Andrew G Haldane: The Sneetches

Speech by Mr Andrew G Haldane, Executive Director and Chief Economist of the Bank of England, at the Scottish Business Friends dinner in aid of BBC Children in Need, Edinburgh, 12 May 2016.

* * *

Accompanying charts can be found at the end of the speech.

I would like to thank Kiran Bance, Venetia Bell, Stephen Brown, Gurmaj Dhillon, Will Dowson, Jeremy Franklin, Richard Galletly, Cat Hines, Charlotte Hogg, Tom Mann, Matthew Manning, Alex Mitchell, Ben Nelson, Raakhi Odedra, Charlotte Pope-Williams, Alice Pugh, Amandeep Rehlon, May Rostom, Emma Sinclair, Anne Wetherilt and Richard Wyatt for their comments and contributions. I would also like to thank Professors Philip Bond and Heidi Johansen-Berg and Alan Milburn and Emma Hardaker-Jones for their insights.

In 1953, Dr Seuss published *The Sneetches*.[1] It tells the tale of an imaginary creature of which there are two types: those with and those without stars on their bellies (Figure 1). Star-bellied Sneetches are perceived in Sneetch society to be superior to those without. Until, that is, those without discover a machine for adding stars to their bellies. At that point the original star-bellied Sneetches, no longer distinctive, begin removing their stars to regain their special status. And so it goes on in a merry-go-round, until the Sneetches collectively realise they are better off treating equally those with and those without.

The Sneetches is a parody of status and discrimination. It has been enjoyed by generations of children, so it has a particular resonance at tonight's event supporting Children in Need. And it has a happy (diverse, multi-cultural) ending. But *The Sneetches* also shines an uncomfortable spotlight on a psychological flaw in us all – the desire to differentiate, to stereotype. A half-century on, this flaw is one with which society continues to wrestle, not least in a world where the co-mingling of cultures, races and creeds has never been greater. In practice, this co-mingling has not always had such a happy ending.

Tonight, I want to discuss some of the issues around diversity. These are relevant to groups large and small, from communities and organisations to economies and nation states. These issues affect all of us, children and adults, whether at school, work or play. In keeping with the spirit, I want to discuss diversity by drawing on a diverse a set of disciplines to explore the lessons they hold. And I will conclude with suggestions for some new directions in promoting diversity, in particular in organisations such as the Bank of England.

We are all sneetches

Let me start with what might appear, on the face of it, a rather controversial statement. Everyone is this room is a star-bellied Sneetch. I am, all of you are and everyone outside this room is too. By that I mean we all discriminate, to a certain degree and in certain situations, based on the characteristics and creeds of the individuals we encounter. Sometimes these biases are extreme, at other times subtle. Sometimes they are conscious, at other times unconscious. But all of our minds are biased.

Looked at through an evolutionary lens, this is not as controversial as it may appear. Let me explain why. Humans are sentient, water-filled whoopee cushions moulded over millions of years of evolutionary experience. For the vast majority of that period, they operated in hunter-gatherer communities of less than 100 people. Evolutionary biologists believe that behaviours learned, and neurological pathways cleared, during that period may have had a lasting impact

[1] Seuss (1953).

on our brains and bodies.[2] The neurological and physiological traces of our ancient past are still very much visible and audible today.

The hunter-gatherer bands of primitive man occupied a hostile environment. Groups of that size were acutely vulnerable to events that could threaten their extinction. Chief among these existential threats was conflict and disease. And the most likely sources of conflict and disease were not found within communities but outside of them – from dangerous strangers, bearing ill-will or ill-ness.[3] Evolutionary biologists believe this existential risk from conflict and disease installed a deep-seated "fear of strangers". It embedded stranger-danger.

Strangers, for this purpose, could be anyone with characteristics different than those of the "in-group". In fragile hunter-gatherer communities, this mind-set made sense. It was a rational, risk-averse response to existential threat. "Do not trust strangers" was a learned evolutionary heuristic, a simple and robust decision-making rule to guard against the threat of extinction. Paranoia in primitive man was rational – everyone really *was* out to get you.

Psychologists call this ecological rationality.[4] Fear of strangers was a *rational* response to the *ecology* of the time. This behavioural trait is shared by other primates, such as apes.[5] What is interesting is that these primordial fears may have persisted long after the ecology itself has changed. To give a trivial example, fear of snakes, spiders and dense rainforests probably arose on the grasslands of Africa in 50,000 BC. It was an ecologically rational response then. Whether it is an ecologically rational response on the high streets of Edinburgh and London today is altogether more questionable.

What is true about fear of snakes and spiders is true, too, about fear of strangers. The evolutionary heuristic – "do not trust a stranger" – remains alive and well today. And in some situations, it remains a useful guide. Among parents, it is a simple but still powerful decision-making rule for children. As Benjamin Franklin put it: "Distrust and caution are the parents of security". At the same time, this neurological relic from the ancient past may be seriously out of kilter with the workings of a modern, multi-cultural society.

Given its neurological roots, it should perhaps come as no surprise that history is pock-marked with instances of overt and enduring fear of strangers, whether that "strangeness" derives from differences in race, gender, culture, religion, political ideology, socio-economic status or age. The notion of the evil stranger is steeped in ancient folklore and political discourse.

Historically, fear of strangers has plainly not been the only reason for discrimination and oppression.

Self-interest, and the pursuit of power or command over scarce resources, has also had a huge influence throughout history. From Ancient Egypt, where colour prejudice was thought to depend on which ethnic group held sway, to the slave trade to apartheid, unpalatable historical examples of power-based discrimination are depressingly legion.[6]

Even if such biases have been ever-present through human history, their precise form appears to have changed over time as societies themselves have evolved. Tectonic shifts in flows of people, and in laws and social norms, have brought about a significant reshaping of biases over the course of the past few centuries.

One important shaping factor here is likely to have been migratory patterns.

---

2 Schaller and Neuberg (2008).

3 Faulkner et al (2004).

4 Todd and Gigerenzer (2012).

5 Goodall (1986).

6 Goldin et al (2011).

Cross-border flows of people have occurred throughout human history: at times an involuntary response to poverty or persecution, at others a voluntary response to opportunity and prosperity. The scale of these flows has waxed and waned, but it is clear cross-border flows of people today are at high levels historically.[7] In London, the fraction of non-UK born residents was almost 3 million or 37% of the population in 2011. And Edinburgh has the largest non-UK born population of any region in Scotland at 16%.

Accompanying this co-mingling of ethnicities and cultures has been an evolution, bordering on revolution, in social attitudes. Through the course of several centuries, laws have emerged forbidding discrimination based on race, gender, disability, ethnicity and age. And, during the latter part of the 20th century, there has been rapid growth in a new set of social norms and policies to promote diversity in schools and universities, in the workplace, in sport and leisure activities and in wider society.

