BOOKS: PSYCHOLOGY

The Search for Intelligence

Thomas J. Bouchard Jr.

IQ and Human Intelligence
by N. J. Mackintosh

Oxford University Press, Oxford, 1998. 429 pp. $98, £55. ISBN 0-19-852368-8. Paper, $35, £19.95. ISBN 0-19-852367-X.

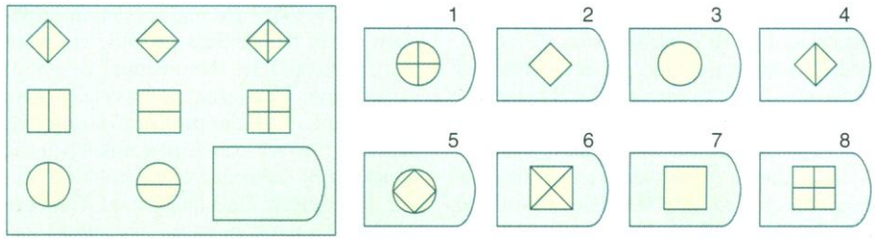
After a long hiatus, interest in Charles Spearman's *g* factor, and its scientific and social implications, has forcefully returned to center stage. The *g* factor is the hypothetical causal entity underlying the phenotype of measured human intelligence (IQ scores). Recent treatments of the nature of intelligence reflect the views of the psychometrically inclined (*1*), the provocatively inclined (*2*), cognitive psychologists (*3*), and even reporters (*4*). Now N. J. Mackintosh, a distinguished animal-learning theorist having considerable psychometric experience and no aversion to tackling difficult and controversial questions, weighs in with his own views. *IQ and Human Intelligence* demonstrates that he has done his homework. The sections on the origins and history of IQ testing are thorough and balanced, as are the reviews of psychometric theories, test validity, test reliability, and test stability. The evidence leads him to conclude that intelligence is an enduring human characteristic, not something that easily fluctuates from day to day or even year to year; that it is causally related to many real life conditions, and thus is of personal and social importance; and that understanding the nature of *g* and the network of relationships in which *g* is embedded (the *g* nexus) is of considerable scientific importance.

Mackintosh's analysis of purported environmental influences on intelligence is one of the most thoughtful in the literature. He deftly dispenses with numerous myths, misconceptions, and flawed arguments. No one doubts that traumatic and inadequate environments negatively influence the development of intelligence. The real issue is what happens in the vast range of "ordinary environments," as a great deal of the variation in intelligence is found within ordinary families. Mackintosh carefully distinguishes between environmental correlations and environmental causes. As he points out, "Factors that correlate with children's IQ scores are two a penny"—the problem is figuring out what they mean and which are causal. After sifting the evidence, he does not flinch from concluding "we have no theory of cognitive development that explains how environments shape different children's different IQ scores."

The review of studies of genetic influence on intelligence is astute and thoughtful. Macintosh argues that the best we can say is that the broad heritability of IQ (the proportion of the variability that can be attributed to genetic differences) in modern industrialized societies is probably somewhere between 0.30 and 0.75. He correctly concludes that "we simply do not know how genetic similarities and differences cause similarities and differences in IQ." He espouses the view that genetic effects may be partly "mediated indirectly via the environment" because to some degree organisms create their own environments. This view (which I share) is, however, a theoretical claim with only a smidgen of empirical support, and, until more evidence is brought to bear, it masks our considerable ignorance about how variation in the environment influences IQ.

According to Mackintosh, the best evidence for environmental influence on intelligence is the dramatic increase in IQ over the last 50 to 75 years that has been observed in most industrial countries (averaging about one standard deviation per generation, although the effect varies considerably), a phenomenon now called the Flynn effect. Flynn (*5*) himself, however, continues to have serious doubts about most proposed explanations of the effect, what it means, and whether it is a real increase in intelligence, comparable to the increase we have seen in height in the same populations. The cause of the Flynn effect is one of the big unknowns in the IQ puzzle.

One of the great strengths of this book is its treatment of cognitive science research relevant to understanding intelligence. Mackintosh's mastery of the empirical findings, their possible interpretation, and contemporary theory is impressive. The role of working memory for verbal or numerical information in cognitive theoretical accounts of various results is particularly well articulated. His review of the evidence suggests there is "reason to believe that the planning and monitoring functions attributed by cognitive psychologists and neuropsychologists to a central executive may constitute the basis of *g* or general intelligence." But then we are warned that giving something a name is not an explanation and "that no one has yet worked out, in any precise or formal way, what these functions are and how they are implemented."



Reasoning abstracted. Raven's matrices tests present items in which one is to select the diagram that best completes the matrix.

IQ and Human Intelligence should be directly compared with Jensen's *The g Factor* (*1*). Given the authors' divergent backgrounds, the degree of their agreement on the interpretation of a number of empirical findings is striking. Both agree, for example, that there are no real differences in intelligence between the sexes and that this lack of differences is not an artifact of test construction procedures. Macintosh even finds Jensen's Level I–Level II theory, now re-named Spearman's hypothesis, of value because it attempts to distinguish those cognitive factors on which there are important group and individual differences from those on which there are few if any differences. According to Mackintosh's version of this model, IQ scores reflect general-purpose problem solving skills on which people differ but we also all have general purpose associative learning systems, largely independent of intelligence, on which we do not differ.

