Intelligence and the logic of the nature-nurture issue

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A revised version of this paper was published in *Proceedings of the Philosophy of Education Society of Great Britain* Vol VIII No 1 (1974)

Please consult the revised version if you wish to cite this paper.

I suppose the first step in discussing the logic of the nature-nurture issue is to define what the issue is; and this is not a simple task. And perhaps, we shouldn't take it as read from the beginning that there is *one* thing at issue here. Perhaps there are several issues. Or perhaps there are none. On the side of 'nature' it does indeed seem that there are at least *two* different claims, not necessarily incompatible: (i) that intelligence is innate ability (Burt's view), (ii) that individual differences in intelligence are largely determined by genetic factors: the 'mainstream' view, held by for example Jensen, Eysenck, Butcher and Burt (again). What is at issue, then? Is it whether intelligence is, or is not, innate ability? Or whether innate determinants of individual differences in intelligence out-weigh environmental ones? Would someone arguing for 'nurture' be claiming that these differences are largely environmentally produced? Or would he object to this whole attempt at quantification?

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All this is very unclear. To help sort things out, let me begin with a necessarily brief, but I hope not too dogmatic, account of the concept of intelligence. One popular view, deriving from Ryle's *Concept of Mind,* is that 'intelligence' is a 'disposition-word' and that statements containing

disposition-words are analysable into hypothetical statements about behaviour. Thus T. R. Miles writes, ‘ "X is intelligent" can be taken as equivalent to "If X is placed in particular circumstances he produces responses of a particular kind" e.g., if he is present at a group discussion he makes appropriate remarks, if presented with a difficult crossword puzzle he can usually solve it, and so on’ [1]. A feature of Miles' 'if-then' analysis of intelligence, which distinguishes it from those of Mark Fisher and of Ryle himself, is his apparent commitment to the *general* nature of intelligence [2]. Where Ryle talks of the intelligence of the sharpshooter and Fisher that of the golfer, Miles' intelligent man must display his intelligence in widely different activities. Before taking up this issue of whether intelligence is general or specific, let me mention an important problem for Miles' and for all 'if-then' analyses of the concept. This is: how are we to understand the 'and so on' at the end of Miles' statement? No doubt a long list of further examples could be given. But it would be necessarily incomplete. It seems that what must hold this list together is that all its items are applications of the general formula 'if he were in circumstances Y, he would act *intelligently'.* The circularity is manifest. It is clear that the concept of an intelligent person must be understood in terms of the concept of an intelligent act. This conclusion also raises problems for the notion of 'general' intelligence. If one can act intelligently in any particular situation, e.g. in playing chess, then one does not have to bring in any reference to a *number* of types of situations—group discussions, solving crosswords etc.—into one's account of an intelligent act. One might, always, of course, decide to write all-round ability into one's concept of the 'intelligent' man; but this would be to introduce a *different* concept.

I mentioned above that the 'and so on' constitutes a problem not only for Miles' but for all 'if-then' analyses. It does so, for instance, for Ryle's analysis, if indeed it is of an 'if-then' sort. For Ryle being intelligent is activity-specific. Let us examine, for instance, Ryle's example of the soldier exercising his intelligence in scoring a bull's eye: 'Was it luck or was it skill? If he has the skill, then he can get on or near the bull's eye again, even if the wind strengthens, the range alters and the target moves' [3]. In terms of the 'if-then' scheme, 'X is shooting intelligently' is equivalent to 'If the wind strengthens, then X tends to do A if the range alters, X tends to do B if the target moves,

and so on'. The 'and so on' is still troublesome, as it was with Miles, but Ryle's account contains a further difficulty. For the above equivalence could be satisfied by a person who had been taught a variety of routines, to be applied in different situations in a quite mechanical way, one situation triggering off one response, another another. He could, moreover, learn response A to an increase in wind-strength in such a way that he never considered it as connected with response B to an alteration in range, and so on. Each item of routine behaviour could exist in isolation from the others.

Such a man would not be an intelligent marksman, but a person who had simply learned a number of routines. If he were acting intelligently, what he did in one situation would have to be *connected* with what he did in another.

What is lacking in Ryle is a principle of unity, something to hold together the different bits of behaviour manifested in different situations. (In many ways his theory of intelligence is not unlike Hume's theory of the self.) The man who argues intelligently is not *merely* 'ready to recast his expression of obscurely put points, on guard against ambiguities . . ., taking care not to rely on easily refutable inferences, alert in meeting objections' etc.[4] Again, he could do these things in isolation; in arguing intelligently each of these forms of behaviour must be related to a common endeavour—to the pursuit of truth, for instance. And one cannot give any account of this relation without talking about how the agent *understands* what he is doing, about how he sees the different situations he is in and his responses to them. What connects the different moves which Ryle's intelligent arguer makes is that he *sees* them all as related to his central concern. We may redescribe them as follows: he must *see* his obscurely expressed points *as* obscurely expressed (and so hindering the pursuit of truth); *see* ambiguities (which also hinder this); *see* easily refutable inferences *as* easily refutable (and so not advancing the pursuit of truth) etc. Briefly, he has to see various things as falling or not falling in the class of things promoting the pursuit of truth. Not only this: the things which he sees as belonging to this class must in fact belong to it. It would not be a mark of intelligence, for instance, to see a *clearly* expressed point as obscurely expressed.