One interesting window on these changing societal attitudes is provided by looking at the etymological roots and evolution of the word "diversity" itself. These can be traced to the Latin "divertere" meaning "to turn aside" – which in turn led to our word 'divert', meaning to change course - and the old French expression "diversite" meaning "difference, uniqueness, oddness". In other words, the semantic roots of diversity support a dual interpretation, part positive, part negative.[8]

That dual interpretation has continued through the ages. Chart 1 plots the incidence of the word diversity in books printed since the 15th Century.[9] Diversity entered the English lexicon in the mid-14th century. At that time, its meaning was broadly neutral. From the late 15th Century onwards, however, the term appears to have taken on negative connotations: "being contrary to what is agreeable or right; perversity; evil".

During the 18th Century, its fortunes changed again. At least some modern democracies began to view diversity as a virtue, a safeguard against any one faction exerting too much power. And from the middle of the 20th century, there has been a surge in the use of the word diversity, as laws and social norms have adapted actively to embrace it.

Secular trends – demographic, legal, social – appear, then, to have reshaped the meaning of diversity. Overt discrimination has become unacceptable, legally and socially. Yet while reshaping biases, this changing societal landscape seems unlikely to have eliminated it entirely. Indeed, it is possible that societal shifts may have nurtured a different, more elusive, form of behavioural bias. Like its evolutionary forebears, this is to some extent rational, given the social ecology of the time.

During the 20th century, psychologists began documenting work on social interaction in communities of people with differing characteristics. In the 1970s, Henri Tajfel and colleagues discovered that this behaviour often exhibited a strong "in-group" bias. People quickly adopted a *social*, as well as an individual, identity having attached to a group. For that reason, this has since become known as "social identity theory".[10]

Several important behavioural consequences flow from this theory. Groups become an important source of pride and self-esteem for the individuals attached to them. To enhance their own self-image, members of the group often then systematically exaggerate differences with other groups, while emphasizing similarities within their own.[11] Perhaps most important of

---

[7] Goldin et al (2011).

[8] Further details available on the Online Etymology Dictionary at http://www.etymonline.com/index.php?term=diversity.

[9] It uses Google's Ngram Viewer.

[10] For example, Tajfel et al (1971).

[11] Karlan and List (2007).

all, people may discriminate or negatively stereotype the "out-group", as a means of enhancing the image of the "in-group" and hence their own self-image.

Behaviour consistent with social identity theory has since been detected in a wide range of social settings: in families, sports teams, schools, gangs, colleges and organisations. It generates important, but often subtle, biases in decision-making which may discriminate against members of the out-group. Despite laws against racial discrimination in most developed countries, there is evidence that racial stereotyping and discrimination in everyday decision-making has persisted, in everything from selling cars to making loans.[12]

While deeply undesirable, these behaviours cannot be dismissed as entirely irrational. Indeed, economists and psychologists have developed models to show this behaviour may indeed be rational once the role of social identity and social norms are recognised.[13] And because a multicultural society gives rise to greater numbers of distinct groups and identities, this socially-discriminatory behaviour might even have become more, not less, powerful over time.

These biases in behaviour are similar in spirit, but different in form, to those of primitive man. Both generate negative sentiment towards strangers or the "out-group". In ancient times, biases were based on the *physical identity* of strangers; they were overt and visible. Today, many biases are based on the *social identity* of strangers; they are often covert and subtle. Where primitive man had conscious biases, modern man often has *unconscious* ones too.[14]

That these biases are sometimes covert, rather than overt, does not diminish their importance for society. Unconscious biases are likely to be just as prevalent, and sometimes as pernicious, as conscious one. And precisely because they are harder to detect, sometimes even among those exhibiting these behaviours, unconscious biases are more likely to go unnoticed, and thus unchallenged, than conscious ones. As conscious biases were violent and visible, unconscious biases are silent and invisible.

The Sneetches is, at one level, a children's story with a moral message. At another, it is a case study in social identity theory, a parable for modern times. Even in advanced economies with little fear of conflict or infection, with laws against discrimination and with social norms favouring diversity, we all remain Sneetches. Our biased minds are in part a neurological hangover from our hunter-gatherer past and in part a sociological side-effect of our multi-cultural present. Either way, these biases are embedded in our brains and behaviours.

Diversity as a social good

Saying that behavioural biases among individuals are understandable is one thing. Saying these biases are acceptable, when viewed from the perspective of society as a whole, is quite another. There are at least two reasons why our biased minds may carry a significant societal cost.

First, fear of strangers is in part a neurological relic of the past, a time of hunter-gather communities, a different ecology. Our biased minds may, in a sense, still be adapting to a multi-cultural environment. In this respect, discrimination is the neurological equivalent of the appendix: essential at the time man ate grass on the savannahs, but today a sometimes-dangerous physiological fossil. Fear of strangers today may be a sometimes-dangerous neurological fossil.

---

[12] Akerlof and Kranton (2011) .

[13] For example, Akerlof and Kranton (2011) explore how our conception of who we are, and who we want to be, may influence our actions and decisions rather than just economic incentives.

[14] For further details, please see the literature review provided by the Equality Challenge Unit at http://www.ecu.ac.uk/publications/unconscious-bias-in-higher-education/.

Second, there are many instances where the collective consequence of individually rational decisions gives rise to sub-optimal outcomes for society. It is perfectly rational for everyone to head to the exits if the fire alarm sounds in the theatre. But the collective consequences of such actions are potentially catastrophic. Economists call this an *externality* problem. And diversity (discrimination) can be seen as just such a positive (negative) social externality, a public good (bad).

This is not a new orthodoxy. Writing back in 1848, John Stuart Mill captured well the societal benefits of diversity:[15]

> "It is hardly possible to overrate the value, in the present low state of human improvement, of placing human beings in contact with persons dissimilar to themselves, and with modes of thought and action unlike those with which they are familiar…Such communication has always been, and is peculiarly in the present age, one of the primary sources of progress"

More recently, Scott Page (2011) has encapsulated the positive social externality of diversity more formally. Economists love an equation, so here is one:

$$\text{Collective Ability} = \text{Individual Ability} + \text{Diversity}$$

Recent evidence, drawn from a range of disciplines and settings, has tended to confirm Mill and Page's conjectures. Diversity generates a positive social externality, helping the collective far exceed the sum of its individual parts. Diversity is synergy. This has been found at almost every scale of social grouping, from small communities and organisations, to large economies and nation states. The benefits have been found, too, in non-social settings, such as ecological and logistical systems.[16]

One channel through which diversity may improve societal outcomes is by fostering innovation and creativity. If different raw ingredients are added to the intellectual melting pot, the final dish is likely to be richer and more innovative.[17] Psychologists believe that divergent thinking is the cradle of creativity. That is why creativity is often found to be greatest among very young children whose thinking is unconstrained by convention. Their brains have license to diverge and roam free.[18]

Education and adulthood put a stop to that. They constrain cognitive freedom. But there are means of freeing our brains from these constraints. For example, convening diverse groups can be seen as a means of adults rediscovering the creativity of childhood. It is a synthetic way of manufacturing divergent thinking, a sociological recipe for artificial intelligence that does not require a robot or a PhD in physics. As childhood individualizes the creativity process, diversity can collectivise that process.

