



**Jon Snow**  
Journalist and broadcaster  
Chancellor of Oxford Brookes University

'One is tempted in 2005 to consider Africa as our first responsibility – certainly it is my first love – but then if our global environment fails, what of Africa, what of us?'

Jon Snow's blackboard is a recently-acquired object in the collection of the Museum. Such blackboard globes would have been used in 20th-century geography classrooms.

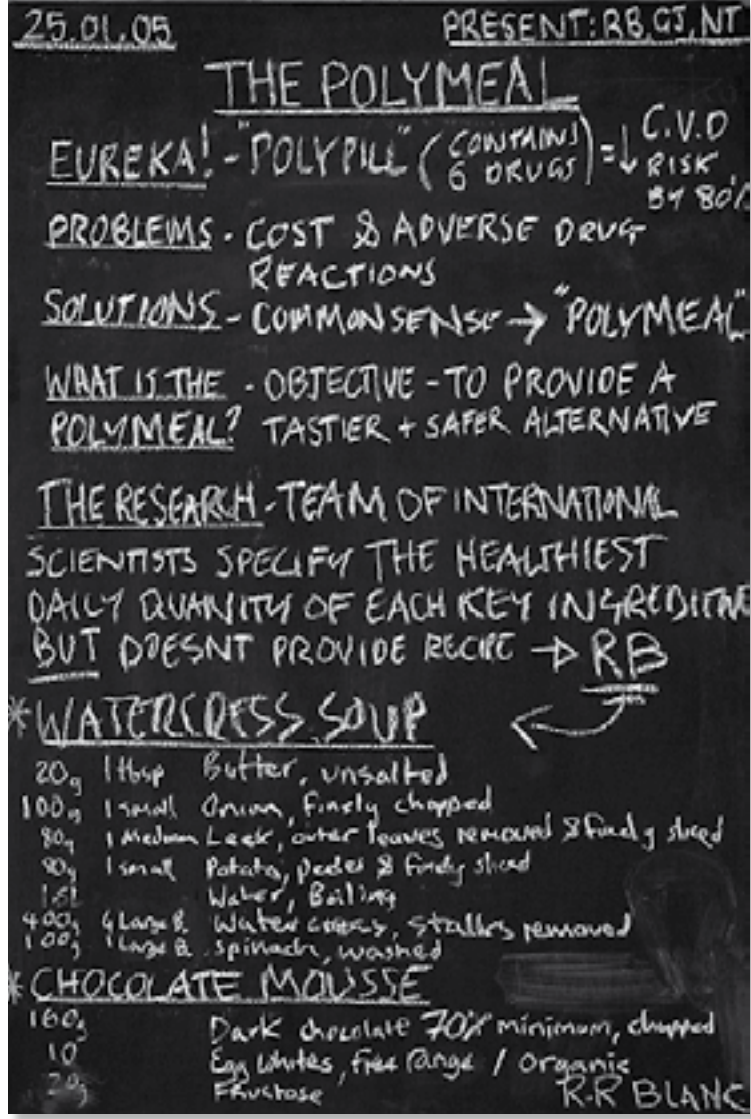
**Brian Eno**  
Musician

'This is the depiction of a theory that Arabic singing bounced around the world in several directions, creating what we call popular music, and how the British Isles were central to this.'

# Bye Bye Blackboard

Blackboards were wiped after use: they were meant for immediate communication, not for record. Even as they were being used, their messages were continuously revised, erased and renewed. But when Einstein came to Oxford in 1931, he was already an international celebrity. After one of his lectures a blackboard was preserved and has become a kind of relic. It is the most famous object in the Museum of the History of Science.

To mark the centenary of the Special Theory of Relativity the Museum invited a number of well-known people in Britain to chalk on blackboards the same size as Einstein's. All these guest blackboards were prepared in the early months of 2005. The result was an exhibition about science, art, celebrity and nostalgia. The blackboard is fast disappearing from meetings, classes and lectures: 'bye-bye blackboard'.



**Raymond Blanc**  
Chef

'This blackboard illustrates how the "polymeal" recipes were created as a response to the announcement from medical science that a "polypill" could significantly reduce the risk of cardiovascular disease. The key ingredients can be taken in a more enjoyable way.'

**Michael Heath**  
Cartoonist



# BROAD SHEET

**BROAD SHEET** communicates the work of the Museum of the History of Science, Oxford.

It is posted on the Museum's website, sold in the shop, and distributed to members of the mailing list, see [www.mhs.ox.ac.uk](http://www.mhs.ox.ac.uk).