By analysing intelligence in terms of tendencies to behave in certain ways, Ryle omits the very feature in virtue of which we call such behaviour 'intelligent': the agent's 'inner' view of what he is doing. Putting together now the two difficulties in the 'if-then' analysis which we have singled out, we see that (i) the concept of an intelligent person is to be understood in terms of the concept of an intelligent act, and (ii) the concept of an intelligent act is to be understood in terms of the concept of seeing one thing as connected with another. This conclusion implies that a behaviouristic account of intelligence must fail: reference must be made to the awareness implicit in this seeing-as.

Now there are problems in ascribing the view I have been attaching to Ryle. Although he seeks to analyse intelligence in terms of overt behaviour rather than private phenomena, it is not clear which kinds of private phenomena he has in mind. Does he mean *any* private phenomena? If so, this would appear to include the form of awareness just mentioned. Or does he mean only 'intellectual' phenomena, i.e. acts of theorising or deliberation? It is evident that he means *at least* these; and to this extent his objections to the 'official doctrine' of intelligence are well made: intelligence is not analysable in terms of deliberation. But this does not imply that it is not analysable in terms of other private phenomena, e.g. seeing connexions. It is not clear how far Ryle would allow the latter claim. He says of his intelligent arguer that 'underlying all the other features of (his) operations there is the cardinal feature that he reasons logically, that is, that he avoids fallacies and produces valid proofs and inferences, pertinent to the case he is making' (p. 48). He goes on, 'What is true of arguing intelligently is, with appropriate modifications, true of other intelligent operations. The boxer, the surgeon, the poet and the salesman apply their special criteria in the performance of their special tasks, for they are trying to get things right' (p. 48). Both these passages seem to imply that an intelligent operation is one where the agent has a certain end in view and follows certain rules conducive to that end. Whatever he does, then, he must *see* as conducive to this.

I will leave the difficulties of interpreting Ryle's theory at this point. But the remarks just made about intelligent operations raise another problem. How far are intelligent operations goal-directed? Peters

claims a necessary connexion between 'intelligence' and 'goal-directedness' on the grounds that the 'adaptiveness or relevant variation (of goal-directed movements) in relation to change (perceived changes in the goal and in conditions that lead to it) is part of what we mean by "intelligence" ' [5]. But I am not at all sure that intelligent operations necessarily involve either goal-directedness or variations in behaviour. One may find these in *some* eases, in those of intelligent squash-playing or intelligent generalship, for instance. But they are either or both absent in other cases. Pavlov's dog, on one interpretation of what was happening to him, may be said to have exhibited intelligence in hearing a bell as a sign of food; but he did not vary his behaviour in relation to a goal because he did not engage in any behaviour at all [6]. Neither therefore, is there any question of means-end behaviour. Though the sound of the bell was certainly *connected* with the dog's end of satisfying his hunger, it was in no way a means of achieving this end.

A second counter example: a man who has recently made an amateur film about Edward Jenner, the discoverer of vaccination, is reading the nursery rhyme 'Where are you going to, my pretty maid?' to his little granddaughter, and comes across the line, ' "My face is my fortune, Sir", she said'. He connects this with the fact that in the old days milkmaids were known to be immune to smallpox. This is an intelligent thing to do; hut once again, although the connexion he makes is itself no doubt connected with his interests, his intelligent act has nothing to do with adapting means to ends. Both examples, in fact, show that the route to understanding the nature of intelligence does not lie through the notion of means-end behaviour. Judgements, whether perceptual, as in the first case, or non-perceptual, as in the second, can equally he described as intelligent. What picks these and all other phenomena out as intelligent is that they all involve some kind of seeing of connexions, that is, application of concepts. Not *merely* this, to be sure; in seeing connexions which do not exist and in applying concepts incorrectly, one is not performing intelligently. Intelligence is *correct* concept-application,

