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## Induction: The Problem Solved

### Journal Item

How to cite:

Shand, John (2001). Induction: The Problem Solved. *Philosophy Now*, 34

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Version: Accepted Manuscript

Link(s) to article on publisher's website:

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## INDUCTION: THE PROBLEM SOLVED

By JOHN SHAND

Induction it is often argued is a rationally justifiable form of non-deductive inference that is required if we are to draw conclusions about the world in cases that we have not observed on the basis of what we have observed. It is often thought to be indispensable to scientific enquiry, and the formation and justification of scientific laws of nature. The cases we have observed may for example be in the past, on the basis of which we may wish to draw conclusions about the future, which we have not observed. Such an inference would be: 'Every time this pen is dropped it has been observed to fall to the desk, therefore, the next time this pen is dropped it will fall to the desk'; or the conclusion may be some universal statement such as 'All pens when dropped over a desk fall to the desk'. In a deductive argument the conclusion follows from the premises because to assert the premises and deny the conclusion would be a contradiction. Inductive arguments are said to go beyond the content of the premises in that to assert the premises and deny the conclusion would not be a contradiction; yet it is said that a belief in a conclusion may be rationally justified on the basis of an inductive inference. One way in which this is done is to say that the conclusion of an inductive inference is made more probable even if it is not made certain. The problem of induction is usually characterised as that of saying how the move from premises that underdetermine a conclusion can be rationally justified. The problem of rationally justifying in general the move from premises to conclusion in inductive arguments is clearly highlighted by Hume. It cannot be justified because the move is deductive, because to assert the premises of an inductive argument and deny the conclusion is never a logical contradiction. There is no contradiction between saying that the pen has always been observed to fall to the desk when dropped, and saying that next time it will not. As Hume says, logically speaking anything could happen that is not a contradiction; the pen could turn into a butterfly and flutter away. The only other way to justify the move is by experience; but Hume says that any such attempt is hopelessly circular. One would have to use an inductive argument to justify inductive argument. Something along the lines of: inductive arguments have worked in cases we have observed therefore they will work in cases we have not observed. But this is itself an inductive argument. Saying that the premises at least make the conclusion more probable does not help because it does not escape the circularity problem: to say of inductive arguments that they have made conclusions more probable in cases we have observed and will therefore make conclusions more probable in cases we have not observed, is still to attempt to justify induction by induction. This is in addition to the probability problem that the cases we have observed are bound to be finite in number but the cases we have not infinite, thus rendering the probability of the conclusion always zero.

When people talk about the problem of induction they mean the problem of justifying the rationality of *inductive arguments*. My eliminative answer is to argue that there is no problem of justifying inductive arguments because there is no such thing as an inductive *argument*. So-called inductive arguments as such have no logical force. Nevertheless I will contend that there is such a thing as an inductive *procedure* whose statements are true and track facts in the world; but such procedures are not arguments as the statements involved are unlinked by deductive relations.

The thesis here in fact applies to any less-than deductive putative argument.

A putative argument is a set of statements where one, the conclusion, is claimed to *follow* from other statements, the premises. If what we are considering is an argument, and not just a putative argument, then the conclusion *does* follow from the premises. My contention is that the *only* sense in which conclusions follow from premises is the in case of deductive arguments. Conclusions in this case follow from premises because to assert the premises but deny the conclusion would be a contradiction. This, of course, is sometimes put by saying that if an argument is valid it is not the case that the conclusion could be false while the premises could be true; an argument is invalid if the conclusion could be false while the premises could be true. If the premises *are* true, and the argument *is* valid, then the conclusion must *be* true - the argument is sound.