Mackintosh and Jensen also disagree on many issues—probably most profoundly on the nature of *g* itself. Mackintosh believes that *g* reflects a general purpose system of cognitive processes and rejects the idea of an underlying unitary process, biological or otherwise. Jensen, on the other hand, has

CREDIT: AFTER FIG. 2.2 IN *IQ AND HUMAN INTELLIGENCE*

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put forth the theoretical claim that *g* is not a cognitive process at all. Instead, he asserts, "[t]he knowledge and skills tapped by mental test performance merely provide a vehicle for the measurement of *g*....At the level of causality, *g* is perhaps best regarded as a source of variance in performance associated with individual differences in the speed or efficiency of the neural processes that affect the kinds of behavior called mental abilities" (*1*).

The scientific study of human intelligence was for a long time primarily an applied activity focused on measurement rather than construction of abstract theories. Times have changed and the search for human intelligence has become a major theoretical enterprise. *IQ and Human Intelligence* is a superb introduction to the current status of both facets of this important and fascinating endeavor.

References

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BOOKS: EVOLUTION

Stories from the Front

Michael Ruse

Science really ought to be all quite simple and straightforward. There is a real world over there in one corner, and there is a bunch of bright people over here in another corner. These people want to find out about the world, and so they set to with vim and vigor. There will be setbacks and disappointments, and people outside the loop may not always like what is being discovered, but the investigators themselves should not be quarreling. They, after all, are united in their quest of discovery.

The Darwin Wars
How Stupid Genes Became Selfish Gods
by Andrew Brown
Simon & Schuster, London, 1999. 255 pp. £12.99. ISBN 0-684-85144-X.

It never quite works out this way. Notoriously, scientists are a disputatious crew. Again and again, they fall out and call each other the most dreadful names. The field of evolutionary studies is an appalling sinner in this respect. Well before Charles Darwin put pen to paper, men were arguing bitterly over organic origins. Although the great Georges Cuvier was a sincerely practicing Protestant, the things he said about his fellow Frenchmen, Jean Baptiste de Lamarck and Geoffroy Saint Hilaire, were really quite unchristian.

This tradition continues. The most recent eruption has been over the extension of Darwinian selection theory to the topic of animal social behavior. It is true that Darwin touched on this topic in *The Origin of Species*. But it was not until the early 1960s, when a number of people developed new models for the evolution of behavior, that the field really caught fire. By the 1970s "sociobiology," as it was then called, was quickly moving forward—its successes marked in the United States by Edward O. Wilson's magisterial overview, *Sociobiology: The New Synthesis*, and in England by Richard Dawkins's wonderful popular discussion, *The Selfish Gene*.

Yet at the same time, criticism of this approach was building and then exploded. In America, Wilson's Harvard colleagues Richard C. Lewontin and Stephen Jay Gould led a band of radical biologists in condemning every aspect of Wilson's thought: the fondness for Darwinian explanations, the extension of the science to humankind, the belief that now we have a new ideology leading us progressively upwards toward a brighter future. In England, Dawkins came under attack from philosophers like Mary Midgley, who dipped their pens in the purest venom and then wrote polemics with a sarcasm index almost equaling Jonathan Swift's.

Opinion is divided on the significance of controversy like this. Your bluff Nobel laureate physicist thinks it has little import. Even discounting the second-class status of evolutionary studies, real science and the understanding thereof have no interest in personalities. The combatants and their quarrels will pass. To the contrary, your cultural studies enthusiast thinks such controversy is the very essence of science. Science is all a social construction anyway, and violent disputes are just what one expects when social values are at stake.

This disagreement over significance is the entry point for *The Darwin Wars: How Stupid Genes Became Selfish Gods* by science writer Andrew Brown. He takes us through the sociobiology battles and, at the end, tries to draw some morals about the nature of science in general and evolutionary studies in particular. Although his account is tilted somewhat toward the British side of things, in basic respects Brown does a reasonable job. He introduces us to the main characters, attempts to summarize the pertinent scientific claims, and shows us how and why people fell out with one another. Brown clearly has favorites and non-favorites—on the back cover there is a particularly scathing comment by the philosopher Daniel Dennett and between the covers the sentiment is returned sevenfold—but, by and large, the author tries to be balanced. Brown provides some good stories and reports of really rather funny conversations. I particularly liked John Maynard Smith's assessment of chaos theory, although I am afraid that in this post-Clinton puritanical era there is no way I can repeat it in public. Some interesting judgments are also made; readers of *Science* will be interested to learn that *Nature* is "the most important and prestigious science journal in the world."

Yet when this is all said, despite the fact that Brown finds me "one of the most subtle and interesting philosophers of Darwinism," *Darwin Wars* is more pedestrian than inspired. The characters never really come alive as they do in the best science writing; the author is really not that comfortable with the science (for instance, he never dares to spell out the full details of Hamilton's explanation of hymenopteran sociality); there is no historical background; and Brown never truly engages the full import of all of the controversy for the really important questions about the nature of science.

Brown apparently cut his teeth for this work with a "highly-acclaimed book on the London Metropolitan Police," clearly not a sufficient training ground. I am not just being a snob about the relative merits of scientists and professional writers. The writer Robert Wright's thumbnail sketch of Ed Wilson (*Three Scientists and Their Gods*) taught me more about the man than I had garnered from a year of being in his lab. Jonathan Weiner's book on Peter and Rosemary Grant's research in the Galápagos (*The Beak of the Finch*) revealed more about the lives of real scientists than I had learned from my many years of sitting at the shoulders of my empiricist friends and colleagues. Good science writing is in a class of its own, with an irreplaceable value. I am afraid that *The Darwin Wars* does not make this grade. There is a good story out there still waiting to be told.

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