

Intuition and Reason

There is a tendency in everyday thinking about knowledge - what one might call 'folk epistemology' - to regard reason and intuition as sharply contrasted and even as opposed methods of thought. The extent to which this tendency is reflected historically in excessively dualist philosophical conceptions of reason will not be explored in this discussion¹. I shall argue that, far from standing in a relation of opposition to reason, intuition plays an essential role within human reasoning broadly construed. This view has two implications: firstly, that *intuition* is not well understood if it is sharply contrasted with reason; and, secondly, that a conception of *reason* which is sharply contrasted with intuition is an unduly technical or 'thin' conception. If these points are sound, we ought to jettison any idea that reason and intuition are opposed, or even wholly discrete 'ways of knowing', and recognize instead their essential co-operation. On the proposed view there continue, of course, to be legitimate uses for a thin or technical conception of reason, to characterise routine logical operations, for example; the point is simply that it is a mistake to take such a technical conception as a general model of reason *per se*. Recognition of the role of intuition in cognition makes way, it is suggested, for a fuller understanding of the character of human reasoning, achieving what we might call a 'rich' conception of reason.

I will draw on Thomas Kuhn's conception of scientific intuition as he presents it in *The Structure of Scientific Revolutions* (Kuhn 1970). Kuhn's conception of intuition features it right at the heart of rational inquiry, as he argues that intuition is the catalyst for theoretical changes in science.

The Catalyst for Scientific Revolutions

In Kuhn's view it is intuition, and not what he calls *rational* deliberation (i.e., on his view, the application of pre-established criteria or rules - rationality in our 'thin' sense) which permits the scientist to envision an alternative paradigm and initiate a scientific revolution or 'paradigm' change. According to Kuhn's characterization, 'normal science' is inherently conservative in its immediate aim. It endeavours not to test or challenge so much as to confirm or 'articulate' the current paradigm. It seeks no counter-instances, but tries to fill in the detail of a paradigm by finding evidence *for* it. Fortunately, however, normal science also has an inherent rebellious streak whereby, after a certain period, it inevitably diverges from its pre-set path, bringing about a state of crisis for the incumbent paradigm. This, according to Kuhn, happens for two reasons. Firstly, because it is only in the context of a well established paradigm that scientists can do the kind of esoteric and detailed research which gives rise to the recognition of (ever-present) anomalies, and therefore to dissatisfaction with the incumbent paradigm and eventually to revolution. And secondly, because 'The more precise and far-reaching... [the] paradigm is, the more sensitive an indicator it provides of anomaly and hence of an occasion for paradigm

¹See Lloyd (1984) for an example of a distinctively feminist historical view of the dualist approach. The feminist perspective has special relevance here, as there persists a cultural tendency to think of intuition as a typically female style of thought, hence the dubious notion 'female intuition'.

change' (1970 p.65). These circumstances are conducive to paradigm change, but the change itself must be catalysed by an intuition. Kuhn claims that such revolutionary intuitions are usually triggered in the mind of the scientist by some personal quirk or chance event, but this arbitrariness does not necessarily infect the characterization of intuition itself. That the genesis of intuitions is subject to chance does not entail that matters of justification are also subject to chance.

I am using, then, a primarily methodological reading of Kuhn's remarks about intuition, which would seem to reflect his intentions, for he affirms in the Postscript that he should not be interpreted as 'trying to make science rest on unanalyzable individual intuitions rather than on logic and law' (1970 p.191). The conception of intuition gradually emerging presents it as a *mode of hypothesis formation*; we speak derivatively of the hypotheses themselves as 'intuitions'. This mode involves the ability to see a new problem as being *like* an old one, the ability to 'follow one's nose', to 'act on a hunch', to 'smell a rat', to 'feel it in one's bones'... Language is rich in expressions for this cognitive mode, and yet it is too easily neglected in our conceptions of reason. The definitive feature of intuition in Kuhn's account, however, is that it depends crucially upon *experience*. Scientists are able to have intuitions about how to solve new scientific puzzles in virtue of a stockpile of lessons learned from past experience. These lessons do not take the form of consciously held beliefs, but rather they amount to a *capacity* for increasingly educated hunches regarding a particular subject matter. This capacity is so internalized that the process by which we generate the hypothesis is usually subconscious, with the result that the subject will not know quite by what train of thought it was reached. (This is not to say that intuitive processes are irretrievably subconscious, since there is no reason to think it impossible retrospectively to retrace subjective associations or triggers for ideas.)

