The Grand Pessimistic Induction

Abstract
After decades of intense debate over the old pessimistic induction (Laudan, 1977; Putnam, 1978), it has now become clear that it has at least the following four problems. First, it overlooks the fact that present theories are more successful than past theories. Second, it commits the fallacy of biased statistics. Third, it erroneously groups together past theories from different fields of science. Four, it misses the fact that some theoretical components of past theories were preserved. I argue that these four problems entitle us to construct what I call the grand pessimistic induction that since the old pessimistic induction has infinitely many hidden problems, the new pessimistic induction (Stanford, 2006) also has infinitely many hidden problems.

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1. Introduction

Pessimists constructed the old pessimistic induction (Laudan, 1977; Putnam, 1978) and the new pessimistic induction (Stanford, 2006) to rebut scientific realism, the view that successful scientific theories are (approximately) true. After decades of intense debate between scientific realists and pessimists, it has now become clear that the old pessimistic induction has at least four problems. On the basis of the four problems, I construct what I call the grand pessimistic induction that since the old pessimistic induction has infinitely many hidden problems, the new pessimistic induction also has infinitely many hidden problems.

The outline of this paper is as follows. In Section 2, I expound the old pessimistic induction, four problems with it, and then new pessimistic induction. In Section 3, I unpack the grand pessimistic induction, delineating how it is structured, how it is justified, how it refutes the new pessimistic induction, and how it can be attacked. In Section 4, I anticipate and reply to five possible objections to the grand pessimistic induction. In short, this paper fleshes out and defends the grand pessimistic induction with the use of the very theoretical resources that pessimists have deployed to attack scientific realism.

Let me first clarify some key terms. 'Old pessimists' and 'new pessimists' refer to those who embrace, respectively, the old pessimistic induction and the new pessimistic induction. 'Pessimists' refers to old and new pessimists. They are pessimistic about scientific theories and/or scientists. By contrast, 'grand pessimists' refers to those who embrace the

grand pessimistic induction. They are pessimistic about the old pessimistic induction, the new pessimistic induction, and pessimists.

2. The Old and New Pessimistic Inductions

The old pessimistic induction holds that since past theories were rejected, present theories will also be rejected. This formulation of the old pessimistic induction largely follows those of old pessimists. Larry Laudan asserts that most "of the past theories of science are already suspected of being false; there is presumably every reason to anticipate that current theories of science will suffer a similar fate" (1977: 126). Hilary Putnam similarly claims that just "as no term used in the science of more than fifty (or whatever) years ago referred, so it will turn out that no term used now (except maybe observational terms, if there are such) refers" (1978: 25).

Why should we accept the premise of the old pessimistic induction that past theories were discarded? Old pessimists might appeal to Laudan's list:[1]

> Laudan's List
> - the crystalline spheres of ancient and medieval astronomy;
> - the humoral theory of medicine;
> - the effluvial theory of static electricity;
> - "catastrophist" geology, with its commitment to a universal (Noachian) deluge;
> - the phlogiston theory of chemistry;
> - the caloric theory of heat;
> - the vibratory theory of heat;
> - the vital force theories of physiology;
> - the electromagnetic aether;
> - the optical aether;
> - the theory of circular inertia;
> - theories of spontaneous generation (Laudan, 1981: 33)

Laudan's list plays a crucial role in the old pessimistic induction. Without it, the old pessimistic induction evaporates, for the premise would merely be an assumption.

Let me introduce four objections that philosophers have raised against the old pessimistic induction. First, present theories are more successful than past theories, i.e., present theories explain and predict more phenomena than past theories did. This objection is raised by Alan Musgrave (1985: 211), Jarrett Leplin (1997: 141), Gerald Doppelt, (2007: 111, 2014), Juha Saatsi (2009: 358), Michael Devitt (2011: 292), Ludwig Fahrbach (2011: 1290), Seungbae Park (2011: 80), and Moti Mizrahi (2013). On these philosophers' account, the superiority of present theories over past theories invalidates the pessimistic inference from past to present theories.

