**d3**), Diehl will examine the connection between the PSR and the endorsement of non-wellfounded explanatory chains. In **(b3)**, Blum will explore neglected parallels between metaphysical and epistemological infinitism in relation to the PSR.³²

2.3.5 Grounding

In section 2.1.2 we noted that philosophical opinion is divided on the possibility of reality not being wellfounded, but that there are few developed arguments either way. This project proposes a sustained examination of the arguments for wellfoundedness, as well as of the coherence of proposed models of a non-wellfounded reality. Our hypothesized answer to the question whether reality is wellfounded is: it depends. Of course, this is informative only to the extent we can specify what it depends on.

One thing it depends on is how exactly we understand non-wellfoundedness, as noted in sct. 2.1.2. Another thing it depends on is how we understand grounding. The notion has had its fair share of critics.³³ A recurrent complaint is that it unhelpfully lumps together a number of different relations. This complaint is difficult to evaluate. Generality is a theoretical virtue, and it is unclear whether any given author has deployed a disjunctive, gerrymandered notion of grounding. In contrast, it is highly plausible that different authors, when using the word “grounding”, are not always talking about the same relation. Certainly they have modelled it on different relations, such as causation, explanation, mereological composition, or logical derivation. So it would seem that some apparent disagreements about grounding might be merely verbal.

Rather than asking whether grounding is wellfounded, we might do better to ask what the theoretically fruitful concepts of grounding are, and which ones are wellfounded. Tell me what wellfoundedness feature grounding satisfies, and I will tell you what notion of grounding you are deploying. Accordingly, we will articulate different notions of grounding, and evaluate what wellfoundedness constraints they satisfy. For this, we will mine the debate on the cosmological argument, in the

³¹Cf.: “The subsequent facts in the chain are not involved in the specification of the truth conditions for the initial statements, which is what would make the chain a vicious regress.” (Hochberg, 1988, 193), “. . . the predicates may ascend, but not the reality in virtue of which they apply” (Armstrong, 2004, 106).

³²Post (1980) is one of only very few who even notices the parallelism. Different types of circularity that have been distinguished with respect to justification, as in coherentists theories (cf. Barnett (2014) for a recent discussion), may well provide a model for some types of metaphysical anti-realism, as may theories of ‘phenomenal conservatism’, according to which seemings can be sources of justification (Huemer, 2001, 2006, 2013; Tucker, 2013). In the grounding literature, this has a parallel in the recently much discussed possibility that some facts may be ungrounded and still not fundamental (cf. Dasgupta (2014, 2016) and Glazier (2017)).

³³Cf. Daly (2005, 2012); Hofweber (2009, 2016); Wilson (2014).

course of which many different relevant relations were distinguished.

To illustrate the dependence of the answer on what concept of wellfoundedness and what relation of grounding is at issue, we may consider three arguments for wellfoundedness. One turns on an intuition about the grounded entities: that there must be an ultimate account of them, and there are fundamental facts that ground them (Schaffer’s “being is infinitely deferred, never achieved”). This argument may work on a conception on which the grounded owes its existence to the grounding. But it would at best justify the weakest of the wellfoundedness claims distinguished in sct. 2.1.2, that reality has a foundation. Another argument rests not primarily on an intuition about the grounded things, but about possible ways of being grounded: the intuition that a chain of grounding must bottom out. This argument has some plausibility on a conception of grounding where it is akin to explanation. If successful, it will justify the stronger condition that reality is bounded from below. In contrast, an argument that depends, like the kalām cosmological argument, on the impossibility of an actual infinity, would establish the strongest condition, that there are no infinitely descending chains. Leuenberger will examine (12) whether some of the wellfoundedness conditions carefully distinguished by Dixon, Rabern and Rabin collapse once certain exclusion principles about grounding are accepted, and whether any such principles are plausible.

Exclusion principles have received a great deal of discussion in the case of causation. It is often held that an event can only have different causes if they are at different times – otherwise candidate causes exclude each other. Suppose now that there is an infinitely descending chain of grounding. Could there still be a full ground of everything in the chain, say God? Since the chain is infinitely descending, it does not have a first element, and we cannot think of God as creating or causing the first element, and thus setting the chain in motion. It seems that he has to cause or create every element in the chain directly. We might well consider that this would be a case of overdetermination, and should be ruled out by an exclusion principle.³⁴ This suggests that the requirement that grounding chains are bounded from below entails the ostensibly stronger requirement that they are finitely grounded – thus collapsing two of the three formally distinct conditions.

