# Skeptical Symmetry:
# A Wittgensteinian Approach to Scientific Reasoning

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In a 1926 review of Russell and Whitehead's *Principia Mathematica*, the logician Harry Sheffer argues, "the attempt to formulate the foundations of logic is rendered arduous by a...'logocentric' predicament. In order to give an account of logic, we must presuppose and employ logic" (228). The logocentric predicament has spilled very little ink when compared to its older sibling, Hume's problem of induction. The major reason for this seems to be that most philosophers simply assume that deductive inferences are *prima facie* justified. For example, Peter Lipton has written that inductive inferences are "underdetermined by evidence and the rules of deduction…", while valid deductive arguments are "perfect truth conduit[s]" and their justification is achieved simply by "show[ing] that arguments we judge valid are in fact so" (392). In this paper I will argue that the philosophers have wrongly assumed that there is an asymmetry between the problem of induction and the logocentric predicament, and that the exposure of this symmetry will reveal that skepticism is unavoidable when demanding justification for the structure of reasoning. Using a Wittgensteinian approach, I will argue that justification has an internal relation with deductive and inductive inferences. Separating the concepts so that one can be applied to the other is, then, a misunderstanding of the role that these words play within scientific reasoning.

## 1. Induction

Karl Popper defines inductive inferences as ones that pass "from singular statements…such as accounts of the results of observations or experiments, to universal statements, such as hypothesis or theories" (406). But the finite capabilities of the observer means that there is always the possibility of an exception that the observer has failed to perceive. If one has never seen an albino raven, then the inference that all ravens are black will move from true particular observations to a false generalized conclusion. Popper argues that justification for induction will have to be found either through analytic statements or synthetic statements. Popper's reason for denying justification through analyticity is that such a justification would have to be formulated in purely logical terms, collapsing induction into a form of deduction. He writes, "the principle of induction must be a synthetic statement; that is a statement whose negation is not self-contradictory but logically possible" (407). But valid deductive arguments preserve truth, which means that a deductive proof for induction would end up showing a relation between the premises and the conclusion that always holds. Since synthetic statements are particular observations, using them to prove a universal statement would be an inductive form of inference, thereby justifying induction by induction. This leads inevitably to an infinite regress, since every inductive principle would require a further principle of induction.

Popper deals with the problem of induction by arguing that science is actually a deductive process. He argues that testable predictions can be derived from a hypothesis. The derived predictions are then compared with the results of scientific experiments and if the predictions are

shown to be false, "their falsification also falsifies the theory from which they were logically deduced" (411). If the process does not show the predictions to be false, then one can say that they have "proved [their] mettle", or that they are "corroborated" (411). A theory or hypothesis is never actually proven to be true; it is only shown to not be false. For Popper, this solves the problem of induction because he has removed the need for an unjustified form of inference from the scientific method. Popper's proposal turns entirely on the assumption that deductive inferences do not face the same justificatory problems that are faced by induction.

## 2. The Logocentric Predicament

But deduction does have problems that are symmetrical to those faced by induction. Wittgenstein noticed this problem in both Russell's and Frege's works, pointing out in the *Tractatus*:

> If *p* follows from *q*, I can conclude from *q* to *p* ; infer *p* from *q*.
> The method of inference is to be understood from the two propositions alone.
> Only they themselves can justify the inference.
> Laws of inference, which – as in Frege and Russell – are to justify the conclusions, are senseless and would be superfluous (§ 5.132).

Ricketts argues that this passage is similar to Lewis Carroll's skepticism in his paper "What the Tortoise Said to Achilles" (11-12). Carroll imagines a dialogue between the tortoise and Achilles in which Achilles tries to convince the tortoise that *Modus Ponens* is a valid argument. The tortoise accepts that the premises are true and that the conclusion follows if the premises are accepted as true, but then refuses to accept the conclusion. Achilles' answer to this infuriating dilemma is to introduce an inference rule as a premise itself. The new premise says that the tortoise has to accept the conclusion if he accepts the premises and accepts that the conclusion follows from the premises. The tortoise is able to maintain his skepticism even in the face of the new premise by demanding a further premise for the justification of the new inference. This leads the bewildered Achilles into an infinite multiplication of premises, since for each new inference the tortoise is able demand another premise. If this is the type of dilemma that Wittgenstein is referring to, then one would expect that Frege and Russell have made the same mistake as Achilles.

Ian Proops argues that one would have to read Frege and Russell uncharitably to find this mistake in their work, especially since they were both aware of Carroll style problems and explicitly avoided them. Proops points to a passage in the *Principia Mathematica* in which Russell writes:

> The principle of deduction gives the general rule according to which the inference is made, but is not itself a premise in the inference. If we treated it as a premise, we should need either it or some other general rule to enable us to infer the desired conclusion, and thus we should gradually acquire an increasing accumulation of premises without ever being able to make any inference... (Russell and Whitehead qtd. in Proops 285).