I have just equated concept-application with the seeing of connexions; and I must now say something to elucidate and justify this equation. One might be tempted to say, 'I can see that in *some* cases seeing connexions can be

redescribed as applying concepts. The intelligent arguer, for instance, sees the exposure of an ambiguity as connected with the promotion of truth. Alternatively one may say that he sees this as falling under the concept of a means to this end. If I say, for instance, 'What dreadful weather!' I use the words 'dreadful weather' to connect an instance of poor weather with other instances of the same thing. Similar connecting is involved in all use of concepts. But not all seeing connexions is redescribable as concept-application. Pavlov's dog may have connected the sound of a bell with food, but, bring language-less, he had no 'concepts to apply'. In reply to this point, I should make it clear that as I am using 'concept' I am not restricting concept-possession to language-users. Insofar as animals can he said to perceive something as something (e.g. the sound of a bell as a sign of food), they can be said to perceive different particulars as members of a class (e,g. differcnt particular sounds as all signs of food). I am using 'concept-possession' to include such primitive classificatory abilities. Pavlov's dog shows his intelligence in applying the concept 'sign of food' to the sound of the bell. A caveat is needed here. The dog has not 'applied' a concept in any active sense of the term. That is, he has not *used* a concept in the way in which I have just now used the concept of a caveat. The dog's conceptual abilities are, in Price's words, 'tied', not 'autonomous'. They are activated by the presence of instances: lacking a language, the dog cannot use concepts in the absence of their instances.

A further objection is likely to be made at this point. Seeing connexions may involve concept-application and vice versa. It may be true that to act intelligently one must correctly sec connexions (or apply concepts). But surely this is at most a *necessary* condition of intelligence. A person who uses a public telephone for the first time may well see a connexion between the operations he performs and his end of communicating with someone. But it is hardly something of which one would ever say, 'How intelligent of him'' This is because we usually only call behaviour 'intelligent' if it in some way transcends normal expectations, e.g. if a person applies his understanding in judgements which are abnormally quick or abnormally sophisticated. This objection has focussed on the kinds of occasions when we use the word 'intelligent'. But it is not clear how much light observations of this sort throw on the *meaning of* a concept. To take another example. We talk about people's *motives* when there is, or may be,

something untoward about what they are doing: we ask for the motives of a criminal, but not of a man going into a restaurant. But the fact that we would never *talk* about people's motives for the quite ordinary and readily intelligible things they do does not imply that they do not *have* motives for these things. The man's motive in going into the restaurant is his desire to satisfy his hunger. The very obviousness of the motive explains why we have no need to mention it.

We must beware of the same fallacy (which Searle calls 'the assertion fallacy' [7]) in analysing the meaning of 'intelligence' in terms of 'transcending normal expectations'. Putting a coin in a slot in a call-box never is *called* 'intelligent', but this does not imply that it is not intelligent. Once again, it is the very *obviousness* of its being an intelligent thing to do which makes it not worth saying that it is. Intelligent performances, like actions from motives, are such omnipresent features of our lives that it is scarcely surprising that we do not often trouble to call them what they are.

This last point also helps to resolve another difficulty. For Ryle, routine or 'single-track' behaviour, like ordering arms, posting a letter or opening a door with a key is not the kind of thing that can be done intelligently. For MacIntyre in *one* sense of the word 'intelligent' action is the successful carrying out of routines. (He also identifies two further senses: the details do not concern us here [8]). On this I would agree with MacIntyre that routine behaviour can be intelligent, but disagree that there is any other sense of 'intelligent' used here than that applicable to the intelligent arguer, for instance. In both 'single-track' and 'multi-track' cases, the agent's behaviour is concept-guided; in both, he sees some connexion between what he is doing and certain ends. There are, after all, intelligent and unintelligent ways of putting a key in a lock; one has for instance, to hold the key horizontally and the right way up and not try to jam the rounded end into the hole.The intelligent way involves seeing the connexion between the position of the key and the successful completion of the task.

This brings me back to an earlier issue. Many writers have argued that written into the concept of intelligence is the concept of flexibility (or variability, adaptability). More specifically, they have argued for a

conceptual connexion between intelligence and flexible *behaviour.* I do not accept the more specific claim, for reasons already mentioned. But the more general claim is acceptable enough. This is, again, because of the connexion between intelligence and concept-possession. To possess a concept is, among other things, to be able to see its different instances as instances of the same thing. Flexibility is a feature of concept-possession to the extent that the conceptualiser is prepared to apply his concept not rigidly, just to one particular object, for example, but to object after object of the same type. Now the *disparateness* of the instances falling under a concept can vary from concept to concept. Some concepts have very disparate instances (e.g. game, table, blue); others have very similar, or even identical ones (e.g. ultramarine). None, however, is less of a concept for lacking disparateness; its possession still brings with it the flexibility mentioned above. The application of these points to the discussion of intelligence and routine behaviour should be clear. In putting a key in a lock one has to see the key's being in a certain position as conducive to one's end. Understanding this rule enables one to apply it again and again, whenever one puts a key in a lock, even though the situations to which one applies it are virtually identical. In intelligent arguing, however, there are many different *kinds* of things, as we have seen, which can be seen as conducive or not conducive to one's ends. The latter concept is in this case more disparate. Both kinds of behaviour may be intelligent, since both contain the flexibility of the kind described. To insist that disparateness as well as flexibility be written into the concept is to conflate a particular *kind* of intelligent performance with intelligent performance in general—a conflation often due to committing the 'assertion fallacy' mentioned above.