Second, Fahrbach (2011: 148), Park (2011: 79), and Mizrahi (2013: 3220, 2015, forthcoming) point out that the old pessimistic induction, based on Laudan's list, commits the fallacy of biased statistics. The theories on the list were drawn from distant past science, but not from recent past science. The number of recent past theories, such as the germ theory, the special theory of relativity, the kinetic theory, and evolutionary theory, is far larger than the number of distant past theories, such as the humoral theory, the ether theory, the caloric

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[1] Laudan (1981: 33) presents the list not to support the old pessimistic induction but to undermine the alleged connection between success and approximate truth (Park, 2011: 76; Wray, 2015: 65, 2016: 366, footnote).

theory, and the phlogiston theory. Recent past theories have not yet been overturned, while distant past theories were overturned.

Wray (2015) accepts the foregoing three philosophers' criticism against the old pessimistic induction, although Wray (2013) vigorously defended the old pessimistic induction. He says that "if one focuses on the recent history of science, one may find that most theories have not in fact been rejected," and that "only the fate of our most recently developed theories are relevant to determining what we can expect of today's best theories" (2015: 63). On his account, we should consider recent past theories, but not distant past theories, to determine whether present theories will be overthrown.

Third, Marc Lange (2002) observes that scientific revolutions occurred in different frequencies in different fields of science. For example, there were transitions of the various theories of light from Newton's particle theory, to Fresnel's wave theory, to Maxwell's electromagnetic theory, to Einstein's particle theory, and to the quantum theory of light. These four transitions occurred in less than 120 years between the early nineteenth century and the early twentieth century (Wray, 2015: 64). By contrast, the Ptolemaic theory remained unchallenged for about 1,200 years until the mid-sixteenth century (Wray, 2015: 64).

Wray accepts Lange's criticism of the old pessimistic induction, saying that pessimists should "be careful not to indiscriminately group together theories developed under very different circumstances, and thus generalize from an unnatural grouping" (Wray, 2015: 64). It is wrong to conclude that present theories in all fields of science will be rejected by appealing to a list of past theories drawn from all fields of science. We should rather take different epistemic attitudes towards different theories, depending on how often scientific revolutions have occurred in different fields of science.

Fourth, selectivists claim that some theoretical components of past theories are retained in present theories, while other theoretical components were discarded. They disagree with one another over what the preserved components are. John Worrall (1989) claims that they are mathematical equations. Philip Kitcher (1993: 140–149) and Stathis Psillos (1999, Chapter 5 and 6) claim that they are working posits. Pierre Cruse and David Papineau (2002) claim that they are Ramsey sentences. Selectivists, however, agree that not all theoretical constituents of past theories were abandoned.

Wray (2015: 69) is convinced of selectivism, approvingly citing Anjan Chakravartty, who says that "there appears to be a great deal of preservation of mathematical structure across theories over time" (Chakravartty, 2008: 155). For example, the mathematical structure of Fresnel's ether theory was retained in Maxwell's electromagnetic theory, although the ontology of the ether theory was discarded. Thus, the old pessimistic induction "does not necessarily spell doom for scientific realism" (Wray, 2015: 70).

Let me now turn to the new pessimistic induction that since past scientists could not conceive of present theories, present scientists cannot conceive of future theories. Why should we accept the premise that past scientists could not conceive of present theories? It is supported by Stanford's list:

Stanford's List
from elemental to early corpuscularian chemistry to Stahl's phlogiston theory to Lavoisier's oxygen chemistry to Daltonian atomic and contemporary chemistry

from various versions of preformationism to epigenetic theories of embryology

from the caloric theory of heat to later and ultimately contemporary thermodynamic theories

from effluvial theories of electricity and magnetism to theories of the electromagnetic ether and contemporary electromagnetism

from humoral imbalance to miasmatic to contagion and ultimately germ theories of disease

from eighteenth century corpuscular theories of light to nineteenth century wave theories to the contemporary quantum mechanical conception

from Darwin's pangenesis theory of inheritance to Weismann's germ-plasm theory to Mendelian and then contemporary molecular genetics

from Cuvier's theory of functionally integrated and necessarily static biological species and from Lamarck's autogenesis to Darwin's evolutionary theory (Stanford, 2006: 19–20)

As Laudan's list is an indispensable foundation of the old pessimistic induction, so Stanford's list is an indispensable foundation of the new pessimistic induction. Without Stanford's list, the premise of the new pessimistic induction would merely be an assumption.

Stanford claims that the space of unconceived alternatives "appears to be indeterminate and unbounded" (2006: 133). Each field of science has infinitely many unconceived alternatives. There are infinitely many theories of light, theories of diseases, theories of heat, and so forth. No matter how many alternatives scientists may eliminate from the spaces of unconceived alternatives, infinitely many unconceived alternatives will remain in the possibility spaces. Given that scientists are finite beings, they will never be able to exhaust the possibility spaces, and thus will never be able to reach and recognize true scientific theories. Therefore, realism is doomed.