At a *micro* level, there is fairly strong evidence for such an effect in communities, organisations and cities. In early societies, there is evidence of brides being given to other tribes and introducing new ideas and technologies.[19] Inter-group marriage was, in effect, a vehicle for technology transfer. And, later, waves of migrant-merchants are believed to have served as a major stimulus to technology-transfer across civilised communities – for example, from the ancient Orient to ancient Greece.[20]

---

15 Mill (1848).

16 For example, Anderson and May (1979).

17 For example, Alesina et al (2015).

18 Land and Jarman (1993), and Land (2011).

19 Manning (2005).

20 Goldin et al (2011)

Coming closer to today, within *organisations* there is widespread evidence of diverse leadership teams improving firm-level performance.[21] There is also evidence of diverse workforces improving firm-level productivity, at least under certain conditions.[22] Within *cities*, there is evidence from the US and Europe of diverse, multicultural cities being a spur to economic development and growth.[23] Richard Florida argues that what defines a thriving city these days is the three "t"s – talent, technology and tolerance – with the third a key enabler of the first two.[24]

At the *macro* level, the evidence is more mixed but in general suggests a positive relationship between diversity and economic growth. The historical experience of creatively-fertile empires, cities or epochs – from ancient Greece to Medieval Florence, from Elizabethan London to post-revolutionary Paris – is suggestive. Each of these social systems was notable for its cosmopolitan culture, with a rich mix of religions, ideas and disciplines. Conversely, the cultural isolation of China for several centuries is held by some scholars to be responsible for its extended period of stifled innovation and growth.[25]

More recent empirical evidence, looking across a range of countries, has added empirical support to this historical experience. Among advanced economies, measures of (genetic and birthplace) diversity have been found to support economic growth and development under the right conditions.[26] And the effects can be large: increasing the diversity of skilled immigrants by 1 percentage point raises long-run output by around 2%.[27] On this evidence, diversity of peoples has been an important ingredient behind organisations, cities and economies growing over time.

A second dimension along which diversity may matter is in supporting the *resilience* of social systems in the face of uncertainties and shocks, be it organisations or nation states. Courtesy of behavioural economics, we now know that individuals suffer from a heady cocktail of behavioural biases.[28] Two of the more important are hubris bias (an exaggerated individual sense of ability) and conformity bias (a tendency to act in line with consensus).[29] The first leaves decisions vulnerable to the whims of an over-confident individual, while the second generates insufficient challenge of prevailing orthodoxy, so-called "groupthink".

What links these biases is that they increase greatly the chances of a large, perhaps even catastrophic, error of judgement. History, including economic history, provides a rich catalogue of these errors, from autocratic emperors, kings and rulers overtaken by hubris to inert academics and policymakers consumed by consensus. Fortunately, social institutions have often adapted to lean against these biases. Indeed, some have argued that these institutional safeguards are the reason some nations succeed and others fail.[30]

One bulwark against bias comes from placing decision-making in the hands of a committee, diverse in its composition, independent in its mindset. Experimental evidence suggests that, so comprised, committees make for more robust decisions. They do so by avoiding large

---

21 For example, McKinsey (2015).

22 For example, O'Reilly (1998).

23 Florida (2002), Ottaviano and Peri (2005).

24 Florida (2003).

25 Goldin et al (2011).

26 Ashraf and Galor (2013), Ager and Bruckner (2013), Bellini et al (2013), Alesina et al (2015).

27 Alesina et al (2015).

28 Kahneman (2012).

29 For example, Haldane (2014).

30 Acemoglu and Robinson (2013).

errors, by leaning against the eccentricities of individuals and the groupthink of crowds.[31] Decision-making diversity makes for greater systemic resilience.

Such diverse perspectives have also been found to improve our powers of clairvoyance. In his recent book "Super-Forecasting", Philip Tetlock explores what makes for a good forecast, based on experimental and real-world experience.[32] A set of forecasters with diverse perspectives, experiences and ideas is found to be a key ingredient. Indeed, teams of diverse amateurs have been shown to out-perform experts in some settings. In other words, there is forecasting wisdom in crowds, provided they are cognitively diverse.

Over time, these insights have found their way into institutional design. For example, diverse decision-making underlies judicial practices in many countries – for example, the design of the US Supreme Court.[33] It is also embodied in the design of the Bank of England's policy committees – the Monetary Policy Committee (MPC), Financial Policy Committee (FPC) and Prudential Regulation Committee (PRC). Each comprises internal and external members, individually accountable and drawn from diverse backgrounds.[34]

The global financial crisis provides the example, par excellence, of the resilience benefits of diversity. A lack of intellectual diversity sowed the seeds of the crisis. So too, arguably, did a lack of gender diversity.[35] And a lack of diversity within the financial eco-system – with many institutions holding very similar portfolios – fed and watered these seeds. This lack of diversity, intellectual and financial, contributed significantly to the depth and severity of the crisis.[36] This old lesson from evolutionary biology and systems theory was learned painfully and abruptly by policymakers and practitioners in 2008.

What applies at the level of institutions and systems may also apply at the level of *nation states*. Democracy can be thought of as a sociological mechanism for maximising the diversity of decision-making. By design, it leans against the hubris bias of autocracy or monarchy while reducing the groupthink bias of single-party rule. As synergy is diversity, so too is democracy. And for the same reasons as among institutions and eco-systems, democracy has also been found to make for more robust decision-making.[37]

So much for the benefits. None of this is to say that diversity is costless. History is littered with examples of the problems associated with integrating and assimilating diverse peoples. Several recent empirical studies have corroborated those perceptions, again at both the micro and macro scale. For example, there is evidence that diversity in the workplace may sometimes lower employee morale and job performance.[38] And there is evidence that racially diverse communities have fewer social interactions and thus are associated with lower levels of trust.[39]

At the macro level, studies drawing on cross-country experience have suggested that certain measures of diversity – in particular, the degree of ethnic fragmentation – may sometimes be associated with *lower* levels of economic growth.[40] One explanation for this finding is that

---

31 Lombardielli et al (2005)

32 Tetllock (2015).

33 Iaryczower et al (2013)

34 Haldane (2014).

35 Lagarde (2014).

36 Haldane (2009).

37 Landemore (2013).

38 Guillaume et al (2015).

39 Alesina and La Ferrara (2000).

40 Easterly and Levine (1997), Alesina et al (2003).

fragmentation may make it harder for society to agree on the public goods it wishes to provide – transport, schools, energy, defence – thereby retarding growth.[41] Another is simply that it increases the risk of conflict and friction, which absorbs human and social capital and thus damages growth.

