

Putting men on a pedestal: Nobel prizes as superhuman myths?

The Nobel prizes for 2010 are to be announced in October. They recognise the best thinkers, the most beautiful minds in their fields; but does the distribution of Nobels accurately reflect the distribution of elite minds? **Danny Dorling** looks at laureate statistics and finds arbitrariness lurks.

In the northern hemisphere you know when the leaves will start falling from the trees because they announce the winners of the Nobel prizes. They do this with great speed, one a day, as the days visibly turn shorter. On October 5th, 2009, Elizabeth Blackburn, Carol Greider and Jack Szostak jointly shared the award in Medicine. On October 6th the Physics prize went to Charles Kao, Willard Boyle and George Smith. And on October 7th the Chemistry prize went to Venkatraman Ramakrishnan, Thomas Steitz and Ada Yonath.

Even before the other prizes had been announced it was clear that 2009 was to be an unusual year. A third of the prize winners by the third day were women. More unusual still, those women were laureates in the sciences.

Herta Müller was awarded the prize in Literature on October 8th – perhaps less unusual since Nobel literature has always been more female-friendly. But that yet another woman, Elinor Ostrom, shared the Sveriges Riksbank Prize in

Economics that was awarded on October 12th was a huge surprise. No woman had been awarded that prize before over the 60 years that it has been given. It does not bear the name “Nobel Prize in Economics”, but it is generally regarded as such.

The Nobels were first awarded in 1901; by the end of 2008 almost 800 people had been made Nobel laureates. Only 35 of them were women. That five women were awarded a prize in the single year 2009 was unprecedented – and increased, at a stroke, the total of women laureates by more than 10%. But does it represent evidence of a real break from the past?

Academics may pretend to be unworldly but they are keenly interested in prizes. As of October 2009 the second most read paper in the journal *Notes and Records of the Royal Society* concerned Nobel prizes and which nations won most¹. The paper suggested that Africa in particular was a place of “no hope” when it came to having a chance of winning any of the scientific prizes.

The main reason for this is fairly simple: inequalities in resources. That reason, however, does not explain the greatest discrepancy of all in the awarding of Nobel prizes. Why, until 2009, have so few been awarded to women?

Are men simply superior?

Most of that difference between women’s and men’s rates of award can, like the Africa effect, be explained simply: until a couple of generations ago, higher education was reserved almost exclusively for men. But a small and significant part of that difference is due to other factors. Those other factors are not any innate superiority of men, but the changing attitudes, assumptions and society surrounding the committees that award the Nobels.

That two of the three people sharing the Medicine prize in 2009 were women need not surprise us too much. In medicine, a greater degree of

teamwork is more common; Nobels in medicine tend therefore to be shared and thus medicine has more named Nobel laureates than any other single subject. A significant handful of women are among them. Physics has fewer prize-winners overall than medicine, and women have been less welcome: only two have ever been awarded the Nobel Prize for Physics. (One was Marie Curie in 1903, the other Maria Goeppert-Mayer exactly 60 years later, for describing the structure of nuclear shells.) Chemistry is fractionally more welcoming, with three winners (one of them again Marie Curie) before the 2009 result, rising to four when you include it.

Elite education and prejudice

Even when women have contributed to work that lead to Nobel prizes they were very often written out of the story, as in the now well-known case of Rosalind Franklin. Her work on the double-helix shape of DNA was not recognised when the Nobel prize for that discovery was awarded to James Watson and Francis Crick². A similar story could be told of Jocelyn Bell (now Dame Jocelyn Bell Burnell) and the discovery of pulsars, and of Lise Meitner in the history of nuclear fission.

