Relational Possibility
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dissertation summary

Relational possibilities are about comparing or otherwise relating things across worlds. My dissertation argues for a new view about their nature, one that gives us a powerful strategy for reducing the metaphysical commitments of science.

Relational possibilities are familiar. We might say that Socrates could have been taller than he is or that the Athenians could have been happier than they are. But while familiar, such claims are also hard to express systematically using operators. This is the problem of expression and the focus of **Chapter 1**. I consider a range of solutions. Perhaps the most popular is to quantify over things like heights. We say that Socrates could have been taller than he is by saying that there is a height Socrates has and it could have been that he had a greater height. Things like heights are degrees and, so, this is called the degree solution.

Chapter 2 is about why the problem of expression matters for science. Our best theories say there are certain things, like quarks and bosons, that have certain features. We thus naturally think of science as having ontological commitments. The question is, how far do those commitments extend?

We know that science requires physical quantities like distance ratios. There is then a certain argument that distance ratios themselves depend on numbers, spacetime points, or something similar. This would seem to show that science is committed to far more than just particles.

The most promising line of response appeals to modality. Rather than explaining distance ratios using further things, like numbers or spacetime points, we use certain relational possibilities. This brings us back to the problem of expression. If relational possibilities themselves depend on further ontology—as the degree solution requires—then they are of no help. What we really need, then, is to solve the problem without degrees. This would clear the way for doing science with minimal ontology.

We set out to do that in **Chapter 3**. One of the best reasons to think we can express relational possibilities without degrees is that we can do it in English. What we use is a combination of modal operators and grammatical mood. I sketch a language called relational modalese that replicates this behavior. In addition to modal operators, it also has what I call mood operators. These let us express relational possibilities directly, so solve the problem of expression without degrees. Armed with our new language, we return to the question of distance ratios. I show how we can use relational modalese to give a formal theory, working out various important details.

As I see it, relational modalese is not just a formal gadget. It corresponds to a certain view about modality. We have all heard that possibility is about ways things could have been. I say that instead, possibility is about ways things could have *differed*. Possibility is naturally about comparing and otherwise relating the possible with the actual. Motivating and defending this basic picture occupies is the topic of **Chapter 4**.

Now a full theory of modality requires not just a theory of modal operators, but a theory of possible worlds. We want to be able to both explain why worlds exist and say how they are characterized. One popular view is that worlds are stories that are characterized by the sentences that are true at them. As it turns out, this view of worlds has a kind of problem of expression—it can account for comparisons across worlds only if we quantify over things like degrees. I show how the problem can be solved. The result is a theory of worlds that appropriately match the modal language described in chapter three.

My dissertation concludes with technical **appendixes**. I describe a proof theory for relational modalese and prove soundness and completeness. I show that the propositional fragment is decidable. There are also results needed for chapter four. These include a variation of the Łoś-Tarski theorem.

Looking forward, I will advance my research along three lines. The **first** is by extending the question of relational possibility to other perspectival notions. These include notions like time, permissibility, counterfactuals, chance, and so on. Just as we would like to know why Socrates *could* have been taller than he is, we would like to know why the stars *will* be farther apart than they are and why the world *should* be better than it is.

I consider the case of time in a current draft. Some say that presentists who think of the past and future in terms of tense operators cannot properly explain relations across time. One illustration of this is an argument from Ted Sider that presentists cannot do physics because they cannot properly explain rotation. I show they can using strategies similar to those from the modal case.

My dissertation shows how to give a modal theory of euclidean distance ratios. But science is more than distance ratios and distance ratios are probably not euclidean. A **second** way in which I will extend my research is by continuing to work out the extent to which relational possibilities can help reduce the ontology of more realistic theories.

As a **third** line of future research, I plan to follow up on various metaphysical questions raised by the dissertation. For example, there is a general sense that modal notions are especially poor candidates for being fundamental. But while generally assumed, the arguments are rarely made explicit. In a current draft, I make them explicit, then say why I think the conclusion does not follow.