The potential fragility of more complex systems is a familiar theme from other disciplines too. In ecological biology, complex eco-systems, like tropical rainforests, are known to be more fragile than simple ones, such as savannahs. Cascades, conflicts and contagion are both more likely and more potent, the greater the number of interacting parts. That means complex societies, like complex eco-systems and financial systems, may exhibit a "robust-yet-fragile" property.[42] The greater richness of the rainforest or cosmopolitan city may come at a cost.

So diversity is no one-way street, no panacea. It confers collective social and economic benefits, at both the micro and macro level, but at some cost. Which one is likely to win the day? The cost/benefit balance seems to be context-specific. It also seems to depend on a country's level of economic development.[43] For developing countries, there is evidence this balance may sometimes be growth-negative. For developed countries, the evidence is more compellingly growth-positive, perhaps owing to their more developed public and social infrastructure to support diversity.

Diversity of what?

Thus far, I have used the word "diversity" in a very general sense. That is inadequate when it comes to crafting policies which promote diversity. Diversity of what exactly? Specifically from a policy perspective, which dimensions of diversity are most important if we wish to maximise the social externalities it confers?

In his book, *The Difference*, Scott Page distinguishes *identity* diversity (race, gender, ethnicity, age *etc*) and *cognitive* diversity (intelligence, problem-solving, personality *etc)*.[44] To this, we might usefully add a third – *experiential* diversity (socio-economic background, skills, experiences *etc*). While there is some overlap between them, these measures are conceptually distinct: the first physiological and pure nature; the second neurological and part nature, part nurture; the third environmental and pure nurture.

The aspect of diversity most extensively studied is identity, specifically ethnicity and gender. That is for the very simple reason that these dimensions of diversity are the ones most easily observable and, latterly, reportable. Moreover, there is plenty of evidence, accumulated over recent years, which suggests that identity-diversity can yield significant social benefits, in part at least because it serves as a proxy for cognitive and experiential diversity.

For example, research by McKinsey has looked at how gender and ethnic diversity affect firm performance.[45] Looking at a wide cross-section of international firms, it finds that companies with higher levels of ethnic and gender diversity have tended to out-perform less diverse companies, often by material amounts. These effects are stronger, the greater is the degree of diversity on these companies' leadership teams. Diversity, in short, supports the bottom line of the annual report, not just the CSR paragraph.

And what is true of companies appears also to be true of cities. Researchers have created "creativity indices" for cities measuring their degree of technological innovation and

---

41 Alesina et al (1999)

42 May and Anderson (1991), Watts (2002), Haldane (2009)

43 Alesina and La Ferrara (2000).

44 Page (2007).

45 McKinsey (2015).

dynamism.[46] There is a striking correlation between these indices and a city's degree of sexual and ethnic diversity – cities such as San Francisco, Boston and Seattle in the US, and also London, Dublin, Vancouver and Sydney. It seems a vibrant city both helps create, and is created by, a diverse and cosmopolitan populace in a virtuous loop.[47]

The source of these benefits may well lie, at least in part, in behavioural differences between groups. The most extensively studied of these differences is between the sexes. For example, men have been found to exhibit greater levels of risk-taking than women.[48] The reasons for this appear to be partly physiological, given the larger amounts of testosterone generated by the male body.[49] This risk-taking bias, taken together with the strong male bias within the financial services sector, has led some to posit a causal link between the lack of gender diversity and the global financial crisis.[50]

There is also evidence of systematic differences in approaches to decision-making between the sexes. Men tend to attach to a single principle, or heuristic, when making decisions and then stick with it. Women, by contrast, show a greater willingness to switch between decision-making principles and heuristics, depending on the context.[51] Or, to caricature things a little, women multi-task while men have one-track minds.

Recent neurological research has explored whether there is a link between these behavioural traits and the wiring of the brain using imaging techniques. It is early days. But one recent study found gender differences in the wiring between the left and right cerebral hemispheres, with women exhibiting greater connectivity *between* hemispheres and men showing greater connectivity *within* each hemisphere.[52] This wiring difference might explain women's superiority at multi-tasking and men's greater spatial awareness.

Yet it is important to place these behavioural and cognitive differences in context. Even if neurological differences exist, they should not be exaggerated. For example, research has suggested these gender differences are typically smaller than the differences in brain wiring that exist *within* each gender. Or, put differently, neuroscientists have challenged the notion that brains are either "male" or "female". Instead, most brains are transgender, a property known as "mosaicism".[53]

Our androgynous brains are also far from static. They evolve and re-wire over time in response to experience and circumstance. Neurologists call this property "plasticity".[54] The malleability of our brains means that differences in the environment facing the sexes can have a lasting impact on their behaviour. Indeed, some studies have suggested that, once allowance is made for these environmental factors, behavioural differences between the sexes effectively disappear.

For example, differences in the relative competitiveness of the sexes tend to be equalised once environmental factors are take into account.[55] And differences in mathematical performance

---

[46] This is measured as the fraction of high-tech industry output relative to that in the economy as a whole.

[47] Florida (2002, 2011).

[48] For example, Charness and Gneezy (2012).

[49] Coates (2012).

[50] For example, Lagarde (2014), Davies (2015).

[51] For example, Ertac and Gurdle (2011).

[52] Ingalhalikar et al (2014)

[53] Joel et al (2015)

[54] Brooks (2011) .

[55] Wozniak et al (2009), Cardenas et al (2014).

between the sexes, often apparent in simple tests, tend similarly to disappear once attempts are made to create an environment which avoids gender stereotyping about numerical ability.[56]

Overall, then, identity-based characteristics, such as gender and ethnicity, may provide a useful basis for judging some aspects of behavioural diversity. But these differences may be as much the result of differences in environment and cognition as identity per se. Identity may be more measurable proxy, than root cause, of diverse decision-making.[57] The evidence here is revealing.

Looked at through an historical lens, the "Medici effect" – historical episodes of great leaps forward in ideas and innovation – typically arose from a melding of cultures, disciplines and experiences, rather than genders. The creativity exhibited by five-year old children derives from their cognitive processes, not their gender or ethnicity. Tetlock's "super-forecasters" are defined by their cognitive and environmental diversity, not their identity. And crowd-sourcing and gamification are means of harnessing the cognitive and experiential creativity of crowds, blind to their identities. And so on.

Moving the diversity dial

Against this backdrop, what might be done to support diversity? The "first wave" of diversity initiatives has been building steadily over recent decades. This has tended to focus on identity-based characteristics, such as gender and ethnicity. And it is heartening to know that considerable progress has been made here.

