as such. Rather it is a more general failure to appreciate the basic principles underlying scientific research, coupled with the "publish or perish" climate.

As the system encourages poor research it is the system that should be changed. We need less research, better research, and research done for the right reasons. Abandoning using the number of publications as a measure of ability would be a start.

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Science in schools: decline and fall?

A possible shortfall of qualified medical school applicants

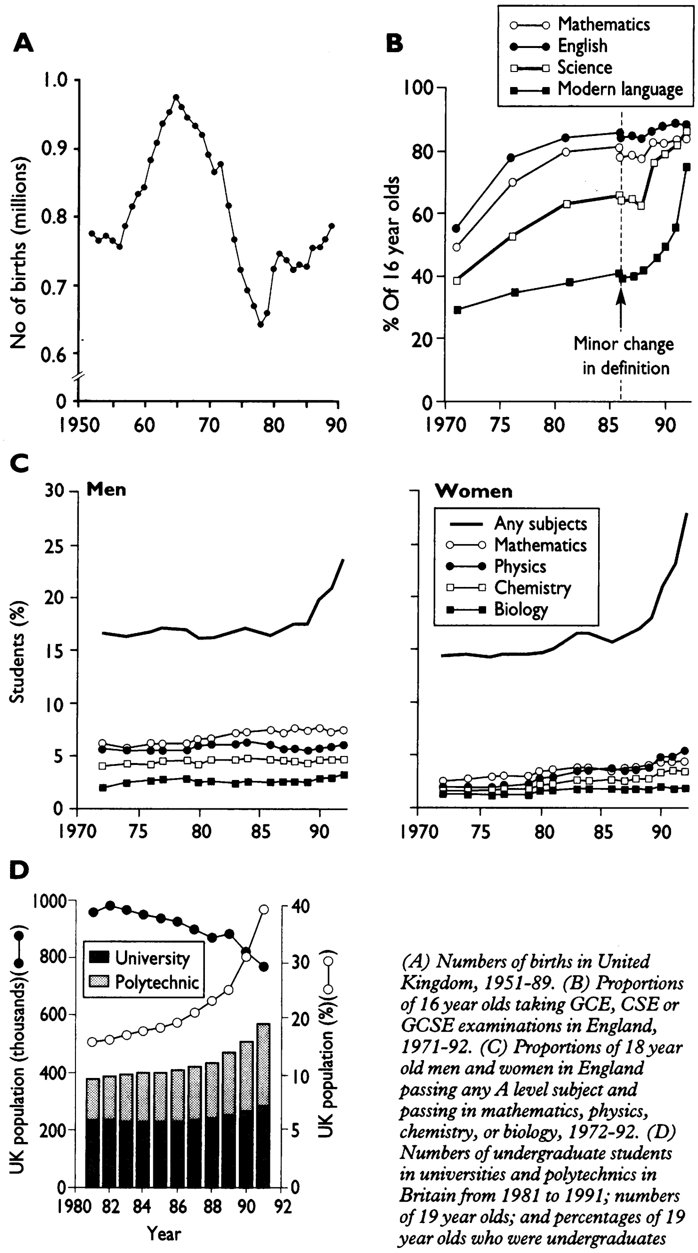
Sciences are learning facts from a book and not thinking for yourself; I wanted to express my own ideas and think for myself.

(A level student quoted in *New Statesman*[1])

The dog days of August are a difficult time: for journalists there is little important news, while for students at school the only news that matters is the results of their general certificate of secondary education (GCSE) and A level examinations. Not surprisingly, the two interests combine in newspaper articles claiming that standards are slipping (or perhaps improving), quality is rising (or perhaps falling), or, as last year, talk of a "decline in science" (*Financial Times*), a "science slump" (*Times Education Supplement*), a "continuing decline in [science] qualifications" (*Nature*), or "science... losing its grip on the syllabus" (*Times*). More recently an article in *New Scientist* headed "Classroom science goes into free fall" quoted John Patten, the education secretary, as saying that there had been a "neo-exponential decline" in students going in to A level science.[2] Is there a flight from science? And how might it affect medical schools, whose principal import is school leavers with good science A levels?

Although the number of entries for science GCSEs in 1993 was 1·7% lower than in 1992, total entries for GCSEs fell by 4·2%, suggesting that science survived relatively well. Undoubted large falls in entries for biology, physics, and chemistry studied as single subjects were readily compensated for by the increasingly popular combined science courses, which are now the norm. The demographic background to such statistics is four decades of changing birth rates; the rate in 1965 was 53% higher than that in 1978 (figure, A). These diminishing cohorts are now in secondary and higher education, and this year's 3·9% decrease in 16 year olds accounts for the fewer entries for GCSEs. Over the longer term, science qualifications have shown increased popularity, partly because of the change from the general certificate of education and the certificate of secondary education to GCSE (introduced in 1988), so that most 16 year olds take a science subject at GCSE level, on a par with those for English and mathematics (figure, B).

