The Educational Backgrounds of Leading Scientists and Scholars

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Summary of Key Findings

- Four in ten (42%) of the UK's most prestigious scientists and scholars were educated at independent schools.
- 40 schools, mostly independent, produced a quarter of today's Fellows of the Royal Society and British Academy.
- Over half (56%) of the Fellows of the Royal Society and British Academy studied at Oxford or Cambridge.
- Over two thirds (68%) of British Academy Fellows educated in the UK went to Oxford or Cambridge universities compared with just under half (47%) of the UK educated Fellows at the Royal Society.
- Cambridge University particularly dominates the Royal Society – accounting for 34% of Fellows, compared to Oxford's 13%.
- The school backgrounds of today's Fellows closely mirror the student intakes to Oxbridge and other elite universities in the 1960s when many entered higher education.
- Current independent school pupils are on average four times as likely to achieve an A* in academic GCSEs than their state school counterparts, and constitute up to a half of the highest achieving pupils in some core academic subjects at age 16.
- Students in independent schools account for fewer than 15% of A level entries, but twice the proportion of A grades. Independent school students account for one third or more of top grades in key subjects like Physics, Chemistry, Economics and History.
- Current trends in student intakes to leading research universities suggest that independent school pupils will continue to be over-represented among the next generation of leading scientists and other scholars.

Introduction

The Sutton Trust has produced a series of studies reviewing the school and university backgrounds of leading people across a number of professions. This work has investigated fields such as law, politics and the news media, and revealed a clear link between private education and professional success. Independent schools make up 7% of the school population at age 11, yet constitute over half of leading news journalists, medics, chief executives, and 70% of barristers and judges[1].

The surveys have highlighted that the majority of those holding the most powerful and influential positions in modern Britain come from a small social elite, and are not reflective of the wider society which the professions are intended to serve.

The creation of these social elites is largely a result of educational inequalities exhibited in the school and university system. Children at leading independent and state schools dominate entry to the country's most highly academically selective universities, which in turn produce the lion's share of graduates in the professions. The problem is that the vast majority of parents are unable to afford the fees charged by independent schools, and so are consequently unable to access the expertise and facilities available at such schools.

Meanwhile, research has found that the careers and education advice and range of qualifications offered by many state schools is inadequate, which means pupils attending maintained schools lack the credentials and pathways required to eventually progress into the professional elites[2]. There is a huge waste of academic talent in state schools in England, with 60,000 pupils at some stage between the ages 11 and 16 among the top fifth of academic performers yet not progressing to higher education [3].

The studies have also shed some light on other barriers facing graduates from non-privileged backgrounds during the early career stages of many professions - factors that determine which graduates are able to gain access to (and prosper within) the professions. This includes access to work experience, internships and social networks, as well as the importance of fostering the 'soft skills' valued by employers.

This latest survey in the series has a slightly different focus. It investigates the school and university backgrounds of the country's leading scientists and scholars – as defined by membership of two of the country's most prestigious academies: the Royal Society, and the British Academy[4].

Being elected a Fellow of the Royal Society or the British Academy is one of the highest accolades an academic can receive in the UK - showing he or she is at the top of their field as judged by academic peers. Previous surveys by the Trust focus on the backgrounds of the top 100 leaders in a given profession. This survey focuses on just under 2000 individual academics. But little up to now has been known about the social and educational backgrounds of these leading scholars and scientists. One question we can pose (tentatively) with the data gathered here is whether the educational profile of Fellows simply reflects the make-up of past graduates of elite universities - or whether there are differences in the likelihood of reaching the top in academe once a university degree (and PhD) has been gained. Some have argued that the academic world is more meritocratic than other areas of public life as there success in pure academic terms is determined on one particular attribute: intellectual ability.

[1] For a summary of these surveys see: http://www.suttontrust.com/reports/ST_MilburnSubmission.pdf
[2] See http://www.suttontrust.com/reports/NCEEOct2008.pdf
[3] http://www.suttontrust.com/reports/wastedTalent.pdf
[4] In an appendix to the report we also present less complete data gathered for fellows of the Academy of Medical Sciences and the Academy for Social Sciences.

As discussed in later sections, another difference in this survey is that the majority of fellows are older than leaders in other walks of life surveyed previously by the Trust. The majority were born before World War 2, and a significant number in the 1940s. This means that many of today's fellows are the products of an education system of a former era: the independent and state grammar system of the post war years. They are the success stories that define the ‘golden generation’ of social mobility, which experienced an expansion of opportunities in the mid 20th century. The data gathered here allows us to explore to what extent today's leading scholars are a direct reflection of this past era.

These historical trends however have clear resonances with contemporary debate over the current school system, and its capacity to produce academically qualified students. Now, as in previous decades, a major determinant of your academic prospects is what qualifications and advice is on offer at the school you attend. We review some of the data on this issue for current schools.

Clearly the characteristics of schools today will have major implications for the make-up of future leading academics. These debates are perhaps even more crucial for the country now given the increasingly skills-based global economy of the 21st century. The country's academic prospects are the key to its economic future. The Trust believes that, as with other elites, the country’s academic elite is something to be proud of; but it should be open to all academically able children irrespective of social background.