We must be clear that in describing the workings of intuition as typically subconscious it is not being suggested that the intuitive mode of thought is just thinly rational thought *executed subconsciously*. That view would be no more compelling (or, rather we should say, no more obligatory, for some people do hold the view in question) than saying that when a tennis player hits the ball she must be subconsciously *making calculations* about where to move and when to hit the ball, using split-second estimates of its velocity, weight, shape etc. This is surely unconvincing. But the advocate of such a view may insist that analysing intuition as subconscious inference nonetheless represents an attractive option. First, it is obviously conducive to the present aim of showing intuition to be a rational cognitive process; and, second, it succeeds in explaining our capacity to draw subconsciously upon past experience -or so the advocate claims - without needing to posit any new kind of cognitive process.

In response to this we can clarify that it is in any case a feature of our account that intuitions are 'drawn' from experience, in the sense that the relation between a set of past experiences and any resultant intuition is an evidential relation. But this by no means shows that inference of any kind is involved. The notion of subconscious inference - which would itself demand some explanation - could not do the job of intuition, because the notion of intuition is posited primarily (though not exclusively) to explain intellectual moves in circumstances where there simply is no inferential path available. When explaining retrospectively how a subject arrived at a given hypothesis, any ascription of inference to that subject carries the necessary condition that the

For a distinctive approach to this feature of intuitive thought, see Michael Polanyi's 'The Tacit Dimension' (Polanyi 1966).

evidence available to her (consciously or subconsciously) was sufficient to license some series of inferences entailing the hypothesis. Yet in the sorts of intellectual moves I am suggesting we attribute to intuition, there is very often no such licence. That there should have existed such an inferential path, then, is clearly a necessary condition for correct ascriptions of subconscious inference; but it is not a sufficient condition. Even in cases where there *was* an inferential path available to the subject, it does not follow that she in fact used it to reach her conclusion (consciously or subconsciously) - she may have intuited the conclusion regardless. In specific cases of this kind the competition between subconscious inference and intuition as rival accounts may be undecidable in practice, though in any given case there will presumably be a psychological fact of the matter as to which process actually occurred.

Intuitions, then, cannot be explained away by pointing to subconscious inference, for the simple reason that intuitions tend to be under-determined by the evidence. But to avoid ambiguity we should distinguish 'common' from 'philosophical' under-determination. I am not here invoking philosophical under-determination: *the* under-determination thesis, which states that theory is under-determined by data. That thesis is supposed to be universally applicable, so that even in the cases where a theory seems 'to us' to be wholly determined by the evidence so that no other possible theory would do, this is so merely from the perspective of the practitioner - a perspective which is to be contrasted with that of the philosopher. Rather, my purpose is to invoke common under-determination: to remain within the perspective of the practitioner, and to appeal to the perfectly ordinary contrast between cases in which a given hypothesis is (by our lights) fully determined by the evidence, and cases where (by our lights) it is not. The notion of intuition is posited to explain a particular kind of intellectual step taken in cases of common under-determination, regardless of whether philosophical under-determination holds or not. In such cases the subject takes not so much a step as a leap from what we would commonly consider an inadequate evidence base to some more or less extravagant conclusion, as in Kuhn's examples of scientists who envision a possible new theory as yet unsubstantiated by normal science.

The proposed conception of intuition grows out of Kuhn's in both senses. I have taken certain elements of his account for granted, and they form the core conception (i.e. the contrast between intuition and 'rational' processes defined as adherence to pre-set criteria; and the idea that intuitive capacities issue from past experience). But the emerging account is distinctive, and its application is far wider than that which Kuhn envisaged. Intuition has emerged as a non-inferential, typically subconscious mode of hypothesis formation. It constitutes a sub-personal level of cognitive operation that is crucial to rational inquiry, since it is primarily the intuitive mode which enables us to solve new problems in the light of old - a skill which is necessary in most, if not all, kinds of inquiry. As Kuhn points out, it is intuition which enables us to recognize a new question as being *like* one we have encountered in the past, and this is so even though we cannot pinpoint the respect in which they are alike, or say why or how we recognize the likeness. But given this characterization we might wonder why Kuhn saves intuition for the grand task of precipitating scientific revolutions. If our conception is right, then intuition must be constantly involved in normal science too, in problem solving activities of the most mundane and practical kinds. Consequently, the exclusively revolutionary office which Kuhn assigns it seems both too grand and too restrictive.

By contrast, Michael Polanyi - cited by Kuhn as the source for his model of intuition - takes the view that intuition is involved in *all* knowledge (Polanyi 1966). But if that means there is nothing which could not be known intuitively, then it seems excessive in the opposite direction.