Russell is referring to tortoise style problems and then avoids them by giving inference rules the "status of informal principles that are employed in making inferences but not recorded as lines in the proofs" (Proops 286). Carroll is often viewed as failing to notice the difference between inference rules and suppressed premises (Smiley 727). Proops and Smiley both argue that these early incarnations of the logocentric predicament are easily dissolved once this distinction has been made. Smiley argues that inference rules, unlike suppressed premises, exist in an external relationship to the structure of arguments, meaning that the original structure of the argument does not have to change in order to justify the inference (731). Inference rules can be interpreted as kind of general permission that exists in the metalanguage instead of the object language (Hanna 57). Once Achilles is able to point out this distinction, the Tortoise will be unable to get his infinite regress going. To demand a further premise that asserts the validity of the previous inference means that the tortoise has failed to understand that validity is generated by following rules, not by hidden premises.

This critique of Carroll's paper has a certain amount of initial appeal, but it is hard not to feel as if this interpretation has failed to understand the full weight of the problem. While metalogic may be able to remove the problem from the object language, it is not clear how a similar problem will not arise in the metalanguage. Quine points out that if logic is to come from generalized conventions, the "derivation of the truth of any specific statement from the general convention thus requires a logical inference, and this involves us in an infinite regress..." (103). In other words, moving from general conventions or rules to particular instances requires or presupposes a further logic that must also come from further conventions or rules and so on. This means that the deductive move from generalised rules to particular instances invites just as much skepticism as the inductive move from particular instances to generalised rules. Smiley's solution also invites skepticism about rule following in a manner that is similar to Kripke's reading of the later Wittgenstein. Kripke points out that while rules may be general, one can only ever apply them to a finite number of cases and therefore one can never really know if the rule one thought they or another was following only applied to the past cases and not to future ones (Hymers 2010, 132). For example, a student could have thought they were following the rule +2, but when exposed to an extremely large number they discover that they are actually following the rule +2 only until a certain number is reached - at that point, the rule becomes +4. In the case of general logical rules, one may think that one is following a certain metalogical rule. But when faced with a particular instance, one may find that one is following something quite different than initially perceived. If there is an infinite amount of cases to which a general rule can be applied, and the rule can only be read off a finite amount of previous applications, then Kripke has argued that there is no way to know what rule is actually being followed (Hymers 2010, 132). By taking Russell's suggestion and creating a hierarchy of languages, we have just allowed tortoises to multiply.

**3. Is Wittgenstein a Tortoise?**

Instead of interpreting Wittgenstein's remarks on inference as a tortoise style critique, there is good reason to see Wittgenstein waving away unnecessary conceptual machinery. In other words, Wittgenstein is pointing out that both Frege and Russell have spent a lot of time guarding

against problems that do not exist. In examining the nature of logical relations, Wittgenstein writes that if God "creates a world in which certain propositions are true, he creates thereby also a world in which all propositions consequent on them are true" (§5.132) While this line and the ones following it could be interpreted as Wittgenstein arguing that even God cannot escape logic, Wittgenstein's main point is that logical relations are internal to the propositions themselves. He writes that a "proposition asserts every proposition which follows from it" (§5.124), meaning that a logical relation is not something that is separate from the proposition itself. In other words, logical relations are a part of the structure of the proposition. If it is not obvious that one proposition follows from another, then it is a failure of the symbolism. The logician's job is to symbolize the structure of propositions as perspicuously as possible. If one proposition follows from another, this relation does not come about by being connected in another proposition; rather, "these relations are internal, and exist as soon as, and by the very fact that the propositions exist" (§5.131).

For Wittgenstein, "a property is internal if it is unthinkable that its object does not possess it" (§4.123). Internal relations are similar: a relation is internal if it is unthinkable that this relationship does not hold. He uses the example of two shades of blue, one brighter and one darker than the other. The two shades exist in an internal relationship with each other because their very identity is at least partly composed of the relation in which they stand (Hymers 1996, 593). Part of the identity of the shade dark blue is parasitic on lighter shades of blue and vice versa. This relation does not exist because one has held up two shades of blue beside each other; instead the relation is a part of the structure of each. In other words, God could not create a world with  lighter and darker shades of blue whose identity - of being lighter or darker - was independent of the relation between those shades of blue. In logic, if $p$ follows from $q,$ then it is unthinkable that they do not stand in the relation. If $q$ is true, then everything that follows from $q$ must also be true: the structure of the propositions means that even God cannot deny this fact.

This means that the fault might not be with the tortoise for denying the logical inference, but with Achilles or the logician, for not creating a notation that is perspicuous enough to lay bare the structure of the propositions. If they had, the tortoise would have to cover his ears in order to continue denying the logical inference. Wittgenstein writes, "the proposition *shows* its sense. The proposition *shows* how things stand, *if* it is true. And it *says*, that they do so stand" (§4.022). Achilles has made the mistake of thinking that he can *say* what the inference rule is, he thinks that by adding a further premise it is possible to force the tortoise into accepting the conclusion if he accepts the premises. The mistake is not that Achilles could have avoided the infinite regress if he presented his inference rule as a metalogical rule instead of a premise within the object language; the mistake is to think that he could say anything about the rule. The rule needs to  be *shown*, and what needs showing is in the propositions themselves, not in an external logical structure. Wittgenstein thinks that if the internal structure can be properly shown through some logical notation, the tortoise would have to also deny reality in order to continue denying the inference. In § 4.023 Wittgenstein writes that while descriptions are about the external features of an object, "propositions describe reality by its internal properties." Propositions are able to represent the world because they share a logical structure with the world, so when the logical structure of the proposition is exposed, the logical structure of the world is also exposed.