One might object here that I have overlooked an important reason why some would wish to challenge the intelligence of routine actions. It is not primarily their 'single-tracked' nature which is relevant, but the fact that because they are single-tracked, they can be performed automatically, as a matter of habit. Accepting the account of intelligence given so far, one might admit that the *first* time one puts a key in a lock one may be doing this intelligently, in that one makes a judgement that its being in a certain position is connected with one's goal. But the more the action becomes habitual, the less it can be described as intelligent, since one comes to perform it without making

such judgements. The expression 'seeing connexions', in other words, must be interpreted in an occurrent sense:

to act intelligently it is not enough to see (i.e. understand) connexions; one must be *aware* of the connexions, here and now.

I would agree that we must interpret 'see' in an occurrent sense if we are talking about intelligent performances. But I am not convinced that successful behaviour of an 'automatic' sort ever excludes seeing connexions in this sense. *Some* connexions can get taken for granted. The key-turner, for instance, does not constantly keep on seeing the connexion between the key's position and successful turning. But he must at least constantly keep on perceiving the key, each time he uses it, as being (now) in the right position for insertion in the lock. 'Automatic' activity is never automatic in the sense that it is performed without any such present awareness.

The great diversity of definitions of 'intelligence', among both psychologists and philosophers, is well-known, or, as some would say, notorious. To many it seems as if there are as many definitions as there are writers on the subject— that the concept is hopelessly confused and intractable. But the account given above may show that the position is not so desperate. It is true that some would and others would not ascribe intelligence to animals, to routine behaviour, to behaviour that does not transcend normal expectations. Some would define it in terms of dispositions to behave, others in terms of seeing connexions. Some would confine it to means-end behaviour; others would extend it to cover acts of judgement unrelated to occurrent ends. To some extent the differences of opinion so far stem from different mistaken presuppositions about the nature of meaning, e.g. (i) the apparent conflation of an analysis of the *sense* of 'intelligent' with a discussion of the *criteria* for its applicability, found in accounts by Ryle and those influenced by him, and (ii) the conflation of meaning and use (usage) found in the view which stresses the transcendence of normal expectations. Apart from this, there is a common thread running through all these very different accounts, a thread which also runs through several *further* accounts of intelligence which will be discussed later in this paper, when I look at some of the psychological work in this field. The common thread is successful concept-application or the seeing of connexions. Some

accounts concentrate on the seeing of certain *kinds* of connexions (e.g. between means and ends); others concentrate on certain aspects of the use of concepts (e.g. flexibility, or the speed with which connexions are made); some disputes turn on different notions of what it is to have a concept (e.g. disputes over animal intelligence). All these last points are illustrated in several further differences of opinion. Some see intelligence as very much an intellectual matter: one finds this in Plato, in the Cartesian tradition which Ryle attacks, and in many of the tests constructed by intelligence testers. Opponents stress the non-intellectual intelligence shown in the performance of physical skills, like playing tennis, for instance. This disagreement may well turn on differences of view about the nature of concepts and their possession. Following the very broad account of concept-possession I outlined earlier, where this is not necessarily connected with the use of language, the tennis player may be said to be applying concepts in the various kinds of sign-cognition which play so large a part in his game. (As Price points out, sign-cognition is not something confined to animal behaviour, but plays an important part in some of the most sophisticated of human activities. [9]) On this view, to have concepts it is enough to be able to see *x* as *f*, e.g. to see the peculiar flight of a tennis-ball as a sign that it will bounce in such and such a way. If, however, one insists that such a recognitional ability is not sufficient for concept-possession, but that one must also understand the connexions between concepts, then one may be inclined to restrict the application of 'intelligence' to more intellectual matters, to the solution of the kind of mathematical and logical problems one finds in intelligence tests, for instance. A still further restriction results from the Platonic insistence that the kind of 'understanding of conceptual connexions' required for concept possession transcends that of the problem-solver and must be that of the *philosopher:* here nothing short of a 'higher-order' awareness of conceptual relationships will do.

I have said nothing to far about the contrast made between intelligence and stupidity. A stupid action is one where the agent fails in some way to apply relevant concepts. But stupidity is not the only contrast. When we say (rightly or wrongly) that dogs and monkeys are intelligent animals but ants and amoebae are not, we are surely not saying that ants and amoebae are *stupid creatures.* To say the latter would imply that they possess concepts but fail to apply them.

But ants, like rocks, are not-intelligent in the more basic sense that they are not the kinds of entities who can possess concepts in the first place. Their 'behaviour' is explicable not in terms of concept-possession, but in terms of mechanical processes.