The figures gathered for this report suggest that much more needs to be done to improve the achievement in core academic subjects within state schools if future leaders in the sciences, arts and humanities are to come from a broader range of school and social backgrounds.

Methodology

The survey focused on the 2,200 leading scientists and scholars elected as Fellows of the two most established academies, the Royal Society and British Academy. The latest lists of Fellows can be found on the Societies' respective websites[5].

Each year the existing Fellows of the Royal Society, the UK's national academy for the sciences, currently elect up to 44 scientists to its prestigious Fellowships. New Fellows must have made 'a substantial contribution to the improvement of natural knowledge, including mathematics, engineering science and medical science'. For scientists in the UK being awarded the Fellowship is perhaps the highest accolade to have been given, short of a Nobel Prize. At the time of the survey, there were 1,328 Fellows.

'Ordinary' Fellows meanwhile are elected by the British Academy to scholars who have 'attained distinction in any of the branches of study which it is the object of the Academy to promote' – i.e. across the humanities and the social sciences. Election is a mark of distinction, as only a very small number of scholars in any field are elected. Up to 38 elections are made in each year to Ordinary Fellowship, and there are now some 890 Ordinary Fellows.

The school and university backgrounds of Fellows were obtained by using publicly available sources, such as *Who's Who*, and contacting academics directly. Schools were then categorised according to their status at the point at which the Fellow would have entered the school - often different to the current status of schools. Schools were classified as non-selective state, state grammar, direct grant or independent. Universities meanwhile were classified into a number of well-defined categories: Oxbridge; the Russell Group, the 1994 Group, and Post-92 universities.

We estimate that the figures collated for the schools attended by Fellows represent at least 80% of those educated in the UK. We believe this sample is broadly representative of the whole Fellowship. There were several reasons for not obtaining data for some individuals: information on schools was not listed in the Who's Who entry; school information was available, but the status of the school was difficult to ascertain; or Fellows did not respond to the email survey through which we contacted those individuals for whom we could not find any publicly available data. It is therefore unlikely the minority of Fellows with missing school information will be sufficiently biased towards a particular school background to skew the findings significantly. The proportion of known university backgrounds among UK educated Fellows is 96%.

Response rates for parallel surveys of fellows of the Academy of Medical Sciences and the Academy of Social Sciences were lower, and consequently it is uncertain how representative they are. The results on these smaller samples are presented for interest in Appendix 6.

[5] See: http://www.britac.ac.uk/fellowship/directory/ordinary.cfm?letter=A; http://royalsociety.org/page.asp?tip=1&id=2215;

Findings

Table 1: Fellows with known UK school backgrounds

	Royal Society		British Academy		Combined totals	
School	**Number**	**%**	**Number**	**%**	**Number**	**%**
Independent	293	38	267	47	557	42
State	484	62	299	53	784	58
Direct Grant	*88*	*11*	*76*	*14*	*164*	*12*
Grammar	*364*	*47*	*214*	*38*	*578*	*43*
Non-selective	*32*	*4*	*9*	*2*	*41*	*2*
Total	**777**	**100%**	**564**	**100%**	**1341**	**100%**

The table above details the school backgrounds of Fellows for whom information was available. This excludes 197 UK-based Fellows of the Royal Society and 151 UK-based Fellows of the British Academy without school details. The remaining Fellows were educated outside the UK.

Detailed definitions of the different school types and discussion of the figures is provided in the following section of the report. But there are a number of stand-out findings. Four in ten Fellows were educated at independent schools, even though these schools made up just 7% of school pupils, and British Academy Fellows are significantly more likely to be privately educated than their Royal Society counterparts. Only one in 50 Fellows were educated in non-selective state schools – with, as might be expected, the vast majority of state school educated Fellows from selective grammar schools.

Elite schools

When the data are broken down for individual schools, it is striking how many Fellows of both Academies come from a tiny number of elite public schools (which made up significant percentages of university entrants in the post war era). The figures for schools with at least five Fellows among their former students are listed in Appendix 2. Perhaps unsurprisingly Eton College tops the list with 22 Etonians now leading scientists and scholars.

In fact, just ten schools - seven independent and three direct grant – educated over 10% of today's Fellows. Eton College, Winchester College and St Paul's School have at least 20 Fellows to their name. Meanwhile 40 schools, mostly independent, produced between them a quarter of the leading scientists and scholars. None of these elite academic schools are in the state sector, although some direct grants are included. A number of state grammar schools produced three Fellows, but the most impressive state performer in this respect in fact comes from overseas: Sydney's High School for Boys produced at least 6 Fellows of the Royal Society.

In Appendix 4, the figures are broken down for age groups of Fellows, by decade of birth. This shows that slightly lower proportions of younger Fellows are independently educated than their elder peers.