Stanford argues that the new pessimistic induction is better than the old pessimistic induction because the new pessimistic induction overcomes the realist objection to the old pessimistic induction that present theories are more successful than past theories. How does it overcome the objection? There is an important difference between the old and new pessimistic inductions. While the old pessimistic induction is over scientific theories, the new pessimistic induction is over scientists, i.e., while the old pessimistic induction is an inference from past to present theories, the new pessimistic induction is an inference from past to present scientists. Stanford claims that there is no relevant cognitive difference between past and present scientists. They are all "creatures whose cognitive constitutions are not well suited to the task of exhausting the kinds of spaces of serious candidate theoretical explanations from which our scientific theories are drawn" (Stanford, 2006: 45). So even if present theories are more successful than past theories, present theories will be displaced by unconceived alternatives, just as past theories were displaced by unconceived alternatives. It appears that Stanford thought up a clever way to get around the realist objection to the old pessimistic induction.

3. The Grand Pessimistic Induction
In the previous section, I highlighted four intrinsic problems with the old pessimistic induction. Those four problems, however, are not all the problems with it. There are other problems that have recently been recognized in the literature (Park, 2016a, 2017). I, however, do not spell them out in this paper because the four problems are enough to get the grand pessimistic induction off the ground, which I unfold in this section.

The grand pessimistic induction holds that since the old pessimistic induction has infinitely many hidden problems, the new pessimistic induction also has infinitely many hidden problems. Why should we accept the premise that the old pessimistic induction has

infinitely many hidden problems? It is supported by the following list of intrinsic problems with the old pessimistic induction:

> The List of Problems
> - The old pessimistic induction overlooks the fact that present theories are more successful than past theories.
> - It commits the fallacy of biased statistics.
> - It erroneously groups together disparate past theories.
> - It misses the fact that some theoretical components of past theories were preserved.

These four problems were hidden when the Laudan (1977) and Putnam (1978) put forward the old pessimistic induction. They were, however, exposed after decades of intense debate over it. There are even more problems with it, although we cannot see them now, i.e., it has hitherto hidden problems. As time goes, they will be exposed. The more such problems are exposed, the stronger the inductive rationale will become for thinking that there are further such problems. It follows that the number of such problems is infinite. Since the old pessimistic induction has infinitely many problems, its successor, the new pessimistic induction, also has infinitely many problems. Grand pessimists predict that the new pessimistic induction will be replaced by a future pessimistic induction hitherto unconceived. But the future pessimistic induction has infinitely many problems, just as its two forerunners do. There are infinitely many such future pessimistic inductions. So it is of no use for pessimists to construct the successors of the new pessimistic induction with the view to rebutting realism.

Grand pessimists construct the list of intrinsic problems with the old pessimistic induction, but not the list of intrinsic problems with the new pessimistic induction. They argue that the list of intrinsic problems with the old pessimistic induction is all that is required to refute all the successors behind it, just as pushing the first domino is all that is required to knock down all the dominos behind it. To reject this analogy is to give up the pessimist program altogether. Therefore, this paper purposefully refrains from constructing the list of intrinsic problems with the new pessimistic induction.

Recall that according to Stanford, the new pessimistic induction is better than the old pessimistic induction because it gets around the realist objection that present theories are more successful than past theories. Grand pessimists, however, object that the new pessimistic induction is no better than the old pessimistic induction. The two pessimistic inductions are equally problematic, given that they are both infinitely problematic. They are equally problematic, no matter how large finite number of advantages the new pessimistic induction may have over the old pessimistic induction. Thus, new pessimists' appeal to infinity backfires on themselves.

New pessimists might protest that they cannot see infinitely many problems with the new pessimistic induction. Grand pessimists, however, reply that new pessimists cannot see the infinitely many problems not because the new pessimistic induction does not have the infinitely many problems but because new pessimists are cognitively no better than old pessimists who could not see the infinitely many problems with the old pessimistic induction. Both old and new pessimists' cognitive constitutions are not well suited to the task of exhausting the possibility spaces of hidden problems. Again, new pessimists are hoisted with their own petard.