The challenge, which I claim to be unanswerable, is to come up with a case where the conclusion of a non-deductive putative argument can be said to follow from the premises. My claim is that except in the case of deduction, there is no sense in which the conclusion follows from the premises - in fact strictly it is a misnomer to speak of 'premises' and 'conclusion' at all. In all but deductive cases, statements are not in fact linked as premise to conclusion at all. So why might we think they are? In the case of a putative argument where we think we have found an instance of a non-deductive argument where the conclusion does follow from the premises, we only think so because we have tacitly assumed often very obviously true premises that would turn the less-than deductively valid sequences of statements into a deductively related set, into an argument. These premises are often derived from other arguments we already accept implicitly. When asked whether in the case of a putative non-deductive argument, *Y* follows from *X*, one is likely to get a reply something along the lines of 'No it doesn't. But if you assume *Z*...'.

The motivation for thinking that inductive 'arguments' (and other less than deductive 'arguments') need a special justification derives from the belief, which I think is mistaken, that something weaker than deduction is required for empirical investigation whereby we may draw contingent conclusions that are underdetermined by the premises. By 'underdetermined' is meant cases where denying the conclusion but asserting the premises does not entail a logical contradiction. But as I will show, this is a profound confusion. The confusion lies in thinking that the problem lies in the move between the premises and conclusion in an inductive argument, and that it is that that needs justifying; whereas in fact the difficulty lies in knowing the truth of premises that would render the argument deductively valid. But the issue of knowing the truth of such premises need not worry us in the slightest. It is not a problem, for to suggest it is in turn confuses our inability to *know* the truth of such premises and their *being true*. If an argument *has* true premises, and the conclusion *does* follow validly from the premises, then the conclusion *is* true, and we have a reason for believing it true, whether anyone knows these things or not. Nor is there a difficulty in squaring the statement constituting the conclusion of deductive arguments with the contingent states of affairs such statements may refer to. The conclusion of a valid deductive argument, although it must be true if the premises are true, is just as contingent as the premises that entail it, and there is nothing illegitimate in the premises of a deductively valid argument being contingent.

All putative arguments that are not deductive arguments are in fact an *enthymeme* - that is, arguments with missing premises. The belief that inductive arguments require a special justification to entitle us to move from premises to conclusion is a mistake. It is odd and arbitrary that we feel the need to justify this sort of invalid argument - we should as in other cases simply categorise it as a formal fallacy. Inductive arguments are simply invalid. Take the following inductive argument.

[Exp.1]

All observed free rocks near the surface of the earth fall towards the centre of the earth

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Therefore, this (or all) free rock/s near the surface of the earth will fall towards the centre of the earth

Is this a good argument? Is it valid? Could the conclusion be false while the premise are true? In fact it is an incredibly feeble argument. There is no problem in thinking, with even only a little imagination, of how the conclusion might be false while the premise true. In fact there are probably no limits to the way in which the conclusion could be false while the premise could still be true. Clearly it is invalid and the next free rock might behave differently from any rock yet observed. It could turn into a butterfly as far as this putative argument is concerned. There is no contradiction in supposing this with the premise involved in this argument. The argument, as it stands, gives us *no reason* for thinking the conclusion true. So why do we think it does? Because we tacitly import latent premises so that the conclusion does follow from the premise.

The problem of making it such that the conclusion follows from the premises is indeed quite simply solved. All that is required are true premises that would turn the putative inductive argument into a sound deductive argument. Something like an appeal to a Uniformity of Nature Principle (UNP) combined with a covering law.

[Exp.2]

All observed free rocks near the surface of the earth fall towards the centre of the earth

Laws of nature hold universally throughout space and time

It is a law of nature that all physical bodies, such as rocks, in the conditions specified with fall towards the centre of the earth

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Therefore, this (or all) free rock/s near the surface of the earth will fall towards the centre of the earth

The perceived difficulty now, which tends to be thought to block this solution, is the difficulty of knowing that the second premise is true. It is well known, as Hume showed, that the attempt to justify a UNP - that there are laws of nature that hold universally across space and time - fails on the only two alternative ways it can be justified. It cannot be justified *a priori* by reason because its denial does not constitute a logical contradiction, and it cannot be justified *a posteriori* by experience because

not all cases can be examined. In addition, of course, the attempt to justify induction directly falls foul of the similar insurmountable problems: that the next instance does not correspond to previously observed instances is not a logical contradiction, and the attempt to justify inductive procedures by observation - that induction has worked in observed instances and so will work in unobserved instances - is itself an inductive argument and so is circular and thus void of justificatory power.