Trends in female labour market participation have improved significantly. The employment ratio for females has increased dramatically across a selection of OECD countries over the past four decades. Data on ethnicity are harder to obtain, but there have been improvements in employment rates among foreign-born residents in many countries over the past 15 years. Numbers of women and ethnic minorities in senior positions have also increased. The Davies Review recently found that the UK has now reached its target of 25% female board representation among FTSE-100 companies, having doubled in less than 5 years.[58]

Although progress has been made, there are a number of areas where we still fall short. In the UK, the employment rate for those with Black, Asian and Minority Ethnic (BAME) backgrounds is still materially lower than for the population at large.[59] Women still only account for a third of employment in higher managerial roles in the UK. Although the pay gap has fallen, average pay for men in the UK remains almost 20% higher than for women.[60] And male CEOs across European public companies earn on average over 30% more than their female equivalents.[61]

The Bank has itself made good progress over recent years. For example, we currently have 43% female representation across the organisation and we are working towards a 50/50 gender split by 2020. At senior management levels, 27% are women with a target to boost this number further. If we rewind 10 years, the equivalent figure would have been only 7%. The proportion of BAME employees is around 17%, greater than the proportion for the UK as a whole. Representation at senior management remains much lower at 5%, but is increasing.

---

[56] Walton and Spencer (2009).

[57] Page (2010).

[58] Davies (2015)

[59] Resolution Foundation (2015)

[60] Although around half of that reflects the fact that there is a greater proportion of women working part time than men.

[61] European Women on Boards (2016)

Like many other organisations, the Bank has sought to support diversity through a range of diversity networks covering, among other things, gender, ethnicity, LGBT, mental health, disability, caring and some of the main religions. One of my responsibilities is as Executive Sponsor of the Bank's Ethnic Minority Network. This Network has put in place some valuable new initiatives to support greater ethnic diversity across the Bank over recent years, including reciprocal mentoring schemes and an Afro-Caribbean Scholarship Programme which funds students through university. The Bank has also recently signed up to UPstanding – an initiative to showcase BAME professionals working in the US, UK and Ireland.

Plainly, there is further to go along these identity-based dimensions of diversity, in the Bank and more broadly. But there is wind in society's sails, as well as in the Bank's, on these dimensions of diversity, which gives good grounds for optimism about the future. That being the case, it is worth considering the "second wave" of diversity initiatives that might augment the first.

An obvious place to start here would be the other dimensions of diversity – cognitive and experiential. The evidence suggests these confer societal benefits every bit as great as identity. Indeed, diversity of thought and experience go the very heart of decision-making diversity. Moreover, because these dimensions are less well-recognised and harder to measure, unconscious biases around them may be harder to detect and correct. That underscores the importance of purposive action to move the diversity dial in these directions.

(a) Cognitive diversity

Cognitive diversity is far from easy to define and measure. It is stored between our ears in an organ which, despite recent neuro-scientific advances, remains largely a black (or grey) box. A second reason is that it is clearly multi-faceted, including diversity of perspectives, interpretations, heuristics and predictive models.[62] It comprises not just technical problem-solving, in an IQ sense, but also social and interpersonal problem-solving, in the EQ sense. Together, these comprise an individual's cognitive toolbox.

Recognising even that this toolbox exists, and what might lie inside, is a useful first step. Work by sociologists, psychologists and neuro-scientists has, over recent decades, shone a light on these wide-ranging cognitive competencies, their implications for behaviour and their source. Yet this evidence is only now beginning to percolate into the workplace, much less into wider society.

Let me give an example. A recent article in *The Economist* discussed whether autism is adequately recognised and rewarded in the workplace.[63] It is well-known that those with autism often have an above-average ability to spot patterns and errors, to conduct repeated tasks with high levels of accuracy and to concentrate for lengthy periods. Indeed, given these cognitive gifts, it has been claimed that half of the innovators in Silicon Valley have Asperger's syndrome, a form of autism.[64]

Yet when it comes to the world of education and work, these gifts appear largely to have gone unrecognised and unrewarded. In the UK, only 12% of high-functioning autistic adults are in work. Globally, the United Nations estimate that 80% of those with autism are not in the workplace. Even once in work, the skills and performance of autistic adults may not be properly recognised and rewarded. In the workplace, as in wider society, we are some distance from recognising the true potential of those with autism.

---

62 Page (2007).

63 "Beautiful minds, wasted: how not to squander the potential of autistic people", *The Economist* April 2016.

64 Temple Grandin (2011).

Once cognitive diversity is recognised, the next step is measurement. This, too, is far from straightforward because the dimensions of cognition and personality are many and varied. Yet there is no shortage of psychometric tests these days which seek to capture these many and various dimensions. And, increasingly, these tests are being applied in recruitment decisions, when seeking to match the characteristics of potential employees to an organisation.

These same tests have been far less often used by organisations to gauge the cognitive diversity of their *existing* employees. For example, there is no reason they could not be used to construct a cognitive map of an entire organisation to gauge its degree of cognitive diversity. Making transparent that cognitive map would then provide incentives to take seriously any lack of cognitive diversity, as well as enabling peer comparison. As the measurement technology exists, these would be big but eminently feasible steps for organisations to take.

To be futuristic for a moment, Magnetic Resonance Imaging (MRI) scans these days provide a different lens on cognitive and personality traits – a techni-colour cognitive map. It is early days to be drawing firm links between the brain's wiring and individual character traits, but progress has been rapid. As one example, the neuro-biology company Emotiv Lifesciences has created a brainwave reading rig, which offers real-time analysis of cognitive activity.[65] While we are some way from arming ourselves with only an MRI scan when judging performance and potential, perhaps in future that will not seem so fanciful.

The Bank is taking steps to improve its own cognitive diversity. For example, it has sought to widen the range of disciplines from which it recruits over the past few years. Of this year's graduate cohort, only 40% has a degree in pure economics and finance. I say "only" because, as recently as 2009, the corresponding fraction would have been 60%. This year's graduate cohort is drawn from diverse disciplines ranging from particle physics to aerospace engineering to ancient history. Disciplinary diversity is on the rise.

That in part reflects changes to the Bank's responsibilities, as over recent years it has taken on new staff and new tasks. Those tasks require different skills and experience – commercial and operational skills, as well as analytical. That has changed the cognitive make-up of the Bank, potentially quite significantly. Bringing together those different skills and experiences in cross-Bank teams – for example, our recently published work on the implications of the UK's EU membership for monetary and financial stability – is a good way of making use of cognitive diversity across the Bank, collectivising the creativity process.

The Bank has also been encouraging intellectual diversity through its new research programme.[66] This has extended the range of topics on which the Bank is researching – for example, to embrace the impact of technology, demography and climate change on the economy and financial system. And because expertise on those issues often does not reside in-house, the Bank is encouraging cross-disciplinary and unorthodox approaches to research, including through outside collaboration and through crowd-sourcing research.