It is clear, then, that we have here two different, though related, concepts of intelligence. (1) An intelligent creature is one who lacks the capacity to form concepts. (2) An intelligent act is one where the agent applies concepts successfully. Indeed, a *third* distinction suggests itself. For between (1) and (2) lies concept-possession. A person (or animal) may acquire certain concepts; and whether he goes on to apply them successfully or unsuccessfully is a further question. He may possess chess-playing concepts, regardless of whether he plays chess on any particular occasion. Concept-possession as a third sense is perhaps close to Ryle's identification of 'being intelligent with 'knowing how to do something'. It is also the sense on which educators and psychologists rely when talking of children 'acquiring intelligence' or of the 'growth (development) of intelligence' in the child. When, too, one is urged to 'use one's intelligence' it is one's conceptual equipment that is meant by the term.

We have, then, *three* concepts of intelligence, a distinction we owe originally, and in a somewhat different form to Aristotle.[10] Beginning with the clearly biological one, we have (i) intelligence as the capacity to *form* concepts (this is innate in some animals but not in others) and (ii) intelligence as the capacity to operate with concepts. This is (as a matter of fact) an *acquired* capacity. And since different activities—like playing chess or fishing or studying philosophy—bring their own conceptual equipment with them, intelligence must be specified according to the activity: one can acquire intelligence in sharpshooting, but lack it in trigonometry (perhaps because one has never learnt this). Finally there is (iii) intelligence as the actualization, i.e. the correct application, of conceptual capacities mentioned under (ii).

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How far do these distinctions help us in sorting out the 'nature-nurture' problem? It looks as if there may be a pretty simple solution

to it. Is intelligence an innate capacity? Well, doesn't it depend on which concept one takes? Intelligence as the capacity to form concepts— the first sense—is clearly innate; intelligence in the other two senses is acquired. I am doubtful how far Hebb, in his well-known distinction between 'Intelligence A' and
'Intelligence B', is right in making the former innate by definition.[11] I see no reason in principle why a substance could not be injected into ants, say, to give them the power to form concepts. They would then have this capacity, but not innately. But *as a matter of fact,* if not of logic, intelligence in one sense is innate and in another sense acquired.

It would be gratifying to think one could solve the 'nature-nurture' issue as quickly as this. But it would be odd if one could. For it would be surprising in the extreme if this long-standing controversy which has generated so much heat and so many millions of learned words, turned on no more than a simple ambiguity in the word 'intelligence'.
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The controversy, in fact, goes deeper than this. To see this, let us look more closely at the first of the two claims I mentioned at the beginning of this paper in support of 'nature' rather than 'nurture'. The second of these claims— that innate determinants of IQ differences outweigh environmental ones—I shall come to later. It was in fact put forward at a later date than the first claim, deriving originally from Francis Galton and found notably in Cyril Burt's writings, i.e. that intelligence is an innate capacity of some sort—in Burt's formulation, that it is 'innate, general, cognitive ability'. Now, despite appearances, it is clear, I think, that intelligence as so defined is *not* intelligence in the first of the three Aristotelian senses, i.e. is *not* intelligence as the (innate) capacity to form concepts. For intrinsic to the Galtonian concept of intelligence is that individuals may differ in this intelligence: one person may be more intelligent than another. The notion of possible degrees of intelligence is not written into the concept of intelligence as the (innate) capacity to form concepts. Animals, including men, either have this capacity or they do not. Human beings (in almost all cases) have it.

There is an important linguistic point to make here, so as to avoid a possible confusion. I am claiming, against Galton or Burt, that it does

not make sense to say that human beings (all those, that is, who are able to form concepts) differ in innate capacity as I have defined 'capacity' so far. But 'capacity' is an ambiguous word. In one sense, it simply means 'power': men are born with the power of forming concepts, a power not found in plants and rocks. But in another sense, it means more than this. In saying, for instance, that a milk bottle has a 'capacity' of one pint, I am implying not merely that it has the power of holding one pint, but also, more importantly, that it *lacks the power to hold more than this.* There are upper limits, if you like, on the amount it can hold.

The Galtonian concept of intelligence sees it as an innate capacity in the latter of these two senses. We are born not simply with conceptual powers, but with individually varying upper limits beyond which we cannot develop.
We can each hold only just so much intellectual substance; some of us may be quart-size, as it were, others pint-size, others quarter-pint-size. A recent example of such a conception of intelligence is found in a paper of Cyril Burt's, written in 1955 and reprinted in Wiseman's *Intelligence and Ability.* Having defined intelligence as 'an innate, general, cognitive factor', Burt goes on to add: ‘The degree of intelligence with which any particular child is endowed is one of the most important factors determining his general efficiency all throughout life. In particular it sets an upper limit to what he can successfully perform, especially in the educational, vocational and intellectual fields.’ [12] (p. 280-1)

I cannot stress too strongly the difference between this Galtonian concept of intelligence and the first of my 'Aristotelian' senses. To say, in the Aristotelian way, that we have an innate capacity to form concepts (or to see connexions) does not imply that there is any upper limit, peculiar to the individual, on what concepts we may form or on what connexions we might see. It does not imply an innate capacity in the milk-bottle sense of 'capacity'. It may be true that in *one* sense any concept-using creature must be limited in what he can achieve. If one agrees with Kant's thesis in his *Critique of Pure Reason,* we must all be limited, as far as our theoretical knowledge goes, to what falls within the bounds of our possible experience.
If so, being an intelligent creature, i.e. having the innate capacity to form concepts, *does* imply upper limits of a sort. This is a conceptual

truth, establishable *a priori.* But the Kantian claim is different from the Galtonian one, in that there is no mention in Kant of the possibility of *individual differences* in one's upper limits. The limits are the same for all concept-using creatures, simply in virtue of their being concept-using creatures. In the Galtonian conception, however, we each have our own, individually distinctive, innately produced ceiling of potential.

