To arrive at the edge of the world's knowledge, seek out the most complex and sophisticated minds, put them in a room together, and have them ask each other the questions they are asking themselves.

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C.P. Snow's 'Two Cultures': The Nature-Nurture Debate

More than 50 years have passed since CP Snow gave the Rede Lecture at the Senate House in Cambridge University. It was May 7th 1959 when he aired his worry that the majority of his colleagues in the humanities were scientifically illiterate, and that the majority of his colleagues who were scientists were disinterested in literature. His worry was that two cultures had emerged, and they were getting more and more unable to understand each other. By way of a graphic illustration, Snow argued that scientists would struggle to read a Charles Dickens novel, whilst most humanities professors would be unable to state the Second Law of Thermodynamics. He wrote "… the great edifice of modern physics goes up, and the majority of the cleverest people in the western world have about as much insight into it as their Neolithic ancestors would have had."

Snow was by training a scientist, who had turned his hand to writing novels, illustrating that rare breed of person who attempts to straddle both cultures. In response, in 1962, Cambridge professor of literature FR Leavis' scathingly wrote of Snow's lack of ability as a novelist, in an effort to rubbish his 'two cultures' argument. Leavis' attack was rightly dismissed as an 'ad hominem'. But was Snow right?

If he was, then given the remarkable rate of progress in science over the last 50 years, the gulf between these two cultures could have been getting wider. On the other hand, through the efforts of John Brockman and other literary agents and publishers who have encouraged scientists to communicate to the wider public, creating the so-called the 'third culture', science is now very accessible to non-scientists. So has the gap between Snow's two cultures become wider or narrower?

I think the answer is both. The gap has narrowed thanks to wonderful books like Steve Pinker's *The Language Instinct*—it should now be virtually impossible for a linguist to see language just as a product of culture, and instead to also see it as also a product of our genes. His book epitomizes what the 'third culture' should be like, illustrating the complex interplay between biology and culture in producing human behavior. Scientists find the idea of a biology-culture interaction unsurprising—almost truistic. As a psychologist, I can think of few if any examples of human behavior that are entirely the result of culture, and I make the assumption that most people interested in human behavior adopt the same

moderate position of acknowledging a biology-environment interaction. To be a hard-core biological determinist, or a hard-core social determinist, seems extreme.

I studied Human Sciences in Oxford in the 1970s, which some people joked was right in the middle of the Banbury Road, the Department of Social Anthropology being on one side of the street, and the Department of Biological Anthropology on the other. The Human Sciences students felt like bilingual children who could not only switch between the two cultures as appropriate, but automatically thought about topics in a multi-disciplinary way, even if their academic 'parents' in each department rarely crossed the road to learn about the other's culture. I would like to think that we've come a long way, and that there is now rich interchange between disciplines, at least in the study of human behavior.

But I worry that the gap between C.P. Snow's two cultures has in some areas remained as wide as ever, and may even have widened. By way of illustration, consider the field of sex differences in the mind. My own view is that research into sex differences teaches us two things: First, one cannot infer what kind of mind a person will have purely on the basis of their sex, since an *individual* may be typical or atypical for their sex. Indeed, to do so would be stereotyping and sexist, prejudging a person because they are male or female. Second, where one finds sex differences *on average* when comparing groups of males and groups of females, these differences are likely to reflect a mix of causal factors, from parenting styles and peer group influences through to the amount of testosterone the foetus produces in the womb and the effects of sex-linked genes.

However, even today, it is still possible to find academics claiming that there are no universal sex differences, for example in language, on the grounds that any sex differences in language and communication are either culture-specific, or do not replicate. Such claims effectively reduce sex differences in language to peculiarities of a particular culture or a particular experiment, thereby needing no reference to biology. Whilst I would agree that the similarities in men's and women's conversational styles are greater than are the differences, but when it comes to *children's* language acquisition, my reading of the evidence is that the differences on average between boys' and girls' language development are non trivial and likely to be universal. Here are just two pieces of experimental evidence:

First, typical girls on average show faster growth in the size of their vocabulary than typical boys. This is seen in a large Russian study of 550 girls and 487 boys, age 18-36 months, mirroring patterns found in a different culture, England. Second, boys' rate of stuttering and other speech problems is at least twice as high as girls'. This is revealed in an even larger dataset from the National Survey of Children's Health that sampled over 91,000 children age 3 – 14 years old across the US, including children of different ethnic backgrounds. Social determinists might want to take the data from such studies and try to explain it purely in terms of post-natal experience; but since mutations in genes (such as GNPTAB and CNTNAP2) have been associated with stuttering and language impairment, it is likely that individual differences in typical language development (including typical sex differences) will also turn out to have a partly genetic basis.

No one denies the important role that experience and learning play in language development. What worries me is that the debate about gender differences *still* seems to polarize nature vs. nurture, with some in the social sciences and humanities wanting to assert that biology plays no role at all, apparently unaware of the scientific evidence to the contrary. If he were still alive today, CP Snow might despair as I do that, despite efforts to communicate the science to a wider public, the field of sex differences remains an example of a domain where the two cultures remain separated by a deep chasm.

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