Exclusion principles have not been much discussed in the case of grounding. In the case of causation, Ausonio Marras (2000, 151) and Ned Block (2003, 140) have argued that exclusion principles would make everything epiphenomenal, on the hypothesis that there is an infinite descent of levels of reality: every putative causal power would be excluded by a lower level (cf. also Block (1990, 168)). Block notes that “perhaps you are suspicious of the step from the claim that causation at each level is undermined by the level below it to the claim that there is no causation. Whether this reasoning is valid depends (you may object) on an open question involving infinitary reasoning, which we can take to be in the domain of philosophical logic.” (2003, 139) To the best of our knowledge, that issue in philosophical logic has not received further attention in the vast literature on the exclusion argument; nor has Kim’s tantalizing suggestion for further work, in his reply to Block (Kim, 2003):

Block’s drainage argument evokes some deep metaphysical associations, and this is part of what makes it so interesting. Just think of the whole group of celebrated philosophical arguments with a similar structure, going back to Aristotle and Aquinas. [...] Thomas’s cosmological argument for the existence of God apparently works [thus]: there must be a first cause that is itself uncaused because the causal series cannot extend into the past without end. If it did, nothing would exist. The classic foundationalist argument [...] for the existence of “basic” knowledge runs the same way, as do the familiar arguments for the existence of semantic primitives, the existence of intrinsic goods, and the like. I think it will be interesting to analyze the metaphysics and logic of arguments that share this general structure. (2003, 174)

One reason for the neglect, presumably, is that a general exclusion principle would conflict with

³⁴The debate between Leibniz and Malebranche about pre-established harmony versus occasional causes is instructive in this context.

the widely held views that A and $(A \vee B)$ both ground $((A \vee B) \vee C)$, and that A and B both ground $A \vee B$ (assuming all the facts mentioned obtain).

Leuenberger will investigate **(13)** the relationship between exclusion principles and non-wellfoundedness, seeking to articulate a more nuanced exclusion principle for grounding weak enough to allow the disjunction cases just mentioned, and yet strong enough to collapse the conditions of being bounded from below and being finitely grounded. Thus armed, he will address the questions prompted by the exchange between Block and Kim.

The problem of causal exclusion has sometimes been met with an appeal to the distinction between determinate and determinable properties, the latter being said to inherit their causal powers from the former. Unsurprisingly, it has then been claimed that there must be absolute determinates:³⁵

The practical impossibility of literally determinate characterization must be contrasted with the universally adopted postulate that the characters of things which we can only characterize more or less indeterminately, are, in actual fact, absolutely determinate. (Johnson, 1921, 185)
... it makes no sense to say that a physical object is light-blue in colour, but is no definite shade of light blue (Armstrong 1961, 59, cf. also 1978, 118)
Nothing can have a determinable character without possessing *exactly one* fully determinate feature. . . (Campbell, 1990, 83–84)

This presupposition seems questionable. Blum’s article “Determinables all the way down” **(b4)** will explore the determinable regress and its connection to fundamentality (cf. Wilson, 2012, 2013).

2.4 Schedule and milestones

2.4.1 The team members

The project team will consist of six core members: two applicants, three post-docs and one project PhD student. While we have uploaded CVs and publication lists of all the four members already designated, we here sketch their specific contributions to the project and outline profiles for the two members yet to be recruited.

The project will employ three post-doctoral researchers:

- Dr. Stephanie Rennick (postdoc, University of Glasgow, 100%);
- Dr. Catharine Diehl (postdoc, University of Lucerne, 50%)
- NN (postdoc, University of Lucerne, 50%)

Rennick was awarded her doctoral thesis – entitled “Foreknowledge, Fate and Freedom” – in 2015, and has since worked at the University of Glasgow and as a lecturer at Cardiff University. Her paper on intentions and time travel was the most-read *Analysis* paper of 2015 (Rennick, 2015), she was commissioned to write the Oxford Bibliographies entry on Foreknowledge (2017), and is regularly an invited speaker at both philosophy and extra-academy events. Rennick’s research interests span metaphysics, epistemology, philosophy of religion and ancient/medieval philosophy, with a particular focus on time, foreknowledge, and free will. She is thus well-versed in the disparate areas under which causal loops are discussed. Rennick will also spearhead the engagement portion of the project (sct. 2.5.3), using her broad range of contacts and experience in public-facing philosophy.

Diehl is currently a Banting postdoctoral fellow at the University of Toronto with a project entitled

³⁵Newman (1992, sct. 4.2) calls this assumption the “principle of ontological determinacy”, Geach (1979, 52) the “total ultimate presupposition”.