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**£1.00**

# BROAD SHEET

No.5

Museum of the History of Science

# Bye Bye Blackboard ... from Einstein and others

**Albert Einstein**  
Physicist

Einstein's blackboard was used in a lecture in Oxford on 16 May 1931. It deals with some of the most fundamental questions in cosmology.

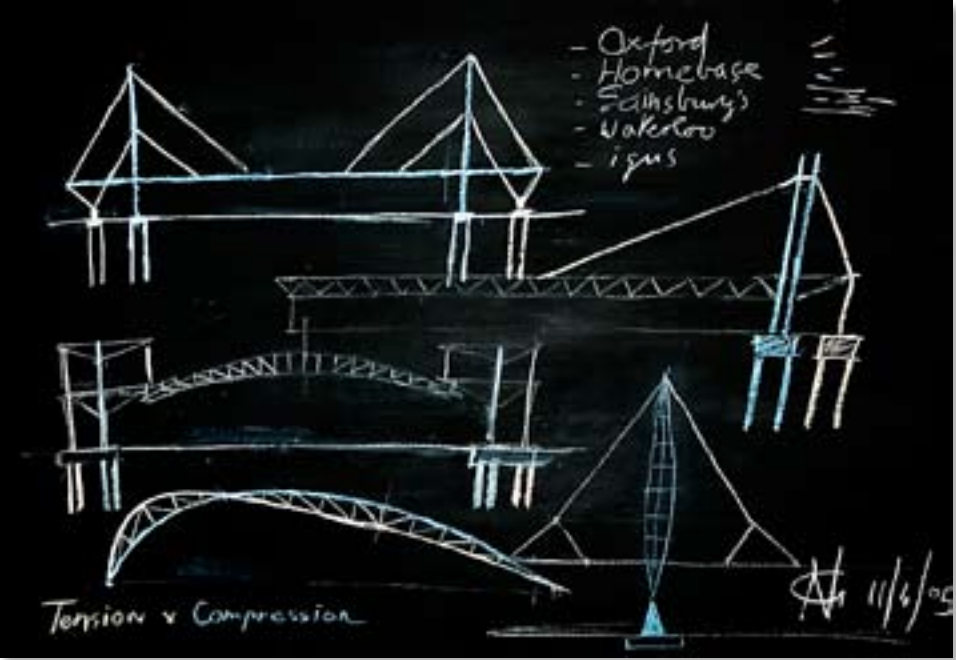
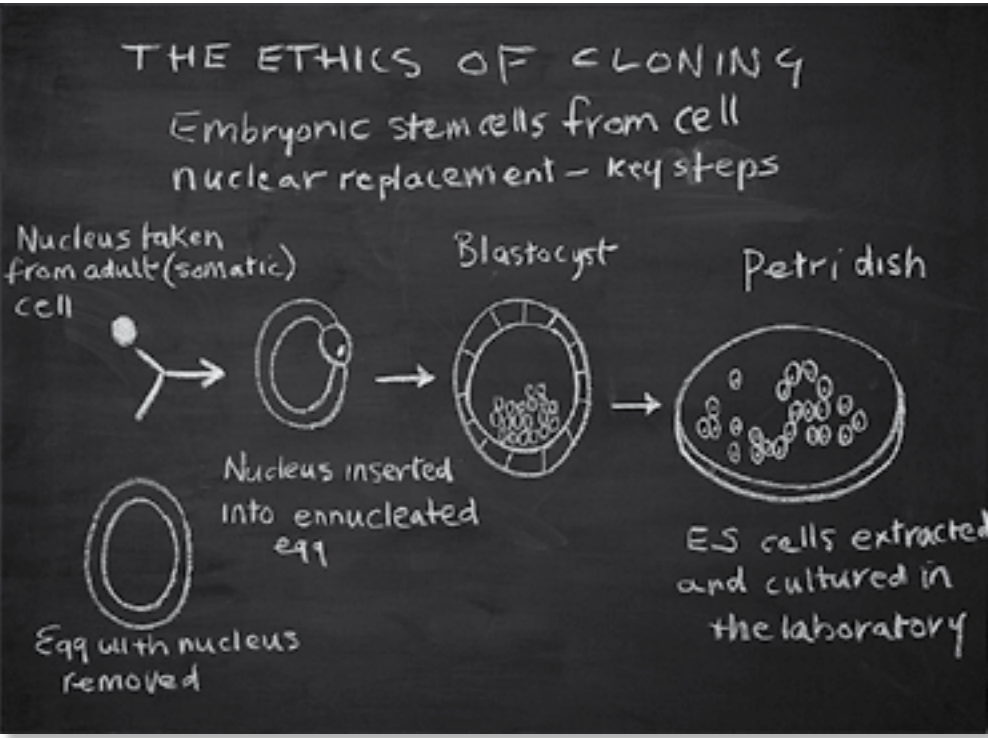
At that time Einstein's theories of relativity were being combined with astronomical data to explain the shifts towards the red in the spectra of distant galaxies, which indicated that the universe was expanding. In his lecture Einstein outlined a fairly simple model to explain this apparent expansion. In the first line on the blackboard, D, the measure of expansion in the universe, is defined in terms of the expansion factor P. The expression for the density of matter in the universe, given by  $\rho$  in the third line, is derived from the field equations. The last four lines contain numerical data, giving values for density, radius and age of the universe, where 'L. J' stands for 'Licht Jahr' (light year) and 'J' for 'Jahr' (year). According to the last line, the age of the universe is about 10, or perhaps 100 billion years (the bracket indicates an alternative figure, not a product of two figures).