There are surely some facts which could not be known intuitively just for the reason that there is no possible human experience which could have any evidential bearing on the matter. For example, the proposition that a certain substance has a melting point of 10.3_C. There is no set of experiences which could nurture specifically the intuition that the melting point is 10.3_ rather than, say, 10.2_ or 10.4_, and so we may conclude that this sort of fact can not be known *directly* by way of intuition. This, however, does not mean that there is some class of propositions whose very nature - and, in particular, whose relation to experience - makes it thoroughly immune to the intuitive mode, for it might be knowable *indirectly*, via intuition. For example, one might have a correct intuition that a certain theory were right or a certain state of affairs obtained, where that theory or state of affairs entailed that the melting point of the substance in question was precisely 10.3_C. Intuition, then, can work indirectly as well as directly, and there would always be some story we could tell about any given fact to explain how it could be known indirectly by way of intuition. In this highly qualified sense we might concede that intuition is, or can be, involved in all kinds of knowledge, though let us emphasize that the indirect route does not produce genuine intuitions, for the hypotheses it produces are in fact arrived at by way of inference from something which just happens to be known intuitively. We could never actually have an intuition with the content 'the melting point of the substance is 10.3_C', even if that proposition were entailed by something we came to intuitively.

Bearing this sort of exception in mind, I nonetheless hope that the general point is sufficiently made that rational inquiry, both theoretical and practical, relies heavily upon the intuitive mode. Viewed in this light our standard conception of reason, in its negligence of intuition, looks excessively rationalistic, excessively 'thin'.

The Rich Conception: reforming a dualism

A basic model of cognition strikingly analogous to Kuhn's account of the role of intuition in scientific progress is found in Daniel Dennett's 'Why the Law of Effect Will Not Go Away' (Dennett 1979). The details of his argument are not relevant here, but what is highly relevant is that it centres on a certain strategy in AI programming, 'generate-and-test':

'The problem solver (or inventor) is broken down at some point or points into a generator and a tester. The generator throws up candidates for solutions or elements of solutions to the problems, and the tester accepts or rejects them on the basis of stored criteria' (1979 p.81).

In the interpretation of Kuhn's remarks about intuition I employed a distinction between the genesis and the justification of hypotheses. This enabled us to see intuition as a necessary part of scientific method, without this having any direct effect on how we should think about processes of justification. Dennett's generate-and-test schema is thus of interest here, for it neatly maps on to what we might call the 'intuit-and-justify' schema which I extracted from Kuhn's account of scientific progress. In virtue of this mapping the generate-and-test model supports our case, for it illustrates in the broader context of the philosophy of mind, rather than in scientific reasoning only, the necessary partnership of two distinct elements, one generative (intuition) and one selective (thin reason), within a unified process of cognition. Earlier in this discussion, the urge to think that intuition could be explained away by reduction to subconscious inference was resisted - an urge which seems compelling if one is in the grip of the excessively rationalistic conception of reason presently under attack. Generate-and-test suggests a picture of the mind which does not encourage that rationalistic conception; it encourages instead the proposed 'rich'

conception of reason.

However, generate-and-test, as we have so far described it, is over-simplified for our purposes. It is flawed as an account of the relation between intuition and thin reason because it fails to represent two distinct ways in which intuition plays a role of 'tester', and it fails to do justice to the 'generative' power of thin reason. As a result the model effectively reasserts an overly dualistic and somewhat caricatured account. Although it depicts intuition as *internal* to reason - a substantial improvement on any dualist characterisation - the essence of the dualist account is in effect reintroduced by featuring intuition as doing *all* the generating and thin rationality as doing *all* the testing. This, I would suggest, leads to misapprehensions about the nature of intuition and its role in thought.

The first problem, then, is that it caricatures intuition as a *random* intellectual sparking mechanism with no internal selective capacity of its own. All selective procedures are thought to be imposed by the 'test' component, of which the analogue here is thin reason. But this cannot be right. If intuition, as the 'generate' component, merely threw up new hypotheses randomly over an unrestricted field, then it could not possibly be of any use. Rather, our generative component must be random within a certain selected range of relevant possibilities, i.e. it must have some internal selective capacity of its own.