When it comes to publishing those ideas, through its blog *Bank Underground* Bank staff are now unshackled from the constraint of only publishing material which chimes with the prevailing policy orthodoxy. This provides room for divergent thinking, the cradle of creativity. It also serves as an antidote to groupthink. These may be baby steps but they are, I hope, steps in the right direction.

---

[65] Deloitte University Press (2013).

[66] Please see the One Bank Research Agenda, available here: http://www.bankofengland.co.uk/research/documents/onebank/discussion.pdf. The full discussion paper is available here: http://www.bankofengland.co.uk/research/documents/onebank/discussion.pdf.

(b) Experiential diversity

A related, but distinct, dimension to diversity is the background and experience of individuals. Again, this is multi-faceted. One dimension which has attracted some attention recently is the *socio-economic status* of individuals. That has been found to have a striking impact on levels of educational attainment, employment and income prospects, independent of ability.

Here, the seeds appear to be sown early in childhood. Studies have looked at the educational evolution of sets of children from different socio-economic backgrounds over time. Parental income and wealth has been found to be a key, if not *the* key, determinant of a child's educational progression.[67] Indeed, these socio-economic effects are sufficiently large that they may dwarf factors such as a child's cognitive ability.[68]

For example, imagine testing the cognitive ability of children when two years old. How does socio-economic status then affect their educational progression? Some studies have found that a low-ability child from a high-status group will exhibit *higher* levels of attainment by the age of six than a high-ability child from a low-status group.[69] And, thereafter, the differences begin to widen further. This evidence suggests it is far better to be born rich and stupid than bright and poor.

Moreover, these early-stage differences in educational attainment, shaped by socio-economic background, have a life-long impact. That is why there is a very high degree of inter-generational persistence in incomes and wealth, even once account is taken of ability. As one diagnostic on that, consider the following evidence, courtesy of the Commission on Social Mobility and Child Poverty: although independent schools comprise only 7% of pupils in the UK, the independently-educated comprise over 70% of the upper echelons of the judiciary, 55% of permanent secretaries in the civil service and 62% of senior armed forces officers.[70] Branching of the opportunity tree starts early, it appears, and then keeps widening.

At present, as with cognitive diversity, there is often a lack of recognition of these inbuilt socio-economic biases. And, as with cognitive diversity, one reason for this lack of recognition is a lack of measurement. There is no agreed set of metrics for measuring someone's socio-economic background. In the UK, the Social Mobility and Child Poverty Commission has begun to develop some metrics. But there is widespread recognition that we are still in the early stages of measurement.

Measurement would enable organisations to draw their own experiential diversity maps. As with cognitive diversity, beyond that there is potentially value in making transparent those maps to provide incentives for purposive action if experiential diversity is found to be wanting. The Bank has just begun to put in place a system for measuring the socio-economic background of its recruits. In future, that might help in sketching the contours of the Bank's own experiential diversity map.

Some organisations have taken more purposive action still to promote social mobility. For example, some have set themselves recruitment targets for employees drawn from lower socio-economic groupings. Others have put in place so-called "contextualised" recruitment, adjusting their entrance requirements to prevent filtering out of candidates based on their socio-economic background. The Bank has also made some initial steps in the direction of contextualised recruitment, as well as signing up as a member of the so-called Social Mobility Compact, which promotes social inclusion and mobility in the UK.

---

[67] Heckman (2006) finds that very early intervention for disadvantaged children is crucial in order to affect outcomes. Intervening when a child is over the age of six has comparatively little effect.

[68] Attanasio and Blundell (2014).

[69] Feinstein (2003).

[70] Commission on Child Poverty and Social Mobility (2014).

Across all organisations and institutions, there is plainly much further to go. This new dimension to the diversity debate could, if the evidence is even half-right, yield high organisational and societal returns from a modest investment in better measurement and in different approaches to recruitment and performance.

(c) Recruitment strategy

Recruitment is typically a singular pursuit. The successful candidate is typically the one deemed to best meet the job requirements. In this way, recruitment is meritocratic, a Darwinian survival of the fittest. Yet most organisations are not singular. They are team sports. What matters most to organisations is collective performance, not individual brilliance. Most successful ones are not a Darwinian dog-fight.

Diversity is important precisely because it improves collective functioning, over and above individual ability – recall the "Page equation". Diversity is, by definition, a collective concept. That lays bare a potential tension between *recruitment* practices, which typically focus on the characteristics of the *individual*, and *organisational* success, which typically relies on the characteristics of the *collective*.

This disconnect is, interestingly enough, the self-same one exposed by the global financial crisis. Pre-crisis regulation was also individually-focussed. Regulators looked at banks one by one. Each of them individually had good CVs, strong social skills, were smartly dressed. Yet the collective consequence was a financial system in which everyone looked the same, thought the same and placed the same bets. That lack of diversity left the whole system vulnerable to collapse which, of course, it duly did.

Since the crisis, regulators have learned their lesson. Regulation has taken on a systemic orientation, with regulatory measures calibrated to risk across the financial system as a whole. That means regulators taking measures which promote system-wide diversity, such as encouraging new entrants into the field with new business models. In short, financial regulation these days seeks to take explicit account of the social externalities of systemic risk.

Recruitment policy might usefully follow in the footsteps of regulatory policy if it, too, is to maximise the organisational and social externalities of diversity. To see how and why, consider a simple example.[71] There are two candidates for a position, A and B. They do a test based on the attributes useful for the hiring organisation. These tests might be state of the art, including all of the diverse attributes one would wish in an organisation – cognitive, interpersonal and experiential skills.

In this test out of 10, candidate A scores 8 and candidate B scores 4. Which one should be hired? The answer is easy. The evidence points strongly to A as the candidate best meeting the requirements for the job. They have, quite literally, ticked the right boxes. But let's add a twist. What if the answers A gets wrong are the ones B gets right? And what if the questions existing employees get wrong are also the ones B gets right? In other words, what if candidate B brings skills to the organisation which otherwise do not exist.

The right recruitment decision for the *organisation* is then to choose B rather than A. Candidate B adds more to the collective ability of the organisation, even though they are weaker individually. The question is, how often would existing recruitment practices deliver such an outcome? In practice, I think rarely. Individuals are typically judged on the alignment between their skills and those of the existing organisation. It takes quite a leap of faith to choose instead the candidate whose skills are *mis*aligned with the hiring organisation.