$$D = \frac{1}{c} \frac{1}{t} \frac{dl}{dt} = \frac{1}{c} \frac{1}{P} \frac{dP}{dt}$$
$$D^2 = \frac{1}{P^2} \frac{P_0 - P}{P} \sim \frac{1}{P^2} \quad (1a)$$
$$D^2 = \frac{K \rho}{3} \frac{P_0 - P}{P} \sim \frac{1}{P^2} \quad (2a)$$
$$D^2 \sim 10^{-53}$$
$$\rho \sim 10^{-26}$$
$$P \sim 10^8 \text{ L. J.}$$
$$t \sim 10^{10} (10^{11}) \text{ J.}$$

Einstein's blackboard is on permanent display at the Museum of the History of Science, Oxford.

**The Right Reverend Richard Harries**  
Bishop of Oxford

'I had the privilege of chairing the House of Lords Select Committee on Stem Cell Research. Most of us were non-scientists, but with the aid of a very good scientific adviser we did I think grasp some of the fundamental principles involved. Cloning was one issue we had to discuss and both then and subsequently I have found these little drawings helpful both for myself and others to whom I am talking.'

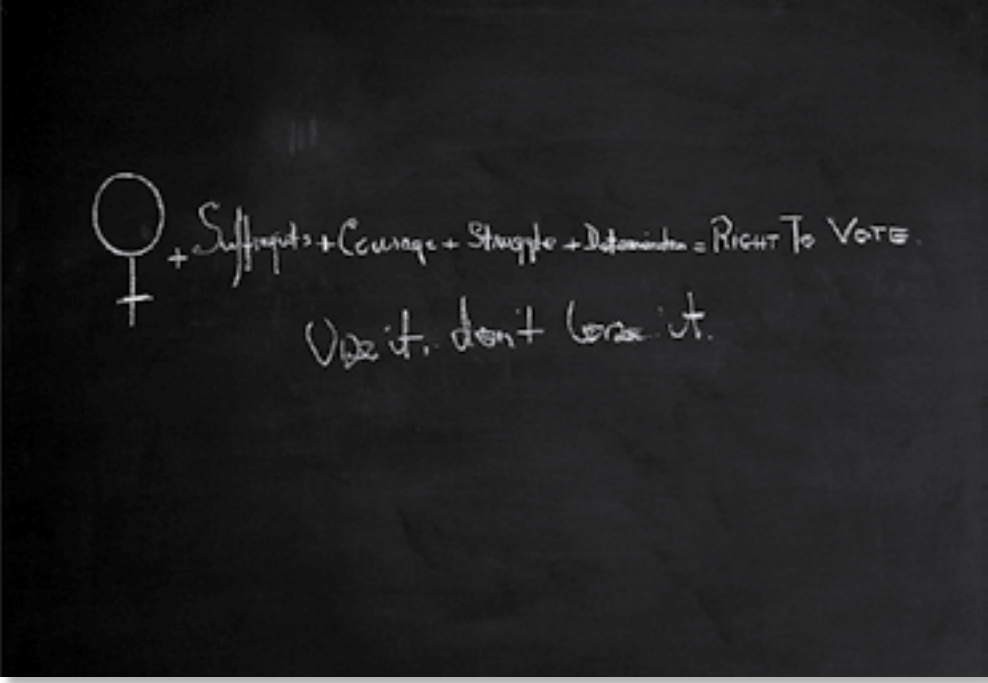


**Sir Nicholas Grimshaw**  
President of the Royal Academy

'Tension & Compression'