The different picture later suggests that what subjects GCSE students take hardly influences their choice of A level



(A) Numbers of births in United Kingdom, 1951-89. (B) Proportions of 16 year olds taking GCE, CSE or GCSE examinations in England, 1971-92. (C) Proportions of 18 year old men and women in England passing any A level subject and passing in mathematics, physics, chemistry, or biology, 1972-92. (D) Numbers of undergraduate students in universities and polytechnics in Britain from 1981 to 1991; numbers of 19 year olds; and percentages of 19 year olds who were undergraduates

subjects. A levels are now showing a sudden and sustained increase in uptake (figure, C), particularly by female students. The change continued into 1993, when 728 574 A levels were sat by candidates from the United Kingdom—0·4% lower than 1992, but a 3·5% increase when demographic changes are taken into account. But the picture for sciences is different. The proportion of male 18 year olds passing science A levels has been surprisingly constant since 1972, at about 5%. In contrast, the proportion of female students taking sciences has shown slow but steady growth since then and seems on target to top out at the same level as men, although female students prefer biology to physics. Intriguingly, the pattern resembles that reported in the Dainton report of 1968,[3] when, despite a 45% increase in the proportion of the population taking A levels between 1962 and 1967, sixth formers taking science remained a constant 5% of the age group. Explaining this remarkable constancy in the proportion of science specialists from 1962 to 1993, despite three decades of massive structural changes in the economy and in education (the Robbins expansion, comprehensive schools, sixth form colleges, GCSEs and AS levels, polytechnics transforming into universities, student loans and reduced student grants), is a difficult and yet unmet challenge for educationalists.

How does this relate to recent changes in higher education? In Britain in 1991 the absolute number of home undergraduates at universities and polytechnics was 50% higher than a decade before—an almost doubling in the proportion of the age group at university, from 13% to 25% (figure, D). Has the number of students studying non-science A levels increased faster than the number studying science because universities have encouraged (cheaper) arts courses at the expense of science courses? No, undergraduate numbers overall increased by 31·4% from 1988 to 1991, while numbers of those taking science courses increased by 34·8%. Here at least is an understanding of August's other news story: unfilled places to study science at universities. Places on science courses increased more quickly than other university places, whereas the number of students taking science A levels showed minimal growth (figure, C), resulting in a shortfall of entrants. The expansion in science has been supply led rather than demand led, and places are outstripping demand.

What implications does this have for medicine? During the 1970s medicine demanded (and obtained) the highest A level grades of any university subject.[4] Recently there have been hints that entrance standards have slipped,[5] although buffering by the increasing pool of well qualified women applicants has mitigated the problem. Medicine still has some leeway, although an overall ratio of two applicants for each place leaves only restricted room for manoeuvre, and applications to study medicine have grown less quickly than applications for other subjects at university.[4] Problems will inevitably occur if a constant proportion of the age group takes science A levels, the size of that age group falls each year, and medical schools seek a fixed absolute number of entrants each year. A crisis may be avoided if medical schools can survive until the nadir of the demographic decline, in 1995, when the cohort born in 1977 enters university. However, following the recommendations of the Medical Manpower Standing Advisory Committee to increase medical student numbers by 5·7% "as soon as practicable"[6] may not help.

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Screening for cardiovascular risk in general practice

Blanket health promotion is a waste of resources

One of the most controversial components of the new contract imposed on British general practitioners in 1990 was the requirement to offer regular health checks to the public. This requirement came even though multiphasic health checks had been shown to be ineffective in terms of their impact on morbidity and mortality.[1 2]

During the 1970s case finding and health promotion had become to be regarded as options available to general practitioners during consultations,[3] but during the 1980s the value of blanket (population) screening of all adults was disputed.[4 5] The professional and scientific concerns were, nevertheless, ignored when the government required general practitioners (or their staff) to perform health checks of the population and also to identify cardiovascular risk factors for all adults and intervene appropriately.[6]

This week's *BMJ* publishes the early results of two large scale evaluations of health checks and interventions for cardiovascular risk factors from general practice (p 308, p 313).[7 8] In both studies general practitioners were supported by nurses trained to screen and intervene. The Oxford and Collaboration health check (OXCHECK) study was mounted two years before the government's new policy was imposed and entailed a four year block randomised evaluation of the introduction of health checks by practice nurses.[7] The British family heart study is a randomised controlled trial in general practices in 13 towns in Britain to measure the impact of a programme of cardiovascular screening and lifestyle intervention led by nurses.[8]

Both studies cover large numbers of patients. The OXCHECK study is being conducted in five urban practices in Bedfordshire and the family heart study in a nationally scattered sample of 26 small town practices. The intervention of the OXCHECK study is health checks and counselling by nurses of patients about risk factors, with an emphasis on ascertaining patients' views on change and targets. In the family heart study the intervention is cardiovascular screening of men and their partners, with lifestyle interventions based on a client centred family approach. The measures in both studies include the change in the main risk factors for cardiovascular disease, but the family heart study also used the Dundee risk score for coronary heart disease and blood glucose assay.