The second way in which the generate-and-test model, as it stands, fails to take account of the corrective role that intuition sometimes plays is familiar from ordinary philosophical method. In philosophy it is usual to change one's intuitions in the light of thinly rational efforts to make them consistent and systematic. A remark made by Robert Nozick indicates one example of a philosopher's theory changing his intuitions in this way. In the preface to *Anarchy, State, and Utopia* he writes, almost apologetically, '*With reluctance, I found myself becoming convinced of (as they are now often called) libertarian views, due to various considerations and arguments*' (p.ix; italics added). However, it is perhaps still more common that intuition should function as a normative standard with reference to which we may moderate the eccentricities of thinly rational deliberation. In philosophy, thin rational argument (the application of pre-set criteria of some kind, to continue with Kuhn's characterization) may lead to conclusions which we find intuitively unacceptable, and when this happens it is frequently taken as a sign that there is something wrong with the theory. Crude utilitarian principle, for example, unchecked by moral intuition, can lead to notoriously wayward conclusions. Hence the need for intuition to function as a 'test' or corrective on such occasions, and perhaps to bring about refinements in the relevant principles. Here I permit myself to draw specifically upon moral intuition in order to make points about intuition in general, because, although moral intuition may have a distinctive character of its own, it nonetheless fits our general model if, in an Aristotelian frame of mind, we come to see it as the internalization of lessons learned from the past experiences that are brought by an appropriate moral 'upbringing'.

The third problem relates to the characterization of thin reason as a 'tester' and nothing but a tester. This may be its primary role, but I would suggest that thin reason can also function as a 'generator' of sorts, not only in the negative sense just mentioned that it is commonly susceptible to correction by intuition, but also in the positive sense that it can lead to unexpected and illuminating insights. Thin rationality may never quite take the form of a flash of inspiration, but

See McDowell (1978), or Burnyeat (1980).

it can certainly transport one, step by step, to unforeseen destinations. Startling conclusions may be reached merely by following through the logical implications of a given philosophical principle, for example. Or, as A.J. Ayer has pointed out, the working out of a priori truths - mere tautologies, on his view - can genuinely illuminate our thinking, if only for the reason that we are not logically omniscient (Ayer 1938 pp.116-8).

In response to these three caveats concerning the corrective power of intuition and the innovative potential of thin reason, we should think of the two not as playing fixed roles of 'generator' and 'tester', but rather as playing inter-changeable roles. As regards methodology, there is no algorithm to decide for us when we should give intuition priority over thin rationality or vice versa. We just have to find a 'reflective equilibrium' between the two (Rawls 1972). We might picture intuition and thin rationality as weighing down either side of a pair of scales where each acts as a responsive counter-balance to the other. There is no guarantee, of course, that human subjects will always succeed in maintaining such an equilibrium of judgement, but in as far as they do we might see this, also in an Aristotelian vein, as a kind of *epistemic* maturity, itself an intuitive capacity produced by the range of experiences that is afforded by an appropriate epistemic training or 'upbringing'.

Finally, we must ask whether generate-and-test can be adequately refined to take account of the above three caveats. The prognosis is good, for Dennett specifically discusses the non-arbitrariness required of the 'generate' component of generate-and-test when he notes that the generative mechanism in a computer, if it is to be more likely to throw up good ideas than bad, cannot be simply arbitrary. Rather, the desired novelty of newly generated hypotheses not only relies on there being a 'fortuitous' (in the sense of non-pre-programmed) element but also an element of 'appropriateness' (hence his use of the word 'fortuitous' rather than 'random'). Dennett's comments here may partially reassure us, since they do illustrate how the generate-and-test model can reflect the fact that intuition, in virtue of its evidential relation to experience, is a non-arbitrary source of innovative hypotheses. This satisfies the first of our three concerns (that intuition is falsely depicted as random), and thereby explains the second (that intuition sometimes serves as a 'tester') by reminding us that its rootedness in experience ensures that intuition merits its part-time corrective role. However, these points still fail to honour the thought that intuition and thin reason sometimes swap roles altogether, revealing their inter-regulative relation.

It would seem, therefore, that generate-and-test remains an imperfect model for the relation between intuition and thin reason. But perhaps the discussion has nonetheless furthered our understanding of how profoundly the two are inter-related. Their apparently exclusive and fixed roles in reasoning turn out to be inter-changeable, since each can in different ways function as a corrective to the other, just as each can in different ways function as an inspiration to the other. However, despite this close inter-relation we may still support the view that the primary roles of intuition and thin reason are as a generator and a tester respectively, where this generalization is now qualified by the acknowledgements: firstly, that such innovation consists not in the generator sparking at random, but rather sparking 'fortuitously'; secondly, that thin reason is not our only means of testing new ideas; and, thirdly, that intuition does not have a monopoly on innovation. Once we understand the co-operative inter-relation between intuition and thin reason, we can appreciate how generate-and-test still provides the rule of thumb for the internal

structure of reason in our `rich' sense.

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