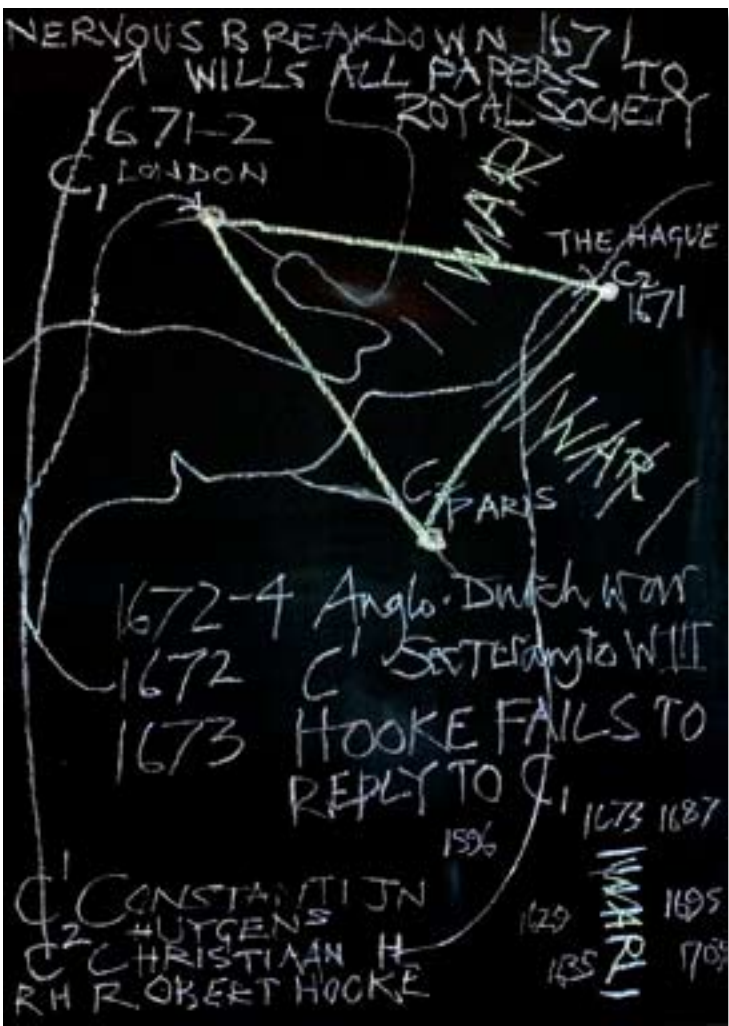
**Glenda Jackson MP**  
Actress and politician

'For me one of the most heartbreaking responses I get campaigning is when a woman will say, "Oh, I never vote." Women died to give us this right. Obviously I'd like all women to vote Labour, but even more importantly, whomsoever you select, vote, vote, vote.'