Having separated out the Galtonian conception from others with which it is too easily confused, we may proceed to examine it more closely. This, as we shall see, will take us into the heart of the 'nature-nurture' issue. Intelligence, on this view, is innate cognitive capacity in the 'milk-bottle' sense.

The crucial problem now is: does intelligence in this Galtonian sense exist? Clearly we cannot take it that it does without evidence. What kind of evidence would be necessary to confirm or refute this claim? At this point we need to break down the claim into two component parts: (i) that for each of us there are upper limits of intellectual development (which may differ from individual to individual) and (ii) that these upper limits are fixed by an *innate* capacity (called 'intelligence'). Both of these sub-claims require evidential support.

Let me concentrate on the first of these. What criteria would have to be satisfied to show that a person has an upper limit in this sense (regardless, for the moment, of how this limit is produced)? Poor achievement on its own would clearly not be a criterion. If a child fails to understand a certain theorem in geometry—Pythagoras' perhaps—we cannot assume such understanding to be forever beyond him. He may well come to grasp it tomorrow perhaps because his teacher has tried to explain it to him in a different way, or for some other reason. But suppose all sorts of teaching methods were tried and none of them worked. Would *this* be sufficient to show that he had reached a ceiling? Is there not still always the possibility that some method may work of which we are not now aware? I suppose there always is. But it seems to me that, beyond a certain point (and I am not clear where that point is) doubts like this may become otiose. Some extreme mental defectives *do* seem to have intellectual ceilings, in that they are unable to develop from the level of sign-cognition very far, if at all, towards the use of symbols. Here the evidence is the failure of all sorts of different methods of helping them over this hurdle. Perhaps

this evidence is insufficient. If so, one might conclude that the claim that at least some people have upper intellectual limits is *unverifiable.* I do not think I want to say this. But the Galtonian claim is in any case stronger than this: not that some, but that *all* of us are so limited. Is *this* a verifiable proposition? One difficulty is that this now applies to normal individuals as well as mental defectives: and with normals it is so much more difficult to tell when the criterion I have been urging has been satisfied because, unlike mental defectives, normals possess a conceptual equipment which teachers can make use of in trying to devise different methods of getting them over intellectual hurdles. It is not clear to me just when, if at all, one would be justified in concluding that a normal individual had reached his ceiling and that no further teaching efforts would be of any use.

A second difficulty over the verifiability of the claim that *all* have ceilings is that it seems that there must be at least one person whose ceilings cannot be shown (always assuming that ceilings in general can be determined). For to establish that X has a ceiling one must have failed in attempts to get him beyond this ceiling—which implies that one can oneself operate conceptually beyond this point. So there must always be at least one person of whom it cannot be shown that he has a ceiling. For if there were no such person, then who could have shown that the man or men with the highest ceiling had such a ceiling?

It looks, therefore, as if the claim we are examining is in principle unverifiable. But neither does it seem to be in principle *falsifiable.* For what could possibly falsify the proposition that we all have intellectual ceilings? Nothing, as far as I can see. If one took the most brilliant man in the world, whose grasp of new ideas seemed boundless, even this would not be enough to falsify it. Even he, clearly, might have his *Pons Asinorum* somewhere, even though no one could ever know what it was.

If this argument is correct, the proposition that we all have our own upper limits of ability is both unverifiable and unfalsifiable in principle. So, too, therefore, is the proposition that we all have innately determined upper limits, i.e. that there is such a thing as Galtonian intelligence. So too, indeed, is the more specific claim that we all have upper limits which vary along a normal curve. To say that these

propositions are unverifiable and unfalsifiable in principle is to underline that they cannot be *empirical* hypotheses. They are, rather, metaphysical speculations in the Kantian sense that they transcend the bounds of any possible experience. Positivists might claim that they are meaningless utterances. Not holding a verifiability theory of meaning, I would not want to go as far as this. But in their unverifiability and unfalsifiability, they are similar to the claim that there is always some unconscious motive for what we do, a hypothesis which some Freudians might hold. Or to the claim that every historical event has been preordained by God, or is the product of economic forces. Or to the claim that Jesus Christ was the Son of God. All of these claims, as far as I can see, *might be* true. But no possible evidence could prove them right or prove them wrong.