Those who speak out are rare. Chemistry laureate Thomas Cech commented in 2009 that the list of Nobels, which he called “Rock Stars of Science”, “is not representing the best of science if half of the population is left out. In the biological and biomedical sciences, half of our PhD students are women. To exemplify only men as models of exciting scientists is misleading and destructive.”³

Outside of the sciences, literature has a rather better record, women being awarded almost a tenth of all the prizes handed out – but even that hardly gives confidence that the distribution of Nobels accurately reflect the distribution of elite minds. Given how many women have been authors since the descendents of Jane



Ada Yonath, Nobel Prize winner in Chemistry, 2009.
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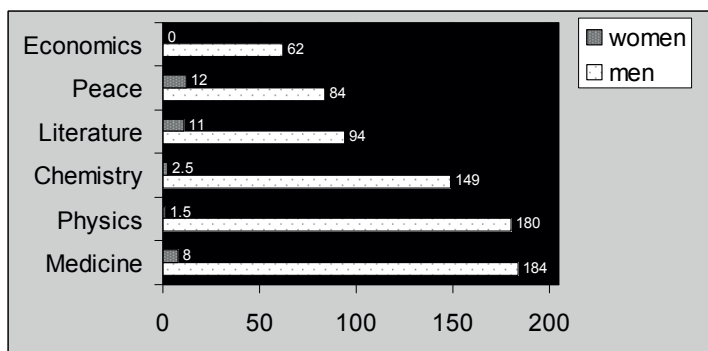


Figure 1. Male and female Nobel (and economics) laureates by subject, 1901-2008. Source: <http://nobelprize.org/index.html> (accessed January 30th, 2009). Note: Marie Curie is split between physics and chemistry, John Bardeen and Fred Sanger are counted only once given the subjects of their awards, but Linus Pauling is counted twice as his were in Peace and Chemistry, not "just" science)

Austen occasionally secured a room of their own⁴ to write in, is there really only one great woman author for every ten men? It would appear there is a problem with the prizes.

Of all the prizes it is peace that is stereotypically seen as most often a more female domain. It is one which is frequently awarded to organisations rather than individuals; women were possibly even in the majority as members of some of the 20 organisations awarded that prize over the years. But women have been among only a small minority of named winners. Those 12 who had been awarded Nobel prizes by the start of 2009 were fewer than 15% of the total ever awarded the prize.

However, it is in the distribution of the last non-scientific prize, the one that does not actually bear Mr Nobel's name, that women have never been welcome. In 1969 Sveriges Riksbank (Sweden's central bank), created the special prize in economics. Over the subsequent 40 years, until 2009, all the sixty-odd prizes, some joint, were, *without exception*, given to men. Clearly it is not just the chemists, medics and physicists who had problems with girls.

Figure 1 shows in summary how these top prizes have been shared out so badly between men and women over the course of the last century, before the 2009 announcements.

Fitting in for prize-winning

The Economics prize provides a natural experiment to test the hypothesis that something is amiss in the distribution of Nobels and the Nobel equivalent. It is possible that only men are able to be good economists. (However, in the aftermath of the global economic crash it is perhaps permissible to question whether there really is any such thing as a brilliant economist at all.) It is possible that just a chosen few are able to glimpse economic truths and reveal them to the small minority of their fellows who can understand the maths, while we masses are permitted to applaud. It is possible, but it is quite unlikely.

Alternatively, it is possible that we have here a group of men awarding each other prizes if they *fit in*. Evidence that the latter is the case, and that these men are no more able than other people, abounds. The Post-Autistic Economics Network (which began as a group of students dissatisfied with the unrealistic narrowness of what they were being taught) and the Association of Heterodox Economists have both pointed out the many ways in which traditional economics – of the sort exemplified by the prize-winners – has become ridiculous. Orthodox economists produce "dictionaries" of their subject where all those listed are men, and almost 90% of

the "great economists" listed are men from just eight United States Ivy League universities. Even prize-winners such as Joe Stiglitz now criticise economics as traditionally taught and by implication the creation of lists like this⁵. Given the passing of a few years, the once-latest economic theories often either appear misguided or to be simply the next logical step in a line of thinking that is, as a whole, too complex to be the work of just one mind, no matter how beautiful. I expect it will become commonly accepted that top economists were so often involved in mutual back-slapping^{6,7} that in future we will all better understand that the awarding of prizes was mostly about "fitting in at the time".

Table 1 shows subjects in which a few women have been welcome and subjects in which almost none, or none (in the case of economics), are recognised as achieving greatness.

Women, committees and prizes

Still, in 2009 the economists at last recognised a woman economist as worthy. Is this a symptom of the march of progress?