How can the grand pessimistic induction be attacked? To answer this question, we need to compare the two radically different ways in which past and present scientific theories are discredited under the pessimist framework. Pessimists reject past theories, such as

Aristotelian mechanics and the humoral theory not on the grounds that they had problematic predecessors but on the grounds that intrinsic problems with them were exposed. By contrast, they reject present theories, such as Einsteinian mechanics and the germ theory not on the grounds that intrinsic problems with them have been exposed but on the grounds that they have problematic predecessors. It follows that the grand pessimistic induction should be discredited either in the way past theories were discredited, or in the way present theories are discredited, depending on whether it has a problematic forerunner or not.

The grand pessimistic induction does not even have a precursor, let alone a problematic precursor. After all, it is the first pessimistic induction about pessimistic inductions. So it should be discredited not in the way present theories are discredited but in the way past theories were discredited. To put it differently, you cannot run a pessimistic induction against the grand pessimistic induction. You should rather expose intrinsic problems with it.

It is much harder to discredit the first idea than its successor. It may take more than a thousand years to expose intrinsic problems with the first idea, as the case of the Ptolemaic theory illustrates. By contrast, it takes less than a minute to discredit the second idea. All that is required to refute it to point out that it has a problematic precursor. The first idea enjoys what I call the first-mover advantage, viz., it is not subject to a pessimistic induction. In contrast, its successor falls prey to a pessimistic specter, the moment it is proposed, due to the fact that it has a problematic forerunner. The grand pessimistic induction enjoys the first-mover advantage.

4. Objections and Replies
4.1. Behind the Old and New Pessimistic Inductions
Pessimists might object that the grand pessimistic induction is a successor of the old and new pessimistic inductions, so the grand pessimistic induction has infinitely many problems, if the old and new pessimistic inductions have infinitely many problems. To use the domino analogy above, if the old pessimistic induction is knocked down, the new pessimistic induction and then the grand pessimistic induction will be knocked down.

In my view, however, the idea that the grand pessimistic induction is a successor of the old and new pessimistic inductions is just as mistaken as the idea that the old pessimistic induction is a successor of past and present scientific theories. The old pessimistic induction is about past and present theories. How can it be their successor? No pessimist claims that since the caloric theory is refuted, the kinetic theory and then the old pessimistic induction will be refuted. In short, the old pessimistic induction is not behind but above past and present theories. Similarly, the grand pessimistic induction is about the old and new pessimistic inductions. How can it be their successor? It is not behind but above them. It follows that although the new and old pessimistic inductions are infinitely problematic, the grand pessimistic induction may not have a problem at all. In fact, the grand pessimistic induction can be free of a problem, provided that the old and new pessimistic inductions are infinitely problematic.

4.2. Hasty Generalizations
Pessimists might object that two hasty generalizations inhere in the grand pessimistic induction. First, it is a hasty generalization that since the old pessimistic induction has four problems, it has infinitely many hidden problems. Such an inference is similar to the fallacious inference that since we observed four black crows, there are infinitely many black crows. Second, it is also a hasty generalization that since the old pessimistic induction is infinitely problematic, the new pessimistic induction is also infinitely problematic. Such an

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inference is similar to the fallacious inference that since we observed one black crow, the next crow is also black.

Consider, however, that Stanford's list includes the transition from the caloric theory to the kinetic theory. New pessimists maintain that there are infinitely many unconceived theories of heat on the grounds that they observed that there were two theories of heat in the history of science. Their inference is similar to the fallacious inference that since we observed two black crows, there are infinitely many black crows. New pessimists might reply that all past theories jointly constitute the reason for thinking that there are infinitely many theories of heat. Such a reply, however, is not available to new pessimists, for Wray earlier warned that pessimists should "be careful not to indiscriminately group together theories developed under very different circumstances, and thus generalize from an unnatural grouping" (2015: 64). In sum, the grand pessimistic induction is no worse off than the new pessimistic induction vis-à-vis the charge of hasty generalization.

Pessimists might accuse me of committing the fallacy of *tu quoque*. In general, we cannot show that an argument is good by saying that it is similar to a bad argument. If it is similar to a bad argument, it is a bad argument too. Thus, to say that the grand pessimistic induction is no worse off than the new pessimistic induction is to say that the grand pessimistic induction is incorrect. Specifically, the grand pessimistic induction commits the fallacy of hasty generalization, just as the new pessimistic induction does.