Table 2: Fellows' university backgrounds

	Royal Society		British Academy		Combined	
University	**Number**	**%**	**Number**	**%**	**Number**	**%**
Russell Group	846	83%	662	88%	1508	85%
- Oxford	*129*	*13 %*	*247*	*33%*	*376*	*21%*
- Cambridge	*348*	*34%*	*258*	*34%*	*606*	*34%*
1994 Group	68	7%	34	5%	102	6%
Post 92	7	1%	0	0%	7	0%
Other	102	10%	56	7%	151	9%
Total	**1016**	**100%**	**752**	**100%**	**1768**	**100%**

The table above details the undergraduate university backgrounds of Fellows for whom information was available. This excludes 70 UK-based Fellows of the Royal Society and the British Academy without university details. The remaining 350 Fellows graduated from universities outside the UK. The current membership of the Russell and 1994 groups of universities are available on their respective websites[6].

Again, these findings are discussed in the following section of the report in the context of the nature of the university sector when the Fellows enrolled on degree courses in the 1960s. The high proportion of Russell group graduates is to be expected given that these universities comprised much of the university sector at that time. Perhaps the most noticeable figures are the different percentages of Oxbridge graduates among Fellows of the two academies. Two thirds of British Academy Fellows educated in the UK went to Oxford or Cambridge, compared with just under half of the UK-educated Fellows of the Royal Society. Graduates of Cambridge are particularly well represented in the Royal Society, accounting for 34% of its Fellows, compared to 13% for Oxford. This is perhaps a reflection of Cambridge's historic dominance in the science subjects.

As can be seen from the tables in Appendix 3, it is also the case that Fellows of the British Academy generally come from a far narrower range of universities than Fellows of the Royal Society, perhaps reflecting differences in the provision of arts and science courses in the university sector of the time.

[6] See: http://www.russellgroup.ac.uk; http://www.1994group.ac.uk

Comparisons with other professions

In tables 3 and 4 below we compare the educational background of Fellows with other fields surveyed by the Trust. Here direct grant grammars are classified with state grammars in line with the figures presented in previous reports, on the basis that more than half the places in those schools were open to non fee-payers.

Fellows are less likely to be privately educated than leaders in other areas of public life, such as law and journalism, but more likely than MPs. Interestingly, the fee paying school sector supplies two in five academics among the scholarly elite, but only one in five Vice Chancellors, those in charge of running universities. Scientists and other scholars (alongside journalists) are also more likely to have attended Oxford or Cambridge Universities than those in any other field except Judges. In part, this may be because the age profile of both Judges and Scholars, on average, tends to be older than the other professions the Trust has reviewed.

Table 3: How the school backgrounds of scientists and scholars' compare with leaders in other professions

	Year	%Independent	%State	%Grammar	%Comp
Scientists & scholars	***2009***	***42***	***58***	***54***	***3***
VCs	2008	24	76	66	10
Judges	2007	70	30	28	2
MPs	2007	32	68	25	42
Journalists	2006	54	46	32	14
Medics	2007	51	49	32	17
CEOs	2007	54	46	26	20

Table 4: How the Oxbridge backgrounds of scientists and scholars compare with leaders in other professions

	Year	%Oxbridge
Scientists & Scholars	***2008***	***56***
VCs	2007	27
Judges	2007	78
MPs	2007	42
Journalists	2006	56
Medics	2007	15
CEOs	2007	39

Discussion

The post war education landscape

The educational characteristics of today's scientists and scholars needs to be put into the context of the post-War education system – a system characterised by academically selective state schools and a small number of elite universities. This is the world in which many of the Fellows, now in their late 60s, were educated – before the introduction of comprehensive state schools, the near abolition of grammar and direct grant schools, and the rapid expansion of the university sector witnessed over more recent decades.

School characteristics

Official statistics on education are hard to come by for this period, but the overall make-up of the school system can be gleaned from a number of official reviews undertaken at the time[7]. During the 20 year period from 1950 until 1970 there were four main types of schools in England (other parts of the UK had similar systems):

- *State grammar schools* -- educating around 25% of all school pupils (both state and independent) during the period.
- *Secondary modern schools* -- accounting for approximately 65% of all school pupils.
- *Direct grant schools*[8] -- making up 3% of school pupils.
- *Independent schools* -- making up around 6% of all school pupils (private school numbers actually witnessed a slight decline over the period, before rising again in the 1980s).

These figures highlight that independent school pupils are significantly over-represented among today's Fellows. Independent schools educated just over 6% of young people in the post war education system, yet account for 42% of today's leading scholars and scientists.

University characteristics

The university sector experienced by many of the Fellows was comprised of what, in modern parlance, is now termed the 'old research universities'. This was essentially the majority of members of the modern day Russell Group, although newer universities were starting to make their mark[9]. Overall, just over five percent of school leavers went on to study for a degree, compared to over one third today. Oxford and Cambridge graduates made up about a sixth of all university students in the early Sixties; today they make up less than two percent of degree entrants.

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[7] The statistics used here are taken from the Public Schools Commission report of 1968. We have also consulted figures available in the Robbins Report tasked by the Government to look into the future of higher education in the early 1960s. For a helpful summary of some of these historical trends see: http://www.parliament.uk/commons/lib/research/briefings/snsg-00616.pdf

[8] These were 179 selective schools funded partly by the state and partly through private fees.

