# Falsifiability: what Popper got right

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Computer science has been a wonderfully fertilising influence on modern philosophy. Not only has it brought new ideas to the subject, but it has breathed new life into old ones. A striking example is the way in which Computer Science's concern with evaluation and strategies (lazy, eager and so on) for evaluation has made the intension/extension distinction nowadays almost more familiar to computer scientists than to philosophers. Intensions evaluate to extensions. In the old, early-twentieth century logic, evaluation just happened, and the subject was concerned with that part of metaphysics that was unaffected by how evaluation was carried out. For example, the completeness theorem for propositional logic says that a formula is derivable iff it is true under all valuations: the internal dynamic of valuations is not analysed or even considered. Modern semantics for programming languages has a vast amount to say about the actual dynamics of evaluation *as a process*. The old static semantics gave a broad and fundamental picture, but was unsuited for the correct analysis of certain insights that happened to appear at that time. A good example of an insight whose proper unravelling was hampered by this lack of a dynamic perspective is Popper's idea of falsifiability. Let us examine a natural setting for the intuition that gave rise to it.

Let us suppose that, in order to be confirmed as a widget, an object $x$ has to pass a number of independent tests. If investigator $\mathcal{I}$ wants to test whether a candidate $x$ is a widget or not, $\mathcal{I}$ subjects it to these tests, all of which it has to pass. Which test does $\mathcal{I}$ run first? Obviously the one that is most likely to fail! It will of course be said that this is so that if $x$ passes it the theory $T$ (that $x$ is a widget) is more strongly confirmed than it would have been if it had passed an easy one. Indeed I have heard Popperians say precisely this.

It seems to me that although this is true, it does not go to the heart of the insight vouchsafed to Popper. This traditional account concerns merely the theory that is being confirmed, and not any of $\mathcal{I}$'s other preoccupations. By taking into account a more comprehensive decription of $\mathcal{I}$ we can give a more satisfactory account of this intuition. Specifically it is helpful to regard the execution of the various tests as events that have a cost to $\mathcal{I}$. Suppose candidate $x$ has to pass two tests $T_1$ and $T_2$ to be confirmed as a widget. Suppose also that most candidates fail $T_1$ but most pass $T_2$. What is $\mathcal{I}$ to do? Obviously $\mathcal{I}$ can minimise his expected expenses of investigation by doing $T_1$ *first*. It is of course true that if $x$ is indeed a widget then by the time it has passed both tests, $\mathcal{I}$ will have inevitably have incurred the costs of running both $T_1$ and $T_2$. But a policy of doing $T_1$ first rather than doing $T_2$ first will in the long run save $\mathcal{I}$ resources because of the cases where $x$ is not a widget.

Notice that this point of view has something to say also about the situation dual to the one we have just considered, in which the investigator $\mathcal{I}$ has a number of tests and a candidate $x$ can be shown to be a widget by passing even *one* of them. In this situation the dual analysis tells $\mathcal{I}$ that the best thing to do in order to minimise the expected cost of proving $x$ to be a widget is to try first the test most likely to *succeed*. Although this is logically parallel ("dual") to the situation we have just considered, the traditional Popperian analysis has nothing to say about it at all. This is surely a warning sign.

This is not to say that Popper's insight is not important: it clearly is. The claim is rather that it has not been received properly. Properly understood it is not straightforwardly a piece of metaphysics concerning verification and support, but a superficially more mundane fact about strategies for minimising costs for agents in an uncertain world. That may have metaphysical significance too, but perhaps only to the extent that mathematics is part of metaphysics.

If there is a moral to be drawn, it may be the following. Do we suffer from a persistent tendency to think that certain problems are part of metaphysics when they are not? Peter Godfrey-Smith's recent penetrating analysis of Hempel's puzzle of the ravens is another recent *aperçu* to the effect that a problem hitherto generally regarded as metaphysical might dissolve if seen in another way.

## Bibliography

Peter Godfrey-Smith www-philosophy.stanford.edu/fss/papers/IndoorOr.pdf

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