We tend to assume that equality between the sexes has been growing at a reasonably steady rate; but Nobel statistics do not support that view. A woman born in the last decade of the nineteenth century could be twice as likely to win a Nobel prize as one born in the first decade

Table 1. Pearson goodness-of-fit test of Nobel prize by sex and subject, 1901-2008

		Medicine	Physics	Chemistry	Literature	Peace	Economics	Total
Observed	Men	184	180	149	94	84	62	753
	Women	8	1.5	2.5	11	12	0	35
	Total	192	181.5	151.5	105	96	62	788
Expected	Men	183.5	173.4	144.8	100.3	91.7	59.2	753
	Women	8.5	8.1	6.7	4.7	4.3	2.8	35
	Total	192	182	152	105	96	62	788
$(O - E)$	Men	0.5	6.6	4.2	-6.3	-7.7	2.8	0.0
	Women	-0.5	-6.6	-4.2	6.3	7.7	-2.8	0.0
	Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0
$(O - E)^2/E$	Men	0.0015	0.2482	0.1235	0.4001	0.6524	0.1280	1.55
	Women	0.0327	5.3407	2.6579	8.6087	14.0354	2.7538	33.43
	Total	0.03	5.59	2.78	9.01	14.69	2.88	34.98

Notes: For source of data, see Figure 1. Strictly speaking, in statistical strictures too few women have been awarded the prize over the course of the last century for this simple goodness-of-fit test to be applied, as in three categories fewer than five women would be expected to have been awarded a prize given how few women have been awarded in general. The sum of the squared differences each divided by that expected number is 34.98. The number of degrees of freedom is sexes less 1 multiplied by subjects less 1, $(2-1)(6-1) = 5$. On 5 degrees of freedom a value of 20.515 is statistically significant at the 0.1% level. This is an approximate test as cell sizes are small. Nevertheless it would appear that sex and subject are far from independent (literature and peace above the average, physics, chemistry and economics below, while medicine awards prizes at the average rate).

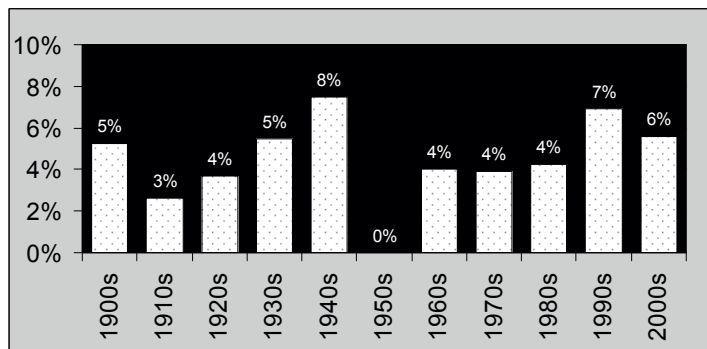


Figure 2. Female Nobel laureates (%) by decade, worldwide, 1901–2008. Sources: <http://nobelprize.org/index.html> (accessed January 30th, 2009; note that since the 1950s almost all the prizes for women have been in literature or peace, with a few in medicine)

of the twentieth century. Until the end of the 1930s women averaged between 3% and 4% of the annual tally; in the 1940s they hit 8%. Figure 2 suggests that had you been observing the tally in 1950 you might have felt optimistically that by the end of the century a quarter of prizes would have been won by women, or even half if you hoped for a little acceleration reflecting the rapid promotion of women into secondary education, universities and beyond (up to then). But it is a curious and shocking fact that in the decade and a half between 1948 and 1962 *not a single woman received a Nobel of any kind*.

Had you carried on observing to the eve of the 2009 awards, you would perhaps have been saddened to find that the 1940s tally of 8% had yet to be matched again.