This objection to the grand pessimistic induction, however, has two unsavory implications for pessimists. First, the objection implies that the new pessimistic induction commits the fallacy of hasty generalization. As such problems accumulate, a list of intrinsic problems with the new pessimistic induction might emerge. Second, the objection also implies that the old pessimistic induction commits the fallacy of hasty generalization. It is a hasty generalization that since the caloric theory was surpassed by the kinetic theory, the kinetic theory will also be surpassed by a hitherto unconceived alternative. It follows that we can expand the list of intrinsic problems with the old pessimistic induction as follows:

> The List of Problems
> - The old pessimistic induction overlooks the fact that present theories are more successful than past theories.
> - It commits the fallacy of biased statistics.
> - It erroneously groups together disparate past theories.
> - It the fact that some theoretical components of past theories were preserved.
> - It commits the fallacy of hasty generalization.

Bear in mind that an attack on the grand pessimistic induction can also be directed at the new pessimistic induction, and can result in the expansion of the list of intrinsic problems with the old pessimistic induction.

4.3. No Extrapolation

Pessimists might object that it is wrong to extrapolate the fate of the new pessimistic induction from that of the old pessimistic induction. If the new pessimistic induction has hidden problems, that should be argued independently of the fact that the old pessimistic induction has hidden problems. In general, it is absurd to reason that an idea is problematic because it has a problematic predecessor.

It is, however, self-defeating for pessimists to advance such an objection against the grand pessimistic induction because it applies equally well to the old and new pessimistic inductions. As noted before, pessimists operate under the assumption that scientific theories

are like dominos, i.e., that the downfall of past theories constitutes an inductive rationale for expecting the downfall of present theories. Under that framework, grand pessimists expect the demise of the new pessimistic induction after observing the demise of the old pessimistic induction. To reiterate, grand pessimists do not expose intrinsic problems with the new pessimistic induction, just as pessimists do not expose intrinsic problems with present theories.

If pessimists, however, insist that the new pessimistic induction should be appraised independently of how the old pessimistic induction was evaluated, grand pessimists also insist that present theories should be appraised independently of how past theories were evaluated. Since another problem with the old pessimistic induction is just exposed, grand pessimists expand the list of problems as follows:

The List of Problems
- The old pessimistic induction overlooks the fact that present theories are more successful than past theories.
- It commits the fallacy of biased statistics.
- It erroneously groups together disparate past theories.
- It the fact that some theoretical components of past theories were preserved.
- It commits the fallacy of hasty generalization.
- It mistakenly extrapolates the fate of present theories from that of past theories.

The last item on the list is of immense importance. If it is true, the old pessimistic induction cannot go through, even if pessimists have a flawless list of past theories. That is, even if the list is large enough, representative of the population of past theories, and reflective of the disparate fields of science, it is entirely an open question whether present theories will follow the course of past theories or not.

4.4. No Successor
New pessimists might argue that the new pessimistic induction is not a successor of the old pessimistic induction, pointing out an important difference between them, viz., while the old pessimistic induction is about scientific theories, the new pessimistic induction is about scientists. So from the fact that the old pessimistic induction has hidden problems, it does not even probably follow that the new pessimistic induction also has hidden problems.

The preceding move to drive a wedge between the old and new pessimistic inductions, however, does not go well with Stanford's contention that the new pessimistic induction is better than the old pessimistic induction. He contends, you may recall, that the former overcomes, while the latter does not, the realist objection that present theories are more successful than past theories. His contention indicates that the new pessimistic induction is the successor of the old pessimistic induction. So if the latter has hidden problems, the former also has hidden problems.

Moreover, if new pessimists say that the new pessimistic induction is not a successor of the old pessimistic induction, it is not clear on what grounds they can say that the kinetic theory is the successor of the caloric theory. After all, there is an important difference between them, viz., while the kinetic theory is about molecules, the caloric theory is about caloric. Despite this difference, however, new pessimists believe that the kinetic theory is the successor of the caloric theory. By parity of reasoning, they should also believe that the new pessimistic induction is the successor of the old pessimistic induction, although the former is over scientists while the latter is over scientific theories.