Back in 2006, the Bank of England did some personality-type evaluations of middle managers and graduate entrants, using the well-known Myers-Briggs psychometric test. This was a

[71] Drawn from Page (2007) and Deloitte (2013).

population of 240 individuals, large enough to make reasonable statistical inferences, although it is worth bearing in mind that no psychometric test is without its drawbacks. The Myers-Briggs test groups individuals according to four classifiers, each with two possible outcomes.[72] So there are in total 16 possible personality types, typically summarised by a four-letter acronym. For example, I am an INTJ: Introvert, iNtuitive, Thinking, Judging.

Although these 16 personality types are not uniformly distributed across the population, no one category typically comprises more than 12–14% and none less than 2–3%. Viewed from this vantage point, the Bank's results were interesting. Around 60% fell into a single category: ISTJ. In 2006, ISTJ's were the star-bellied Sneetches of the Bank of England. The chances of this occurring by chance in the population at large are far less than one in a million.

The good news on this front is that, with the arrival of new staff with new and different skills at the Bank over the past few years, its personality has already become more diverse, perhaps significantly so. But longer-term, the challenge for all organisations is this: to put in place a more system-oriented approach to recruitment and performance management, which weighs diversity explicitly and systematically. We are not close to being there yet. This would be a leap of faith. But it would not be a leap into the unknown given the known benefits such diversity confers.

Conclusion

We are all Sneetches, some with stars, some without. The sooner we recognise that our minds are biased, the better placed we will be for dealing with its consequences. Diversity is a public good because it corrects our biased minds in ways which benefit society – from greater creativity and innovation to more robust and resilient decision-making, in every social setting from schoolrooms to sports fields, from companies to communities, from eco-systems to economies.

This public good, like all public goods, requires an on-going investment. Society has made a real investment in identity-based diversity over the past few years. So too has the Bank. That first diversity wave is reaping significant societal rewards. There has probably never been a better time for making progress on creating that second diversity wave, one which cultivates the subtle, but as important, cognitive and socio-economic dimensions. While leopards can't change their spots, Sneetches can change their stars.

References

Acemoglu, D and Robinson, J (2013), "Why Nations Fail: The Origins of Power, Prosperity and Poverty", *ISBN: 978-1846684302*

Ager, P and Brückner, M (2013), "Cultural diversity and economic growth: Evidence from the US during the age of mass migration", European Economic Review, Elsevier, vol. 64(C), pages 76–97.

Akerlof, G and Kranton, R (2011), "Identity Economics: How Our Identities Shape Our Work, Wages, and Well-Being", *Princeton University Press*

Alesina, A, Harnoss, J, and Rapoport, H (2015), "Birthplace Diversity and Economic Prosperity", available at: http://scholar.harvard.edu/alesina/publications/birthplace-diversity-and-economic-prosperity

Alesina, A. and E. La Ferrara (2000), "Participation in Heterogeneous Communities", *Quarterly Journal of Economics, 115(3): 847–904.*

[72] Extrovert or Introvert (E or I); iNtuitive or Sensing (N or S); Thinking or Feeling (T or F); Perception or Judging (P or J).

Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat and R. Wacziarg (2003), "Fractionalization", *Journal of Economic Growth, 8(2): 155–194.*

Alesina, A, Baqir, R and Easterly, W (1999) "Public goods and ethnic divisions", *Quarterly Journal of Economics 114:4, pages 1243–84.*

Anderson, R and May, R (1979), "Population biology of infectious diseases Parts I and II", *Nature 180, 361–367*

Ashraf, Q and Galor, O (2013), "The "Out of Africa" hypothesis, human genetic diversity, and comparative economic development", *American Economic Review 103(1): 1–46*

Attanasio, O and Blundell, R (2014), 'Human Capital in the 21st Century', presentation at the 'Capital in the 21st Century' conference hosted at the Bank of England on December 19 2014. Slides available here: http://www.cepr.org/sites/default/files/bank%20of%20england.pdf

Bellini, E, Ottaviano, G, Pinelli, D and Prarolo, G (2013), "Cultural Diversity and Economic Performance: Evidence from European Regions"; in R. Crescenzi and R. Percoco, eds.: Geography, Institutions and Regional Economic Performance, Advances in Spatial Science, Berlin and Heidelberg: Springer Verlag: 121–141.

Brooks, D (2011), "The social animal: a story of how success happens", ISBN 978-1907595448

Cardenas, J, Dreber, A, von Essen, E and Ranehill, E (2014), "Gender and Cooperation in Children: Experiments in Colombia and Sweden", PLoS ONE 9(3): e90923. doi:10.1371/journal.pone.0090923

Charness, G and Gneezy, U (2012), "Strong Evidence for Gender Differences in Risk Taking", *Journal of Economic Behavior & Organization 83 (2012) 50– 58*

Coates, J (2012), "The Hour Between Dog and Wolf: Risk-taking, Gut Feelings and the Biology of Boom and Bust", ISBN: 978-0007413515

Commission on Child Poverty and Social Mobility (2014), "Elitist Britain?", available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/347915/Elitist_Britain_-_Final.pdf

Davies, E (2015), "Improving the gender balance on British boards: five year summary", available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/482059/BIS-15-585-women-on-boards-davies-review-5-year-summary-october-2015.pdf

Deloitte University Press (2013), "Diversity's new frontier", available at: http://dupress.com/articles/diversitys-new-frontier/

Easterly, W and Levine, R (1997), "Africa's Growth Tragedy: Policies and Ethnic Divisions", *The Quarterly Journal of Economics, vol. 112(4), pages 1203–1250.*

Ertac, S and Gurdle, M (2011), "Deciding to decide: gender, leadership and risk-taking in groups", *Journal of Economic Behavior 83, 50–58.*

European Women on Boards (2016), "Gender Diversity on European Boards: Realising Europe's Potential: Progress and Challenges", available at: http://european.ewob-network.eu/wp-content/uploads/2016/04/EWoB-quant-report-WEB-spreads.pdf

Faulkner, J, Schaller, M, Park, J, & Duncan, L (2004), "Evolved disease-avoidance mechanisms and contemporary xenophobic attitudes", Group Processes and Intergroup Behaviour, 7, 333–353.

Feinstein (2003), "Inequality in the Early Cognitive Development of British Children in the 1970 Cohort", *Economica Vol 70 Issue 277*

Ferrie, J and Hatton, T (2015), "Two Centuries of International Migration", *Handbook of the Economics of International Migration*

Florida, R (2002), "The rise of the creative class", Washington Monthly, available at: http://www.washingtonmonthly.com/features/2001/0205.florida.html

Florida, R (2003) "Cities and the creative class", available at: http://creativeclass.com/rfcgdb/articles/4%20Cities%20and%20the%20Creative%20Class.pdf.