[9] The Russell Group consists of: Birmingham, Bristol, Cambridge, Cardiff, Edinburgh, Glasgow, Imperial College, Kings College London, Leeds, Liverpool, London School of Economics, Manchester, Newcastle, Nottingham, Oxford, Queen's University Belfast, Sheffield, Southampton, University College London, and Warwick

But the university system of the Fellows era was, as today, far from representative of the school system from which it drew its students. A useful snapshot of university admissions is provided by figures collated for the Public Schools Commission in 1966. As the summary table below shows, 42% of the intake of Oxbridge was drawn from independent schools, and a fifth of the student population as a whole came from private schools – far more than the proportion of pupils educated by the sector.

Table 5: Intakes of universities in 1966 by school background

Schools	Percentage of university student intake		
	Oxbridge	Other universities	Total universities
Independent	**42**	**16**	**19**
Direct Grant	**19**	**13**	**13**
State	**39**	**72**	**68**
- State grammar	*37*	*63*	*60*

Backgrounds of Fellows compared with post war education system

As has been noted, it is hardly surprising that the vast majority of Fellows in our survey had attended one of the Russell Group universities, as these accounted for most of the higher education sector at the time. The high representation of Oxbridge graduates is also to be expected – educating about a sixth of undergraduates at the time, but over half the Fellows – as such academic powerhouses are bound to supply the lion's share of leading scholars.

In terms of school background, if we take the above 1966 university admission figures as the benchmark - most Fellows are aged in their 60s - the immediate observation is how similar the school backgrounds of the Oxbridge intake is to the make-up of the Fellows in our sample. Just over four in ten of the student intakes at Oxford and Cambridge were privately educated in the mid-1960s - the same proportion of privately educated Fellows at the Royal Society and British Academy combined.

We do not have detailed figures on the admissions makeup of the other universities that Fellows attended, but we know that, overall, universities outside of Oxbridge had a far lower proportion of independently educated students (less than one fifth in the mid Sixties). It seems likely, though, that the representation of privately schooled students was stronger in some of the most prestigious and established universities of the time, and the school backgrounds of the Fellows in our sample reflect this.

Progression in academic careers

The close association between the proportion of independently educated students enrolled at elite universities in the 1950s and 1960s and the proportion of independently educated fellows suggests broadly that school background might have little impact on the progress of individuals once they are in academe. This contention is supported when the education backgrounds of Fellows from different age groups is considered: a slightly smaller proportion of younger Fellows went to independent school and it is also the case that independent school pupils made up a smaller proportion of degree entrants in elite universities during later years. The figures for fellows with known birth-dates, organized by different decades, are presented in Appendix 4.

However, given the paucity of data on the backgrounds of academics as a whole for various stages of their careers, this remains, at best, a suggestion.

Postgraduate progression

The data available on the progression to postgraduate degrees, and PhDs in particular, for very recent cohorts of graduates suggests that school background has no impact on the likelihood of taking up postgraduate study.

In 2005 the Higher Education Funding Council for England published a report that examined postgraduate participation rates and concluded that progression, once in possession of a first degree, is essentially invariant by background of the student[10].

Another recent survey supports this conclusion and suggests that the chances of progressing to a PhD are the same for current university students from different types of schools - as long as they have performed well enough in their first degree to pursue research[11].

Although this may not always have been the case. Forthcoming research by the London School of Economics suggests that in previous decades independent school pupils were actually less likely than their state school counterparts to pursue postgraduate education after graduating. One possible reason for this is that the financial returns to postgraduate courses has radically improved in more recent decades This finding applies to one year Masters degrees as well as research PhDs[12].

Career progression

Much less is known about the backgrounds of young researchers during the early stages of academic careers. This is despite concerns about low pay and high insecurity for young academics in fixed term postdoctoral positions (before becoming full time lecturers)[13], The relatively low pay of academics compared with other high skill professions has led many to speculate that it now attracts fewer individuals from prosperous backgrounds with expectations to earn high salaries. However, others suggest that it is precisely the low relative pay that means it is increasingly likely that young academics will come from privileged backgrounds, as poor earnings will impact on their lives far less.

What evidence is available for lecturers and professors indicates that academe attracts on the whole individuals from increasingly average income homes – unlike those in other professions.

A research paper published by Bristol University for the recent Government-commissioned Milburn Review on fair access into the professions compared the income backgrounds of children born in 1958 and 1970 who went on to pursue particular careers[14]. Children in the 1970 cohort who grew up to become academics came from homes with incomes closer to the average for the country as a whole, than those academics born in the 1958 cohort. In other words, more recent generations of academics have come from less well off backgrounds than their predecessors. This is in stark contrast to professions such as journalism, law and medicine, which are in fact becoming more privileged. In these fields, individuals born in 1970 on average came from homes with increasingly higher than average incomes compared with those born 12 years earlier in 1958.