“The Principle of Individuation in Leibniz, Kant, and Contemporary Philosophy”. She completed her dissertation, entitled “Ontological Nihilism and Existential Commitment”, at the Humboldt University, Berlin in September 2017. In addition to her dissertation, Diehl has published on Marcus Gabriel’s ‘new realism’ (together with Tobias Rosefeldt, cf. their 2015; 2016) and on Katharina Felka’s work on the semantics of number-containing expressions (2016). Her dissertation examines a view, commonly called ‘generalism’ or ‘nihilism,’ that denies that the fundamental level of reality contains individuals (cf. also her 2009; 2014). The subject of her dissertation is closely connected to the project’s research focus, since, according to generalism, the chain of object dependence is ultimately grounded in non-object-containing facts. In her dissertation, Diehl undertakes a systematic evaluation of such a view, exploring the motivations for adopting it and the strategies for developing it. Contrary to prominent recent critics, she argues that nihilism is a cogent and well-motivated metaphysical position and develops formal tools that extend nihilistic languages to the modal and higher-order case.

The post-doc to be hired in Lucerne will take sct. 2.3.3 and 2.3.4 as his or her starting-points, and will specifically investigate the links between metaphysical explanation and cosmological arguments for the existence of God. Alain P-Curto, who defended his PhD thesis on organic wholes on the 8th of June 2017 in Geneva, might be a candidate for this position, as is Rim Essafi who will defend her PhD in Lausanne at the beginning of this summer.

The sixth member of the project will be a PhD student, to be based at the University of Lucerne and supervised by Dr. Blum. In case Dr. Blum’s habilitation procedure is not completed by the start of the project, Prof. Ventimiglia will have the student immatriculated as a PhD candidate.

We will start the recruitment process for all three NN positions as soon as we hear about a positive outcome of this grant application. They will be advertised widely, on international mailing-lists and websites advertising academic jobs.

The teams in Lucerne and Glasgow will work closely together. This will be made easier by the fact that they have already done so: Leuenberger and Blum as part of the SNSF-funded project ‘Properties and Relations’ (113688); Leuenberger and Rennick in Glasgow, and Blum and Diehl last year at the Humboldt University in Berlin. To enhance interaction between project participants, we will, in addition to holding regular internal meetings, maintain an internal blog on www.philosophie.ch and a project website.

2.4.2 Project workshops and team collaboration

The launch conference (3 full days), designed to make our project known, will seek the input of renowned specialists and their comments and criticism on our research plan and paper drafts. We plan to invite 20 participants to Lucerne, with total costs of 16400 CHF, and will arrange additional subsidies for Swiss doctoral students. We plan to spend the same amount on the final conference, again in Lucerne, where we will present the fruits of our research. Project workshops, in the second and the third year, will take place in Glasgow. We will have seven speakers not based in Glasgow, and eight or nine talks over the two days. The budget for each of the two Glasgow workshops is CHF 7265.

It is important that project members present their work not just at the internal meetings, workshops and conferences organised by the project itself, but also at ‘outside’ gatherings, in particular at some of the major international conferences organised during the duration of the project (the Mind-Aristotelian ‘joint session’ conferences, the American APAs, the conferences of the European Society for Analytic Philosophy, the Philosophy of Science association conferences, both of their US- and their European branches etc.). For this, we calculate 1000 CHF / year per member of the project, including the PhD candidate.

2.4.3 Project partners

To firmly anchor the project members, particularly the PhD candidate, within the institutional landscape of Swiss philosophy, we have asked the following professors of philosophy to participate as project members in our supervisory panel:

- Prof. Giovanni Ventimiglia, University of Lucerne;
- Prof. Kevin Mulligan, Università della Svizzera Italiana, Lugano;
- Prof. Gianfranco Soldati, University of Fribourg.

These three established research leaders have agreed to receive annual updates about the progress of the project, and offer advice and guidance as appropriate.

In addition, our project involves the following project partners:

- Prof. Winfried Löffler, Departement of Christian Philosophy, University of Innsbruck;
- Prof. Kerry McKenzie, Departement of Philosophy, University of California at San Diego;
- Prof. Bruno Whittle, Department of Philosophy, Texas Tech University.

Löffler is an expert on cosmological arguments, and also on the philosophy of Bernard Bolzano (cf. e.g. 2002a) – the chief historical precursor for contemporary work on grounding.³⁶ His input and guidance will help the project members to relate their research to currently pressing concerns in the philosophy of religion.