Various other moves have been proposed here that need not detain us long. In particular there is the Kantian manoeuvre that aims to show that induction works at least for the world as experienced, because such a notion is a necessary condition of our having an experience at all. Apart from the difficulty of how such a claim could itself be justified, this leaves all the well-known problems of how to deal with the world as not experienced - and the deflection that such a world can be 'nothing to us' seems hardly very satisfactory.

It might be argued that the premises of putative inductive arguments at least render the truth of their conclusion more *probable*. But this again helps not at all and makes no difference to the arguments presented here to the effect that there is no such thing as an inductive *argument*. Such structures give us no reason for the conclusion being true. There is the well-known problem that premises usually refer to a finite set of instances from what is potentially an infinite set, so strictly speaking the probability remains zero. But the knockout blow is that probability only pushes the problem of justifying the move from 'premises' to 'conclusion' one step back, whence it arises hale and fully formed again: for to say that the premises make the conclusion even *more probable* is itself an inductive argument of exactly the sort the appeal to probability was meant to circumvent. Again the reason we think the premises render the conclusions more probable is because we tacitly turn the so-called inductive argument into a deductive one through latent premises. Otherwise such premises imply almost nothing.

Before presenting the answer here of eliminating the problem of induction by eliminating induction as an argument, it must be said that inductive *procedures* can still have a place in our approach to dealing with the world even when we do not turn such inductive procedures into deductive arguments by adding premises that would do so. This is not to re-import induction as a process of *argument*. But it needs explaining why we might still think inductive structures useful. The schema for the above [Exp.1] is:

[Exp.3]

All observed *A* is *B*

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Therefore this (or all) *A* is *B*

As an argument this is a non-starter. In fact very little follows from what are usually presented as the premises of inductive arguments. At worst putative inductive arguments are just disconnected heaps of statements. But we could still find that the procedure of making judgements on what we have not observed on the basis of what we have observed is a useful one, and tends to lead to the truth rather than not. But it is a commonplace that showing the conclusion (outcome) of a putative argument to be

true (indeed its *being true*) does not show the argument to be valid. It is quite possible to go from true premises (or indeed false premises) to a true conclusion, and the argument still be invalid. What one cannot do is go from true premises to a false conclusion and the argument be valid. That following the statements of a putative argument takes one from truth to truth - involves only true statements - does not show it is a valid argument or indeed an argument at all: that it gives a reason for the final statement, the 'conclusion', being true. Of course we would have to be careful in such inductive procedures. We might find that in using inductive procedures they tend to come out true, or culminate in some truth, but they are not arguments; they do not give us a reason for the 'conclusion' being true; they may just happen to be made up of statements that track truths. Take this case:

[Exp.4]

A man walked up to a tree (true)  
The man hit the tree with the axe repeatedly (true)

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The tree fell over on my head (true)

This is not an argument, although it may look like one - it gives no reason for the last statement being true - nor is 'The tree fell over on my head' strictly speaking a conclusion. But still these true statements track a series of facts that we might find useful trace. But there is *no sense* in which the conclusion *follows* from the premises. Again, the argument gives us *no reason* for the conclusion being true. For the conclusion to *follows* from the premises we would have to make the statements connected to one another in such a way that the relation is deductive. It is no use asking one, in order to test the validity of the 'argument' to 'think of ways in which the conclusion could be false while the premises could be true' as there will always be innumerable ways in which this could be so - unless the argument is deductive in form.