[10] See http://www.hefce.ac.uk/pubs/hefce/2005/05_03/ pages 129-131
[11] For further details, see: http://www.york.ac.uk/depts/educ/people/WakelingP.htm
[12] *Growth of Postgraduate Education and its Effect on Intergenerational Mobility*, forthcoming
[13] See for example the 2002 Roberts report that sought to improve career progression for young scientists, http://www.hm-treasury.gov.uk/ent_res_roberts.htm
[14] See http://www.bristol.ac.uk/cmpo/publications/other/socialmobility.pdf

Election of Fellows

We received many comments from Fellows and reviewers on the peer selection processes deployed by the Academies to appoint new Fellows. Concerns have been expressed about the low representation of females, younger academics, and researchers from particular disciplines in the Fellowship[15].

Some academics even questioned the assumption that the Fellowship is a good proxy for leading academics - as so many highly rated researchers are not elected as fellows. As we have no data on academics as a whole it is impossible to make any conclusive observations on these issues - only to re-iterate that any differences need to be considered in the context of the educational achievements at school, university and during academic life, that are the major factors in determining likely Fellows.

[15] For a discussion of these issues see the 2002 House of Commons Science and Technology Committee report, at http://www.publications.parliament.uk/pa/cm200102/cmselect/cmsctech/774/77403.htm

The academic divide in today's schools: prospects for future Fellows

This report shows the high representation of the privately-schooled among leading researchers. Yet with an average age of 60 plus, the majority of the leading figures in the sciences and humanities experienced the education system of the 1950s and 1960s – academically selective at 11 and with much lower staying on rates to higher education than today. As discussed, these educational patterns persist for the youngest Fellows as well, but even these will have entered school in the early 70s at the very latest.

While there are lessons to learn from these historical trends, what can we say about the prospects for the future generation of leading scholars and scientists? What will the school and university backgrounds of Fellows look like in 2050? Given the close association between educational achievement and the make-up of current Fellows, we can consider the achievement in core academic subjects among today's school children – as well as intakes to research-led universities – to provide an indication of future trends in the educational backgrounds of tomorrow's leading scholars and scientists.

Attainment gaps

Analysis by the Trust of the 2008 results for GCSEs in England in a number of core academic subjects reveals a stark state-independent school divide in the likelihood of achieving a top A* grade -- an indicator of high academic potential. The figures are presented in Table 6.

Independent school pupils entered for these disciplines are up to five times as likely to achieve an A* grade. As independent school pupils are also more likely to be entered for such subjects in the first place, this means that in many academic disciplines, they make up a substantial proportion of A* pupils – despite representing only 7% of school pupils overall. In modern languages, for instance, independent schools now make up nearly as many A* pupils as the entire state sector. So while independent school make up a fraction of school pupils at age 11, by age 16 they constitute up to a half of the highest achieving pupils in certain core academic subjects.

Table 6: Proportions and numbers of GCSE students achieving the top A* grade in 2008 in independent and state schools in England

	State		Independent	
	% of entries A*	Number A*	% of entries A*	Number A*
Biological Science	15.4	9450	36.0	5718
Chemistry	19.1	10288	41.3	6203
Physics	18.7	9993	40.7	5898
Core Science	2.2	11132	12.5	2723
Additional Science	5.1	17017	17.8	3314
Maths	4.5	31709	17.7	5537
Geography	8.0	12452	30.3	6676
History	8.1	14601	31.1	7376
Art and Design	5.2	8843	24.6	3905
English	3.2	19152	17.4	7627
French	6.5	9833	30.3	8622
German	6.7	4293	30.3	2286
Spanish	10.4	4796	35.1	3992

This academic divide widens further at sixth form level. The chart below shows the extent to which pupils in independent schools currently dominate entry to and high achievement in key A level subjects. Students in independent schools account for just under 15% of A level entries, but twice the proportion of A grades. In many of the subjects core to the Royal Society's remit and that of the British Academy, independent schools perform even better. The private sector contributes over one fifth of the entries in Physics, Maths and Chemistry, for instance, and produces one third of the A grades.

Table 7: Independent school A level entries and A grades as percentage of total entries and A grades

	% of total entries (2008)	% of total A grades (2008)
Economics	33.1	48.4
Physics	22.7	35.3
Maths	21.3	31.4
Chemistry	21.2	33.5
Geography	19.5	32.5
History	17.7	33.0
Biology	17.2	30.5
English	10.7	23.5
All subjects	**14.8**	**28.6**

Source: Independent Schools Council Bulletin 52

University entry

Attainment in core academic subjects is the key to gaining entry to elite research universities – the launch pad for the vast majority of future leading academics.

Recent work by Policy Exchange[16] has shown that certain A level subject choices are much more likely to lead to a place at such universities than others. The study found that traditional science and mathematics subjects, for example, account for a little under a quarter of the A levels studied by young people, but one third of the A levels accepted by research-led universities. Similarly, 'soft' arts and humanities subjects comprised just 5.2% of the A levels accepted by leading universities, while 'traditional' arts and humanities subjects made up 16.6% of accepted qualifications.

So the school supply chain is vital in predicting the composition of the next generation of top scholars. Research-led universities need to take on undergraduate students who have the attributes and knowledge to prosper in a highly academic environment.