4.5. Science vs. Philosophy

Pessimists will now argue that science and philosophy are different enterprises, and that scientific ideas and scientists are vulnerable to pessimistic inductions, whereas philosophical ideas and philosophers are not. To put another way, a pessimistic inference from some scientific ideas to other scientific ideas, or from some scientists to other scientists, is legitimate, but a pessimistic inference from some philosophical ideas to other philosophical ideas, or from some philosophers to other philosophers, is illegitimate. The old pessimistic induction is a pessimistic inference from some scientific ideas to other scientific ideas, and the new pessimistic induction is a pessimistic inference from some scientists to other scientists. Thus, the old and new pessimistic inductions are inductively correct. By contrast, the grand pessimistic induction is a pessimistic inference from a philosophical idea to another philosophical idea. So it is inductively incorrect.

The preceding move to separate philosophy and science has the following four problems. First, an argument is required for the bold assertion that science is vulnerable to a pessimistic induction whereas philosophy is not. In the absence of such an argument, scientists would simply make the opposite assertion, viz., philosophy is susceptible to a pessimistic induction whereas science is not. Blunt scientists would add that it is the manifestation of philosophical arrogance to say that improvement and achievement ensue philosophers' mistakes whereas further mistakes and failures ensue scientists' mistakes (Park, 2016b: 12).

Second, grand pessimists protest that not all philosophical ideas are immune to a pessimistic induction. As we noted in Section 4, an idea is subject to a pessimistic induction or not, not depending on whether it is philosophical or scientific, but depending on whether it has a problematic forerunner or not. Some philosophical ideas, such as the new pessimistic induction, have precursors, whereas other philosophical ideas, such as the grand pessimistic induction, do not. So the new pessimistic induction falls prey to a pessimistic induction, whereas the grand pessimistic induction does not. To reiterate, the grand pessimistic induction enjoys the first mover advantage.

Third, how about scientists and philosophers who practice their enterprises on the borderline between science and philosophy? For example, Sean Carroll at the California Institute of Technology is a theoretical physicist, but advocates diverse philosophical positions, including the many-worlds interpretation of quantum mechanics. Are such thinkers vulnerable to a pessimistic induction because they are scientists? Or are they immune to a pessimistic induction because they are philosophers? Pessimists owe us answers to these questions.

Fourth, many philosophers rely on scientific theories to defend their philosophical views. For example, Thomas Kuhn (1962/1970: 172–173) uses evolutionary theory to defend his philosophical view about science. He argues that science does not move toward truths, just as biological organisms do not evolve toward a goal. Wray also relies on evolutionary theory to defend his philosophical view about science. He claims that old concepts are thrown out when an old scientific theory is superseded by a new scientific theory, just as a species loses some morphological features when it becomes a new species (Wray, 2011: 136). Are such philosophers' philosophical views susceptible to a pessimistic induction or not? If they are, we have some examples of philosophical views that are susceptible to a pessimistic induction. But if they are not, we have an example of a scientific theory, viz., evolutionary theory, that is not susceptible to a pessimistic induction. Either way, it is false that the pessimistic specter pervades over science, but not over philosophy.

5. Conclusion

Worrall (1989: 99), Kitcher (1993: 136), Psillos (1999), P. D. Magnus and Craig Callender (2004: 322), and Wray (2013: 4321) claim that the old pessimistic induction is the most compelling argument against realism. Grand pessimists, however, dispute this popular assessment of the old pessimistic induction, arguing that it is infinitely problematic, and that its successor, the new pessimistic induction, is also infinitely problematic.

The grand pessimistic induction would be refuted, if a list of intrinsic problems with it were presented. It is a matter for future debate whether such a list can be constructed. Pessimists should be careful, though, when they make such a list, for they might end up expanding the list of intrinsic problems with the old pessimistic induction, as we have already seen in Section 4. The grand pessimistic induction mirrors the new pessimistic induction, and the new pessimistic induction is similar to the old pessimistic induction. Hence, a criticism directed at the grand pessimistic induction can also be directed at the old pessimistic induction. Moreover, such a criticism can serve to generate a list of intrinsic problems with the new pessimistic induction, a list that I purposefully avoided constructing in this paper.

Finally, it is also a matter for future debate what other hidden problems beset the old pessimistic induction. If they are exposed, they will be added to the list of intrinsic problems with the old pessimistic induction, will serve as positive instances confirming grand pessimists' prediction that the old pessimistic induction has hitherto hidden problems, will strengthen the inductive rationale for thinking that there are yet more hidden problems, and as a result, will reinforce the grand pessimistic induction.

In sum, we should shake off the initially appealing, but infinitely problematic, intuition that scientific revolutions will oust present theories, as they did past theories.

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