The awarding of no Nobel prizes to women in the period 1948–1962 did not occur by chance; it is too unlikely an event for that. As an exact test, if the process is random, and if on average 4.9% of prizes were awarded to women each year before 1950, then over the fifteen years 1948–1962, and over the five prizes then available, the chance that not a single woman would be awarded a prize in any year is $(1 - 0.049)^{(15 \times 5)} = 0.023$. This is less than the traditional 5% cut-off for suspicion, or even than the stricter 2.5% cut-off if we consider the outside chance that the awarding of prizes was so random that women could have been given almost all of them in those years. The lack of prizes thus did not occur by chance. It also did not occur from conspiracy; it is too glaring an outcome for that. Conspiracy between the committees would surely have resulted in at least one woman being selected during this decade, as a token. Women had been given prizes in every previous decade, so the lacunae did not occur in the 1950s because too few women had been in “top jobs” by then. It has to be something else.

Women were still nominated of course. For the Peace prize, for instance, nominations included educationalist Maria Montessori in 1951, birth control campaigner Margaret Sanger in both 1953 and 1955, and Helen Keller in 1954 for her work on disability and ability.

But increasingly for that prize it was men, especially anti-communist men, who were pushed forward. The Cold War was at its height. The witch hunts for communists and the macho politics of the 1950s are reflected in the Nobel awards. They are reflected in literature too: Winston Churchill was awarded the Literature prize in 1953, Ernest Hemingway in 1954, and Boris Pasternak in 1958. That no woman was awarded any of the highest of international prizes between 1947 and 1962 almost certainly says more about social changes and the political imperative to be seen to be supporting “men of freedom” at that time, than about any lack of achievements among the women who might have qualified.

The sharing of Nobel prizes over time between women and men is partly a litmus test of changing attitudes. The 15-year gap in a single woman being awarded a single Nobel prize occurred, I would argue, because those who awarded the prizes and made the initial nominations were reflecting the times they were living through. The prizes had begun to matter greatly, not for their cash value, but for the prestige that they car-

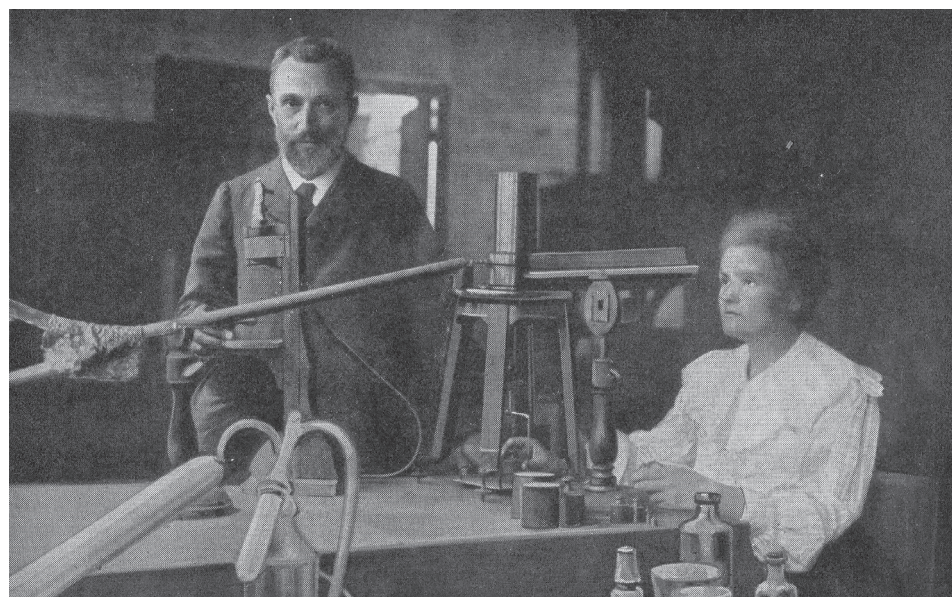
ried and the increasingly political message which their awarding gave.

Times change, and attitudes change with the times. That in 2009 women gained a third of the science prizes was a record entirely unprecedented. In that single year the number of women who had ever been awarded a Nobel prize increased by more than 10%. It will be some years before we know if this is a blip, or a change in the shape of things to come. But as we wait for the 2010 Nobel laureates to be announced, we are entitled at least to hope.

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Danny Dorling is Professor of Human Geography at the University of Sheffield. A fuller version of this article can be found in his book, *Injustice: Why Social Inequality Persists*, Bristol: Policy Press, April 2010.



Pierre and Marie Curie in their Paris laboratory. The photograph was probably taken around 1905