University access

The data compiled for Fellows show that almost all had attended a Russell Group University for their undergraduate degree. While the broadening and expansion of the higher education sector may change this situation a little for the leading scholarly elite of the future, it seems high likely that – as in other elite walks of life – attendance at a relatively small number of prestigious institutions will continue to be the dominant pathway to success. This is particularly so in a field where research and academic rigor is paramount. And, indeed, some core academic disciplines are only offered by a select range of universities in the country.

Yet, when we look at access to a sample of these universities for today's young people, the situation is starkly unequal, despite some shifts in the last decade. The table below highlights the backgrounds of students over the last ten years entering the thirteen universities ranked most highly by the newspaper league tables (the Sutton Trust 13).

'Sutton Trust 13' intake	1997/98	2001/2	2002/3	2005/6	2007/8
% from independent schools	39	35	32	33	33
% from state schools	61	65	68	67	67
% from lower social classes	13*	14*	16	17	16
% from low participation areas	6	7	8	8	4**

Source HESA; * comparable with later social class measures; ** not comparable with figures for previous years. The 'ST13' universities are: Birmingham, Bristol, Cambridge, Durham, Edinburgh, Imperial College, London School of Economics, Nottingham, Oxford, St Andrews, University College London, Warwick and York.

Independent schools now educate seven percent of the school age population and 15 percent of A level entrants; yet these schools account for one third of undergraduate students at top ranked universities. Similarly, around half the population are from the lower four social classes – but they make up just 16% of entrants to leading universities, meaning that the richer half of the population

[16] The hard truth about 'soft' subjects, Policy Exchange, Dec 2008, at www.policyexchange.org.uk

account for the remaining 84%. And the proportion of students from the poorest areas of the country is pitifully low, at just four percent.

If the leading scientists and scholars of 2050 more or less reflect the current student intakes at these highly-ranked universities, then we will continue to see fewer state educated figures, particularly from our most deprived neighbourhoods and most challenging schools, than if we were truly making the most of the talents of bright young people from all backgrounds. And it may be that the intake figures for top universities overestimate the proportion of non-privileged students who will go on to become future scholars, as the dominance of the independently schooled in the sciences, for example, may skew the figures further.

As discussed earlier, these university enrolment trends are driven by earlier achievement at school. But this is not the whole story. Another reason driving inequalities in access to university is that students in comprehensive schools – and especially those in schools with no track record in admissions to elite higher education – are less likely to apply to prestigious institutions even when armed with the appropriate A level grades, deterred by misconceptions and less confident in their abilities. A recent report commissioned by the Sutton Trust and the Department for Business, Innovation and Skills, for example, showed that pupils in high performing independent schools made twice as many applications to elite institutions that their peers in similarly high performing comprehensives[17]. There is also evidence of some teachers in state schools actively discouraging applications to, for instance, Oxbridge, even for their brightest pupils, as well as poor careers and education advice holding back those from non-traditional homes[18].

[17] http://www.suttontrust.com/reports/BIS_ST_report.pdf
[18] See for example: http://www.suttontrust.com/reports/MORIJan2008.pdf

Appendix 1: Comments from Fellows

The email survey of Fellows prompted many unsolicited views on the education system of which they were the products. Here we provide a selected summary of some of the comments. These provide a small insight into the experiences of the so called 'golden generation' of upward mobility during the immediate post war period – the grammar school boys and girls, and 'scholarship kids', and grant maintained university students. As these comments testify, the education system enabled many to become the first in their family to go to university, transforming their lives.

As ever, views on grammar schools differ according to whether the individuals benefitted from them or not. In a small minority of cases, some scholars also spoke passionately about how they struggled against the odds in a non-academic school, after failing to pass the eleven plus exam. While the grammar school debate is often seen as a particular historical feature of English school policy, many comments from Fellows educated overseas in fact revealed common experiences in Australia, South Africa, and in Wales and Scotland.

Tom Foxon
School of Physics and Astronomy
University of Nottingham

My own background, like many of my peers, was from a working class family and I was the first to go to university from the family. The secondary school, unusually for that time, had a scientist as headmaster who worked with Appleton according to my recollection, so science was very much encouraged. I took the then mandatory 11 plus, which enabled me to go to the Grammar school. I do recall the most difficult thing financially for my parents was the cost of school uniform, but somehow they managed.

At university I was completely self sufficient since the grant at that time was £300 per year and my parents' income was around £1000 per year. This made attending university much easier in reality than for today's students, but then of course the student population was much smaller as a fraction of the total population.

Professor Lord May of Oxford
Department of Zoology
University of Oxford

My secondary school was Sydney Boys' High School. It was in fact the first secondary school established in Sydney, and was essentially a state grammar school. That is, it was a state school, but it selected from a wide region (the Eastern Suburbs of Sydney).

It had an absolutely superb set of teachers, including a remarkable chemistry teacher who taught no fewer than eight Fellows of the Royal Society (including one Noble Laureate and one PRS). The same chemistry teacher coached the track team, which won the state school championship 28 of the 33 years he coached the team.