Florida, R (2011), "How Diversity Leads to Economic Growth", The Atlantic City Lab, available at: http://www.citylab.com/work/2011/12/diversity-leads-to-economic-growth/687/

Florida, R and Gates, G (2001), "Technology and Tolerance: The Importance of Diversity to High-Technology Growth", The Brookings Institution Survey Series, available at: http://www.brookings.edu/~/media/research/files/reports/2001/6/technology-florida/techtol.pdf

Goldin, I, Cameron, G and Balarajan, M (2011), "Exceptional People: How Migration Shaped our World and Will Define our Future", Princeton University Press

Goodall, J (1986), "The chimpanzees of Gombe: patterns of behaviour", Harvard University Press, Cambridge (Massachusetts). 673 pages. ISBN 0-674-11649-6

Guillaume, Y, Dawson, J, Otaye-ebede, L, Woods, S, West, M (2015), "Harnessing demographic differences in organizations: What moderates the effects of workplace diversity?", *Journal of Organisational Behaviour*

Haldane (2009), "Rethinking the financial network", Speech given at the Financial Student Association, available at: http://www.bankofengland.co.uk/archive/documents/historicpubs/speeches/2009/speech386.pdf

Haldane (2014), "Central Bank Psychology", Speech given at the 'Leadership: stress and hubris conference', available at: http://www.bankofengland.co.uk/publications/Documents/speeches/2014/speech776.pdf

Heckman, J (2006), "Investing in Disadvantaged Young Children is an Economically Efficient Policy" available here: http://jenni.uchicago.edu/Australia/invest-disadv_2005-12-22_247pm_awb.pdf

Iaryczower, M, Lewis, G and Shum, M (2013) "To elect or to appoint? bias, information, and responsiveness of bureaucrats and politicians". Journal of Public Economics 97, 230–244.

Ingalhalikar, M, Smith, A, Parker, D, Satterthwaite, T, Elliott, M, Ruparel, K, Hakonarson, H, Gur, R, Gur, R and Verma R (2014), "Sex differences in the structural connectome of the human brain", *Proceedings of the National Academiy of Sciences of the United States of America Vol 111 No. 2*

Joel D, Berman Z, Tavor I, Wexler N, Gaber O, Stein Y, Shefi N, Pool J, Urchs S, Margulies D, Liem F, Hänggi J, Jäncke L, Assaf Y (2015), "Sex beyond genitalia: the human brain mosaic", Proceedings of the National Academy of Sciences of the United States of America Vol 112 No 50

Kahneman, D (2012), 'Thinking, Fast and Slow', ISBN: 978-0141033570

Karlan, D and List, J (2007), "Does price matter in charitable giving? Evidence from a large-scale natural field experiment", *American Economic Review 97:5 pages 1774–93.*

Lagarde, C (2014), "The Economic Power of Women's Empowerment", *Keynote speech, Tokyo, available at:* https://www.imf.org/external/np/speeches/2014/091214.htm

Land, G and Jarman, B (1993), "Breaking Point and Beyond", *San Francisco: HarperBusiness*.

Land, G (2011), "The failure of success", *TEDxTucson available on youtube.*

Landemore, H (2013), "Democratic Reason: Politics, Collective Intelligence, and the Rule of the Many", *Princeton University Press*

Lombardelli, C, Proudman, J, Talbot, J (2005), 'Committees versus individuals: An experimental analysis of monetary policy decision making', International Journal of Central Banking. Available at: http://www.ijcb.org/journal/ijcb05q2a5.htm

May, R.B and Anderson, R.M (1991), 'Infectious Diseases of Humans', Oxford University Press.

Manning, P (2005) "Migration in World History", ISBN: 978-0415516792

McKinsey (2015), "Diversity Matters", *available here:* http://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters

Mill, J S (1848), "Principles of Political Economy with some of their Applications to Social Philosophy", *Longmans, Green and Co*

O'Reilly, C and Williams, K (1998), "Demography and Diversity in Organisations: A review of 40 years of research", *Research in Organisation Behaviour, Volume 20 Pages 77–140*

ONS (2016), "What is the gender pay gap?", available at: http://visual.ons.gov.uk/what-is-the-gender-pay-gap/

Ottaviano, G and Peri, G (2005), "The economic value of cultural diversity: evidence from US cities", Journal of Economic Geography Vol 6 Issue 1

Page (2007), "The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies", *Princeton University Press*

Page (2010), "Diversity and Complexity", *Princeton University Press*

Resolution Foundation (2015), "26 percentage point gap between best and worst parts of the UK for BAME employment", available at: http://www.resolutionfoundation.org/media/press-releases/26-percentage-point-gap-between-best-and-worst-parts-of-the-uk-for-bame-employment/

Schaller, M and Neuberg, S (2008), "Danger, Disease, and the Nature of Prejudice(s)", *Advances in Experimental Social Psychology, Volume 46*

Seuss (1953), "The Sneetches and Other Stories", *Harper Collins Childrens Books*

Tajfel, H, Billig, M, Bundy, R and Flament, C (1971), "Social categorization and intergroup Behaviour", *European Journal of Social Psychology, 1, 149–178.*

Temple Grandin (2011), comments based on a telephone interview in 2011, for further details please see: http://www.templegrandin.com/

Tetlock, P (2015), "Super forecasting: The Art and Science of Prediction", *ISBN: 978-1511358491*

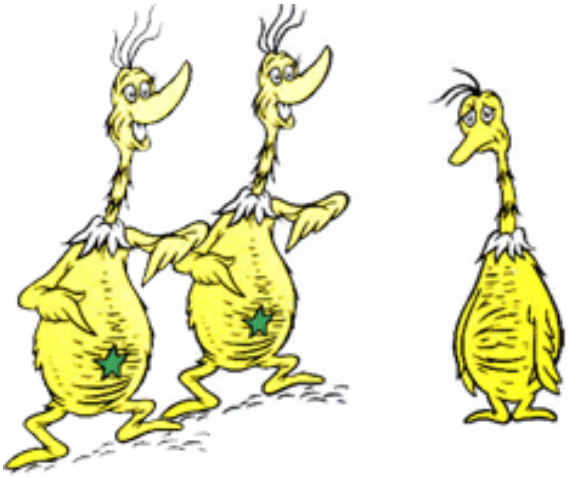
Todd, P and Gigerenzer, G (2012), "Ecological Rationality: Intelligence in the World", *Oxford Scholarship Online*

Walton, G and Spencer, S (2009) "Latent ability: grades and test scores systematically underestimate the intellectual ability of negatively stereotyped students", *Psychological Science Vol 20*

Watts, D (2002), 'A simple model of global cascades on random networks', Proceedings of the National Academy of Sciences 9: 5766-5771.

Wozniak, D, Harbaugh, W, Mayr, U, (2009), "Choices about competition: differences by gender and hormonal fluctuations, and the role of relative performance feedback", *University of Oregon Working Paper*

Figure 1: The Sneetches



Source: Dr Seuss (1953)

Chart 1: Incidence of the word diversity in books printed since the 16th Century

Source: Google Ngram Viewer.