The answer presented here is simply to say that there is no such thing as an inductive *argument*, so there is no 'problem' of justifying inductive arguments since they are not *arguments* at all. There is no sense in which so-called inductive arguments give us any reason for believing their conclusions true. This is so even when they happen to lead to truth. There is no form of reasoning weaker than deduction that somehow still mysteriously gives us a reason for what stands as the 'conclusion', whereby the 'conclusion' follows.

This would seem to present us with the unsatisfactory position of saying that most of the arguments we actually use give us no reason at all for what we think they give us reasons for. In fact in a sense this is strictly speaking correct. However, it is not a concern because those weaker-than deductive arguments are in fact usually shorthand for deductive arguments that do give us such reasons: arguments with the required but all-to obvious deductive-making premises filled in.

The solution to the problem of induction is to acknowledge that there is no problem about justifying inductive arguments because there is no such thing as an inductive argument: no inductively arranged set of statements gives any reason for the 'conclusion' being true. They are just that: a heap of statements. The next step is to

acknowledge that in order for there to be a reason for the conclusion being true one has to introduce additional true premises that render the putative argument a deductively valid argument. Further, one has not to be concerned that these required premises are difficult or impossible to know to be true. For all that is required for us to have a reason for the conclusion being true is that the conclusion *does follow* from the premises (the negation of the conclusion forms a contradiction with the premises) and that the premises *are* true. That is to say the argument is deductively sound. If an argument is deductively sound, then we have a reason for believing the conclusion true whether we can know the premises to be true, or indeed can see that the argument is valid. Now it could just be true that the UNP *is* true: there are universal laws of nature. It may also be the case that it *is* true that we have identified some true laws of nature. If these matters are true, and we may thereby transform putative inductive arguments into deductively sound arguments by the addition of the true UNP and a true law of nature, then we just *do* have a reason for the conclusion being true. We should not be side-tracked at this point into quibbling over exactly what premises one might introduce to render a putative inductive argument into a deductively valid one. The point is made as long as some premises can be found to do the job, and that what is wrong with inductive 'arguments' is not justifying the shaky move from 'premises' to 'conclusion' but knowing the truth of *whatever* additional premises are required to render the sequences of statements a deductively valid argument.

It might be said that the question remains as to whether such required premises are true. But our not knowing whether they are true does not undermine in the least our having a reason for the conclusion being true *if they are true* and the argument deductively valid.

(I direct the reader to the discussion in my recent book *Arguing Well* (Routledge, 2000), especially see sections 1.6-1.7 and 3.4-3.15; here I make a distinction between argument in the *objective* sense and *person-directed* sense; the latter presupposes the former; both are however purely logical notions involving no appeal to causality or psychology.)

There is thus no special problem of justifying induction as a rational procedure. The only difficulty is to know whether premises needed to make the procedure rational - in that we have a reason for the conclusion being true - are true. But this means there is no problem of induction - no problem of legitimising some non-deductive move as a rational argument - but just a problem of knowing the truth of premises required to make such a move deductive. Such premises could still be true, regardless of how difficult this problem is, which would mean such moves are rational even if we could never know they are. This might look like replacing one problem with another. But the situation has improved dramatically: from the intractable to the fundamentally unproblematic. Whereas before we had the impossible task of seeing how induction could ever be justified, there is now only the fundamentally unproblematic notion of certain premises being *shown* (or *known*) to be true: but there is no difficulty in our seeing how it is *possible* that they could *be* true whether we can show them to be so or not. The two matters are quite separate: the first is an epistemic problem, what is knowable; the second is a matter of what is the case, what is true. So there is no problem of there being a reason for the conclusions of such arguments being true when such true premises render them deductive. It has never been a problem that a deductive argument does not give a reason for the conclusion being true just because

we do not know, or even cannot know, the truth of the premises: if the argument *is* deductively sound, there *is* a reason for the conclusion being true. There never was a problem justifying putative inductive arguments because they were never arguments in the first place, not even in a weak sense. Thus the 'problem of induction' is solved because induction as an argument never existed and so was never a form of argument that needed justifying.

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