Propositions of this kind are often found at the centre of ideological systems of belief, e.g. Marxism, Christianity, psychoanalytic theory. This is not surprising. To say that a proposition like 'God exists' cannot be falsified is to say that no one can produce any good reason for claiming that it is not true, or if you like, it is to say that its truth cannot rationally be denied. But if its truth cannot rationally be denied, its truth is surely undeniable. In which case one might be inclined to conclude it surely must be true.

This line of thought may help to explain why adherents of different ideological systems often cling so tenaciously to their beliefs, even where these depend on unverifiable propositions like the one mentioned. But it is, of course, fallacious. What is undeniable in the sense that it cannot be falsified is not necessarily undeniable in the sense that it *must be true.*

Like the religious and political propositions I have mentioned, the proposition that we all have innately determined upper intellectual limits has become the hub of a new ideological system. Around it, too, have accreted all kinds of other propositions, both descriptive, for instance about the constancy of IQ, normal distributions and so on and prescriptive, for example about the different kinds of educational provision which ought to be made for children of different 'innate capacities'. As such a system grows in complexity and the more its supporters occupy themselves with discussions about details, about the more peripheral parts of the system, the greater the likelihood that

the basic beliefs, presupposed to these peripheral ones, get taken for granted and so made all the harder to question or relinquish. If two people, for instance, are arguing whether God is one person or three, they are each committed to the belief that God exists. If two others are arguing whether one's IQ is a valid indication of one's intellectual ceiling, they are each committed to the belief that we have such ceilings.

I now want to link all this up with a discussion of the second claim made on the side of 'nature', mentioned earlier—the claim that individual differences in intelligence are determined largely by genetic factors. 'At last!', some may be thinking: 'this is surely what the "nature-nurture" issue is all about. Whether we have or haven't intellectual ceilings is neither here nor there. What is, is *how far* individual differences in intelligence (as measured by IQ) are attributable to innate or environmental factors.'

But *is* this the 'nature-nurture' issue? Suppose one enters the lists. A dominant school of thought today claims that genetic factors outweigh environmental ones, by about three to one. Suppose one challenges this emphasis on the genetic, arguing that environmental factors are more influential. What, if anything, is one committing oneself to in joining the debate?

To see this, we will have to look more closely at what it *means* to say that individual differences in intelligence are determined largely by genetic factors. First of all, 'intelligence' here stands for 'measured intelligence': a person of high (or low) 'intelligence' is, on this definition, simply a person of high (or low) IQ. There is an important question as to how far a test of 'intelligence' in this technical sense is a test of it in any ordinary language sense. It seems to me that it tests, at most, only restricted areas in which intelligence can be displayed, for instance the area of formal logical relations. It does not test one's intelligence, say, as a boxer or as a tennis-player. In addition, a low score on a test fails to discriminate between intelligence in the second and third of my Aristotelian senses. That is, it is not evident simply from a subject's answers whether he scored badly because he *lacked the conceptual equipment* to do tests of this sort or he *possessed the equipment but failed,* on this occasion, to apply it.

But leaving these doubts on one side it is still not at all clear what it means to say that individual differences in IQ are largely determined by genetic factors. This is especially so, where this is taken to mean that over 50 per cent of the variation is determined by the genes and 50 per cent by the environment. (A commonly found ratio in the literature is 75-25 in favour of 'nature'.) Can causal factors be quantified? Suppose we are asking what caused a fire in a warehouse. Does it make sense to say that it was due, say, 50 per cent to the lighted cigarette end, 30 per cent to the presence of inflammable material, and so on? It does not make much sense to me, either in this case or in the intelligence case.

But if we leave out precise proportions, we can at least attach *some* sense to the claim in question. It certainly makes sense to say that variations in the height of individual adults are largely determined by genetic factors, more by these than by environmental ones. It is a move towards unintelligibility to then ask: but what is the precise proportion? For to say in this case that genetic factors are more influential than environmental ones is not to say that they account for more than 50 per cent of the sum-total of causal factors, but that they fix the upper limit of physical growth for each individual, while environmental factors, like diet, can only operate below that limit, to bring people up to it, or leave them stunted.

The application of this to intelligence should be clear. The claim that individual differences in IQ are largely determined by innate factors only makes sense, I believe, if it means that innate factors fix the upper limits of one's intellectual development while environmental factors operate only within this innately determined framework. But this presupposes the existence of intelligence in the Galtonian sense, that there are individually differing upper intellectual limits. Whoever enters the lists over whether innate or environmental factors are more influential is equally committed to a belief in this. In joining issue at all one cedes victory to the nativists, since one admits the truth of the untestable belief which is the bedrock of their position. It is more rational, perhaps, not to begin to take sides. Or, at least, not to attack the nativistic position by coming down in favour of 'environment' (what would it mean, after all, to say that environmental factors counted for, say, 60 per cent?) but, rather, by drawing attention to the untestable

assumption on which the whole nativistic position rests. The claim that 75 per cent of the variation between individuals in IQ is genetically determined is based on studies of identical twins to a large extent. In case it should seem that I am ignoring direct reference to these studies, let me spend a minute or two looking at this evidence. The nub of the argument is that there is a high correlation (0.75) between the IQs of monozygotic twins reared apart. Since, it is held, their environments are very different, the factor explaining this similarity in IQ is the factor they have in common, i.e. their genetic endowment.