After having completed a PhD thesis entitled *Physics without Fundamentality* at the University of Leeds (2012), McKenzie has established herself as a leading expert on the topic of non-wellfoundedness in the philosophy of physics (cf. in particular her 2011; 2013; 2014a; 2014b; 2016; 2017b; 2017a; 2017c; 2018; forthcoming, as well as Saunders and McKenzie (2015)).

Whittle is currently developping a novel account of logical consequence and validity that accounts for self-referential paradoxes and the ungroundedness of the truth-values of self-referential truth-bearers in Kripkean-style theories of truth by allowing logical laws and rules to have exceptions (2017c; 2017a; 2017b). Having worked on a number of projects at the intersection of logic and metaphysics (cf. his 2009; 2010; 2015a; 2015b), he is very well equipped to bridge the gap between the extensive work on non-wellfoundedness in philosophical logic and questions in metaphysics that this work promises to have applications to.

We plan to offer our project partners a lump sum of 10'000 CHF each for their participation at the project workshops and for a two-week residency in either Glasgow or Lucerne, to be coordinated with the externally funded 'internal meetings'.

2.5 Relevance and Impact

2.5.1 Scientific output

For our project deliverables, we distinguish between completion of the first draft X , submission Y and re-submission Z according to the schema $(X/Y/Z)$:

- Stephan Leuenberger will produce a monograph (**11**) 4/6/14 and three articles, one of which jointly with Blum (**12** 6/14/18, **13** 16/24/28, **1b** 36/44/48).

³⁶Cf., in particular, Künne (2008); Schnieder (2008, 2014); Mulligan (forthcoming) and the essays in Schnieder (forthcoming). Löffler has also specifically worked on Bolzano's version of the cosmological argument (Löffler, 1999, 2002b).

- Philipp Blum will, in addition to **lb**, produce four other articles (**b1** 6/14/18, **b2** 12/14/18, **b3**, 24/26/30, **b4** 26/34/38).
- Stephanie Rennick will produce a monograph (**r1**) 12/14/24 and three articles (**r2** 6/14/20, **r3** 18/20/30, **r4** 20/24/32) .
- Catharine Diehl will produce 3 articles: **d1** 6/14/19, **d2** 16/16/24/28, **d3** 18/26/34.
- The Lucerne post-doc is supposed to submit to internationally renowned peer-reviewed journals at least two articles during the duration of the project (**n1** and **n2**), one of which should be submitted during the first two years, so as to leave enough time for re-submissions.
- The project members will make a joint effort to help the Lucerne PhD student submit two articles, one of which should be submitted during the first two years, so as to be published at the end of the project, when the PhD student will go on the job market.

2.5.2 Scientific Relevance

Many philosophical debates and theories take it for granted that reality is well-founded. Our project challenges this assumption, and explores what new shape these debates and theories can take once it is given up. This is the direct scientific impact.

In addition, the project will indirectly benefit philosophical understanding of the different types of reality-structuring relations. The examination of various arguments for and against wellfoundedness will reveal significant distinctions among relations that currently go under a generic label such as “grounding” or “explanation”.

2.5.3 Broader impact

The potential relevance for and impact on our own discipline does not exhaust the significance of our proposed examination of the foundationalist paradigm. That paradigm is operative in science more broadly, and is perhaps central to our world-view even beyond a scientific context. To realise our project’s potential for broader impact, Blum and Rennick will prepare an *Agora* application to the SNSF for September 1, 2019. This application centres around the identification and analysis of ‘tropes’ (recurring patterns or concepts) as they arise in popular media, focussing specifically on those relating to infinity, circularity, causation and regress.

The *Agora* project aims to foster a bi-directional exchange between philosophy and the broader public. It will consist of a web-based component – an online database of trope instances as well as trope- and text-analyses targeted at a lay audience – as well as various events. Rennick is well-versed in public engagement: she writes accessible pieces on tropes and fiction at *The Epicurean Cure* and elsewhere (e.g. her 2016), and is a regular speaker at conventions and other public-facing events (for a full list see www.stephrennick.com).

Philipp Blum will hold public “philosophy and film” screenings, complete with philosophical discussion. A first round of such screenings will take place in Biel/Bienne, at the “Vignes du Pasquart”, and in Solothurn, within the context of the ‘philosophy festival’ “Aus der Tonne”. Blum has a long experience in such popularisation, having organised the very successful lecture series “Découvrir la Philosophie”, for the general public, at the University of Geneva in 2009 (cf. philipp.philosophie.ch/services/decouvrir/) and the subsequent cinematographic dialogue “Philomaton Mobile” (philipp.philosophie.ch/services/philomaton/).

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