As in the UK, a misguided Government disestablished most of the selective state schools in the 1970s, with the result that the private schools were greatly academically strengthened -- just like the UK.

David Miller
Solid State and Photonics Laboratory
Stanford University

I was educated at Perth Academy, Perth, Scotland. At that time (I left in 1972), it was a state school in Scotland, but had been operating as a selective high school, that is, pupils were streamed on the basis of perceived academic ability on the basis of a test at the end of their primary school education, which was at about age 11. At the very end of my time at Perth Academy, the school was just transitioning to being comprehensive, eliminating the above selection procedure.

I honestly think, incidentally, that I as an individual benefitted substantially from being in that more selective school – I think I got a very good high school education. It is a fair question however whether it was best overall for the larger body of students to do that streaming.

Tariq Modood
Department of Sociology
University of Bristol

My secondary school was Aylestone Secondary Modern School in Brent, London, which I attended during 1964-71; I failed the 11+ and so was assigned this school, which became a comprehensive (though only in name) in the late 1960s. I went on to Durham University in 1971. In doing so I was the first person to go to university directly from Aylestone (in a 14 year history). Most of my teachers did not have a degree or know anything about universities and I had to research universities myself without any assistance.

Adrian Sutton
Department of Physics
Imperial College

I went to a state school the Dartford Technical High School For Boys in Kent. I was there between 1967 and 1973. At that time if one passed the 11 plus one had a choice between going to a grammar school or a technical high school. I was recommended to go to the technical high school because I only just passed the 11 plus.

I subsequently got 5 A-levels and 2 S-levels at that school, and became the first pupil to apply to Oxbridge, and the first member of my family to go to any University. My experience has always convinced me that the 11 plus is potentially a catastrophic examination for late developers like me, and had I failed it I doubt very much that my career would have been as successful.

John Morris
Director of Preclinical Studies
Oxford University

I attended Colston's School in Bristol – an independent school – on an academic scholarship. My mother was a teacher in Bath where we lived, and the son of another teacher had a son who had applied for and gained the scholarship the previous year. It was suggested that I have a go with two others, all of whom were thought to have a better chance than I. However, for whatever reason I was given the fee-assisted place (there were 5 or 6 as I recall)

John Barrell
Centre for Eighteenth Century Studies
University of York

I went to Dulwich College (1954-61) and Trinity College Cambridge (1961-4). In those days Dulwich College, though now unambiguously an independent school, was not so when I went there. Although it was calling itself a public school and admitted fee-paying pupils like any other public school, the great majority of the places were free, and paid for by local authorities. It was called the 'Dulwich experiment'. My place was free, and, like most other pupils, I went there after taking the 11-plus at a state primary school. We all became little gentlemen quite easily, or so I thought until I went to Cambridge and met lots of real public schoolboys.

Appendix 2: Schools that produced at least five Fellows of the British Academy and Royal Society

School	School type	Number of Fellows
Eton College	IND	24
Winchester College	IND	21
St Paul's School	IND	21
Christ's Hospital	IND	16
Manchester Grammar School	DIR	15
Westminster School	IND	15
King Edward's School Bham	DIR	15
Rugby School	IND	11
Charterhouse School	IND	10
Latymer Upper School	DIR	10
University College School	IND	9
Dulwich College	IND	9
George Watson's Boys' Coll	IND	9
St Albans School	IND	8
George Heriot's School	IND	8
Haberdashers' Aske's,London	IND	8
Shrewsbury School	IND	8
Highgate School	IND	7
Oundle School	IND	7
Wellington College	IND	7
Whitgift School	IND	7
Harrow School	IND	6
King's College School	IND	6
Leys School, Cambridge	IND	6
Marlborough College	IND	6
Bolton School	DIR	5
Nottingham High School	IND	5
Norwich School	IND	5
Portsmouth Grammar School	DIR	5
Royal Grammar Schl, Nwcstle	DIR	5
Sevenoaks School, Kent	IND	5
St Edward's School, Oxford	IND	5
Stowe School	IND	5
Bedales School, Petersfield	IND	5
Birkenhead School, Cheshire	DIR	5
Bryanston School, Dorset	IND	5
City of London School	IND	5
Clifton College, Bristol	IND	5
Edinburgh Academy	IND	5
Emanuel School, London	IND	5
St Paul's Girls' School	IND	5

Key: IND- Independent school; DIR- Direct Grant school

Appendix 3: Universities that produced at least ten Fellows of the Royal Society / British Academy

Arts versus sciences

Further analysis of the data suggests that the higher representation of independent school alumni among Fellows of the British Academy compared with Fellows of the Royal Society is due largely to the social composition of the different universities attended by the Fellows as students.

The tables below show that only a relatively small number of universities have produced more than 10 Fellows of the British Academy, compared with the number of universities producing at least 10 Fellows of the Royal Society. Oxford in particular makes up a far larger proportion of university graduates among leading scholars of the British Academy – and historically Oxford admitted fewer state school pupils than Cambridge.