As far as I can see, this argument rests on a unjustified assumption. Suppose one does indeed find a correlation of 0.75 between IQs of identical twins. Or suppose, to make the issue more clear-cut, there is even a correlation of 1.0: each twin has exactly the same IQ as his co-twin. This in itself would not support the genetic case. For suppose one twin from each pair were given intensive coaching in answering intelligence tests and as a result, when both these twins and their co-twins were retested, the coached twins scored on average 20 IQ points above their co-twins. This would, of course, significantly reduce the correlation between IQs. So the assumption lying behind *actual* twin research is that none of the twins' IQs could alter sufficiently to change the 0.75 correlation. But, as far as I know, this assumption is quite without foundation. No varied attempts have been made, and have failed, to change the twins' IQs by coaching. Far from this twin research being able to *show* us that people have their own intellectual limits, it is clear, I think, that this assumption is built into the research itself.

In searching for what is at issue in the 'nature-nurture' controversy, I have tried to show that the fundamental issue is whether or not we all have our own upper limits and that this is undecidable. I have tried to rebut the suggestion that the issue is whether genetic factors out-weigh environmental ones, since to make *this* the issue is to presuppose this assumption. But the 'nature-nurture' controversy has also often been presented as revolving round
a different issue; the issue of whether or not ones IQ is 'fixed', i.e. represents the upper limits of one's possible development. If the IQ can be improved, this is thought to be a point in favour of 'nurture' rather than 'nature'. *].* McV. Hunt identifies the issue in this way in his

Intelligence and Experience. He discusses the arguments for and against what he calls the 'belief in fixed intelligence'. His 'evidence dissonant with fixed intelligence', includes evidence against the constancy of the IQ and evidence on the improvements in IQ due to schooling. For Hunt the 'nature- nurture' issue is one which can be settled by empirical research. But this, I think, is to misconstrue the nature of the controversy. The recent resurgence of nativistic literature, by Jensen and others, shows how little evidence like Hunt's against a fixed IQ has damaged the nativistic position. If one claims, as recent writers do, that *most* of the variation in individual IQs is genetically determined, this is not to deny that environmental influences have *some* effect; so any improvement in individual IQs can easily be accommodated in the theory.

The 'nature-nurture' issue cannot be settled by empirical research. There is indeed a danger that immersion in research may strengthen the hand of the Galtonians, by drawing attention away from the irrefutability of their doctrine. Hunt himself provides an interesting example of this. He rejects the belief that the IQ indicates one's upper mental limits. But he could still quite consistently hold that there *are* such upper limits, and there is in fact some evidence in his book that he does believe in the existence of Galtonian intelligence. He writes, "The genes set limits on the individual's potential for intellectual development, but they do not guarantee that this potential will be achieved and they do not, therefore, fix the level of intelligence as it is commonly measured.' [13] Paradoxically, therefore, Hunt is still on the nativistic side of the fence.

It is misguided, therefore, to locate the 'nature-nurture' issue in disputes either over the relative weight of genetic and environmental factors on IQ differences, or over the fixedness of the IQ. The real issue is whether we all have our own upper limit. But to call this an 'issue' is itself, perhaps misguided. Since it cannot be falsified, no one can seriously take issue with it. The most one can do is to indicate just this. Some self-styled 'environmentalists' seek to rebut the Galtonian doctrine by claiming that there are no upper limits of ability. But this, it seems to me, goes too far, for this claim is just as unverifiable and as unfalsifiable as the claim that such limits exist: atheism on this issue is no more rational than theism. There is, perhaps, after all, no 'nature-nurture' issue, since there is no scope,

at this level, for rational disagreement. Those who accept the Galtonian claim as true have forsaken rationality for the domain of faith. There is no reasoning with them.

Notes and references

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3 Ryle, G., *The Concept of Mind,* p. 45 (Hutchinson, 1949).

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5 Peters, R. S., *The Concept of Motivation,* p. 112 (Routledge,1958).

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7 Searle, J. R., *Speech Acts,* pp. 141 ff. (C.U.P., 1970).

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10 Aristotle, *de Anima,* II. 5., 417a 21.

11 Hebb, D. 0**.,** *The Organisation of Behaviour,* pp. 294 ff. (New York, Science Editions, 1961).

12 Wiseman, S., op. cit. As well as Burt's article (pp. 260-81), see also the extracts from Gallon's *Hereditary Genius* ch. 3 (pp. 21-32).

13 Hunt, J. McV., *Intelligence and Experience,* p. 7 (New York,

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