Therefore, the tortoise's denial becomes a different type of skepticism, one that is similar to traditional Cartesian skepticism.

## 4. Language Games and Tortoises

While Wittgenstein does provide the tools to the answer the tortoise in the *Tractatus*, it still might not seem very persuasive, mostly because there are few philosophers who find the metaphysics of the *Tractatus* all that compelling, including the later Wittgenstein himself. But Wittgenstein's answer to the tortoise is actually strengthened once the metaphysics of the *Tractatus* are left behind. The idea of internal relations survives Wittgenstein's move to language games and exists in their grammar (the structure). For the later Wittgenstein, the meaning of a word is no longer determined by the logical relation it shares with reality but by "its use in the language" (2009, §43). Two concepts are internally related if "in order to understand one I must also understand the other" (Hymers 1996, 597). If we are teaching concepts to a child, and the only way for the child to understand the meaning of one concept is to also teach them another concept, then we can say that those concepts are internally related. Wittgenstein once again uses colours as an example. He notes that when one says "white is lighter than black" it seems like it is expressing something about the *essence* of the two colours..." (1972, §105). But this does not make very much sense because essence makes one think that there is something "inside" or in the "constitution" of a thing; it is hard to imagine what it would mean for there to be something inside black. This leads Wittgenstein to ask "Whom do we tell 'White is lighter than black'? What information does it give?" (§105). The idea that "white is lighter than black" seems to be already given if one understands the concepts in the proposition. This shows that white and black are internally related. If one uses the words 'white' and 'black' without understanding this relation between them, then it is unlikely that one will be able to use these words in a communicative or non-confused way. The process of justification has an internal relationship with deductive and inductive inference rules. Wittgenstein notes that it is tempting to try to justify the "rules of grammar" by saying, "But there really are four primary colours" (1967, §331). The assertion of this fact, however, cannot justify: the colour words one uses, that some are primary and others are not, the number of colours that are primary, or even that one has divided up the world in such a way. Any attempt to do so will use the very rules and structures one is trying to justify (O'Neill 8). We are now in a position to diagnose why the justification of deduction and induction has been such an abysmal failure.

Deductive and inductive inferences play an internal role in the process of justification: in order to understand justification, one must (at least, implicitly) understand the processes of deduction and induction and vice versa. This internal relationship is clear when one tries to imagine what justificatory practices would look like without deduction or induction, or when one tries to imagine explaining deduction to someone who has no understanding of the concept of justification. Wittgenstein's early idea of a relation being internal if it is unthinkable that the relation does not hold is also relevant – these scenarios are unimaginable.

Since the process of deduction is internal to the practice of justification, to ask for its justification is ultimately confused. From this perspective, it makes complete sense that trying to justify deduction through deduction does not work. Like the grammar of colours, the process has

to presuppose itself if one attempts to justify it in this way. Induction fails to justify deduction because this is an attempt to step outside the language game of justification itself. A justification for deduction by induction seems to cannibalize deduction. An inductive proof for deduction can only ever say: Since every valid deductive inference from true premises used thus far has also had a true conclusion, the relation between the premises and the conclusion will *probably* continue to hold. Deductive proofs can only be, at best, inductively true. But such a 'proof' seems to make every deductive inference just a form of induction.

O`Neill writes that using a different conceptual grammar to the grammar that one is trying to justify cannot work, because the "justification will employ concepts different from our own, and will thereby be irrelevant to the justification of *our* grammar", and since the "rules of grammar determine meaning...the employment of a different conceptual grammar will involve the use of *different* concepts" (8). While induction and deduction are both internal to justificatory practices, they are different concepts, and therefore they play different roles in the process of justification. Using one to justify the other is the attempt to use something completely irrelevant to its justification. An inductive proof cannot justify deduction, instead it can only show itself. The fact that deduction and induction are internal to justificatory language games does not make them *prima facie* justified. Instead, this relation points out the way in which the tortoise's demand is inappropriate— he is asking Achilles to do something unthinkable. The later Wittgenstein does not give a solution to the logocentric predicament. Instead, Wittgenstein offers a therapeutic approach, whose aim is to *dis*solve the problem by utilizing the tools of internal relations, grammar, and language games.

## 5. Conclusion

In this paper I have argued that Wittgenstein's understanding of internal relations is central to both his early and later responses to the logocentric predicament. In the *Tractatus* he asserted that internal relations are those in which it would be unthinkable if the relation did not hold and that those relations are a part of the propositions themselves. In his later work, Wittgenstein's understanding of internal relations changes slightly, as he sees an internal relation as holding if, and only if, in order to understand one concept, one must understand another. I have argued that an internal relation holds between the concept of justification and the concepts of deduction and induction. Both Popper and the tortoise's request for a justificatory inference rules is ultimately confused.

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