The slightly higher proportion of state school entrants at Cambridge and other universities such as University College London and Manchester in past decades, meanwhile, is consistent with the similarly higher percentage of Royal Society Fellows from state education compared with their British Academy counterparts. This wider group of universities produced a larger share of today's nationally recognised scientists.

University	No. RS Fellows
Cambridge	348
Oxford	129
UCL	58
Manchester	41
Bristol	40
Imperial	38
Birmingham	28
Edinburgh	25
London	24
Glasgow	21
Nottingham	21
KCL	20
Leeds	19
Liverpool	16
Durham	15
Sheffield	14
Queen's Belfast	12
St Andrews	12
Queen Mary	10
Reading	10
Sussex	10

University	No. BA Fellows
Cambridge	258
Oxford	247
UCL	34
LSE	25
Edinburgh	19
Glasgow	14
Manchester	12

Appendix 4: Backgrounds by date of birth

The table below documents the school backgrounds of Fellows from the Royal Society and British Academy by their decade of birth. These figures exclude those with unknown school backgrounds and those educated overseas.

The proportion of Fellows from private schools seems to have declined over time, but has possibly stabilised more recently – with similar proportions of Fellows born in the 1940s and 1950s educated in independent schools.

		Independent		State		Direct Grant		Grammar		Non-selective	
Decade born	Total number	number	% of year group	number	% of year group	number	% of year group	number	% of year group	number	% of year group
1920 - 29	277	122	44%	148	53%	26	9%	115	42%	7	3%
1930 - 39	377	148	39%	221	59%	42	11%	173	46%	6	2%
1940 - 49	430	148	34%	268	62%	56	13%	198	46%	14	3%
1950 - 59	179	62	35%	112	63%	17	10%	86	48%	9	5%

Appendix 5: School backgrounds of British Academy Fellows in different disciplines

Tables in Appendix 5 breakdown the school backgrounds of Fellows of the British Academy by different disciplines. Numbers in each subject area are much smaller, but the figures suggest differences between different academic fields. Around 7 in 10 Fellows are privately educated in History of Art, Philosophy, or Classical Antiquity for example.

	Number of UK fellows with known school background	%IND	%State	%unclassified
Classical Antiquity	**45**	67%	33%	0%
Theology and Religious Studies	**18**	44%	50%	6%
African and Oriental Studies	**22**	64%	36%	0%
Linguistics and Philology	**17**	24%	71%	6%
Early Modern Languages and Literatures	**28**	39%	54%	7%
Modern Languages, Literatures and other Media	**41**	49%	39%	12%
Archaeology	**28**	57%	43%	0%
Medieval Studies	**51**	35%	55%	10%
Early Modern History to 1800	**39**	46%	51%	3%
Modern History from c.1800	**45**	58%	40%	2%
History of Art and Music	**23**	78%	17%	4%
Philosophy	**27**	67%	33%	0%
Law	**51**	43%	53%	4%
Economics and Economic History	**39**	28%	72%	0%
Anthoropology and Geography	**31**	32%	65%	3%
Sociology, Demography and Social Statistics	**40**	25%	73%	2%
Political Studies: Political Theory, Government and International Relations	**24**	50%	50%	0%
Psychology	**15**	47%	47%	7%
Totals	**584**	**273**	**289**	**22**

Appendix 6: Educational backgrounds of Fellows of Academies of Medical and Social Sciences

These tables summarise data from surveys of Fellows of the Academy of Social Sciences and the Academy of Medical Sciences. Fellowship of the Academy of Medical Sciences is based 'on exceptional contributions to the medical sciences either in the form of original discovery or of sustained contributions to scholarship'. Fellows are drawn from clinical academic medicine, veterinary science, dentistry, laboratory science, medical and nursing care and other professions allied to medical science. There are currently 912 Fellows[19].

Members of the Academy of Social Sciences will have demonstrated 'a significant contribution to Science and its promotion' and include Learned Societies in the UK and individual social scientists. The contributions made include research, teaching, professional practice, consultancy and the promotion of social science knowledge. There are currently 554 Fellows[20].

We estimate that the figures collated for the schools attended by Fellows represent at least 53% of those educated in the UK for the AMS, and at least 62% of those educated in the UK for the ASS. The proportion of known university backgrounds among UK educated Fellows meanwhile is 71% and 62% respectively.

Fellows with known UK school backgrounds

	Academy of Medical Sciences		**Academy of Social Sciences**	
	Number	**%**	**Number**	**%**
Independent	203	44	61	24
State	234	50	196	76
Grammar	*204*	*44*	*160*	*62*
Non-selective	*30*	*6*	*36*	*14*
Total	464	100	257	100

Fellows with known UK university backgrounds

	Academy of Medical Sciences		**Academy of Social Sciences**	
	No	%	No	%
Russell Group	443	73	105	36
Oxbridge	*220*	*36*	*74*	*25*
94 Group	30	5	50	17
Post 92	18	3	3	1
Other	112	19	136	46
Total	603	100	294	100

[19] http://www.acmedsci.ac.uk/p59.html
[20] http://www.acss.org.uk/about3.htm