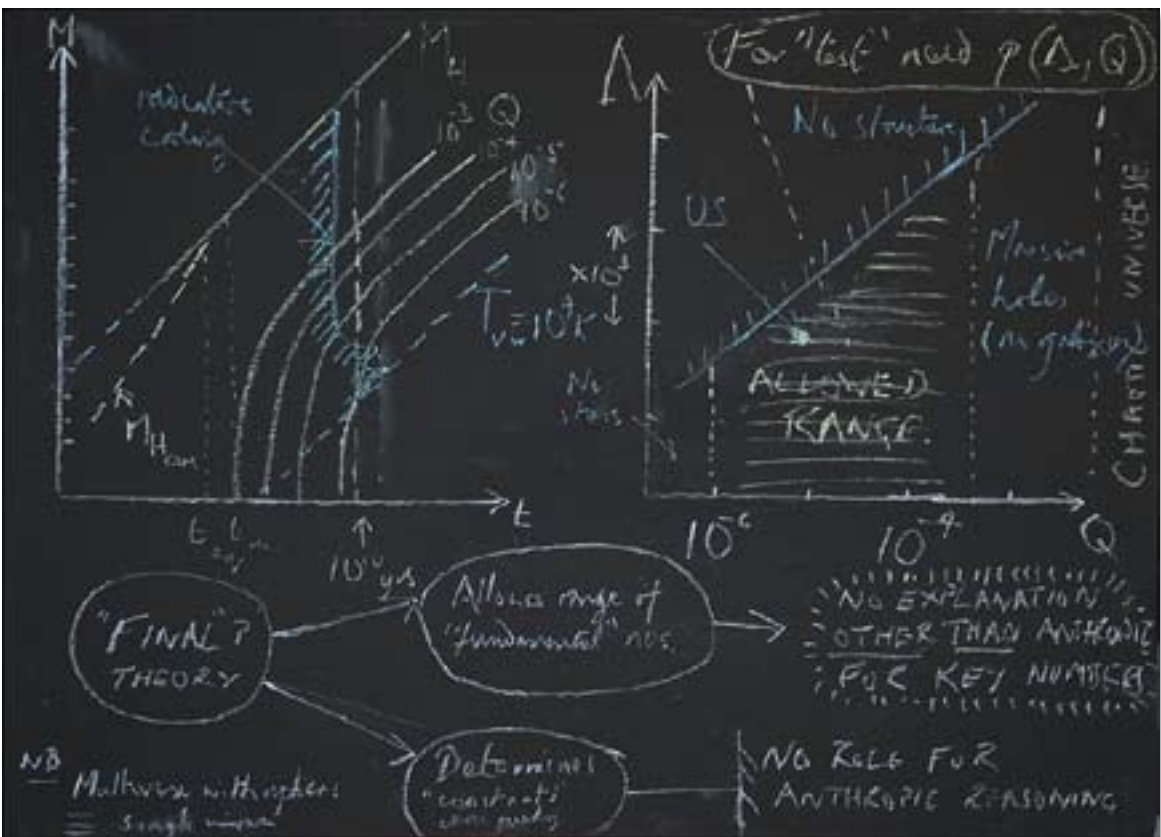




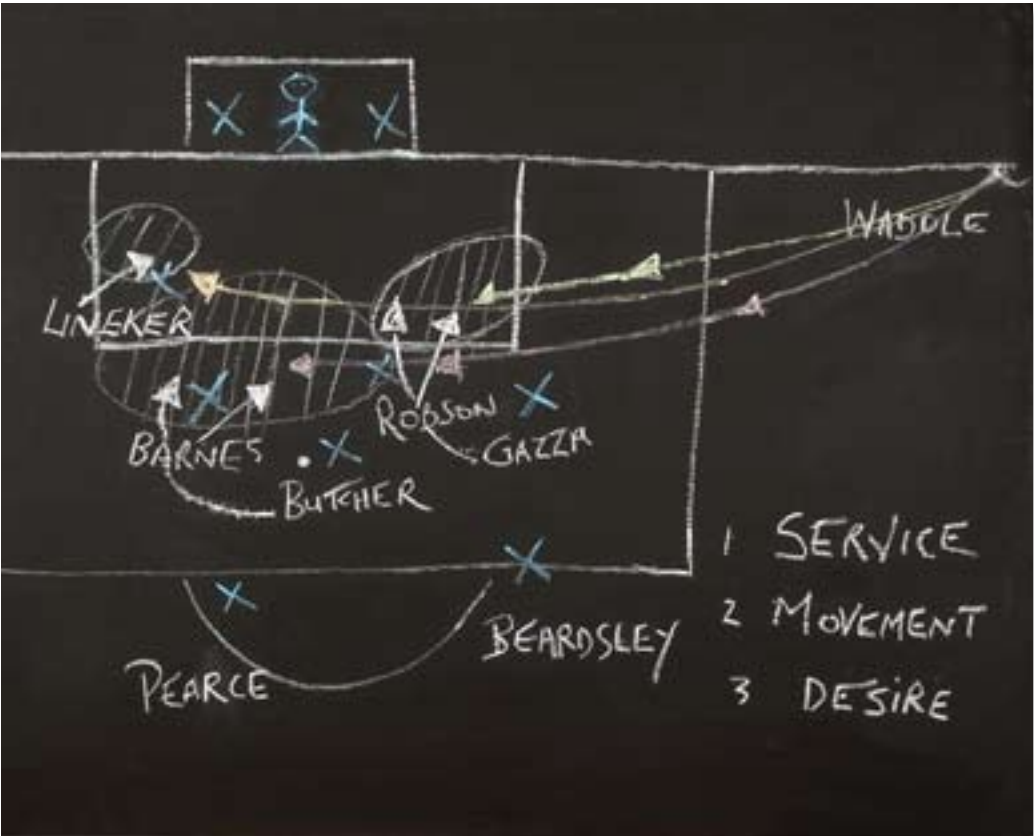
## Historian and broadcaster



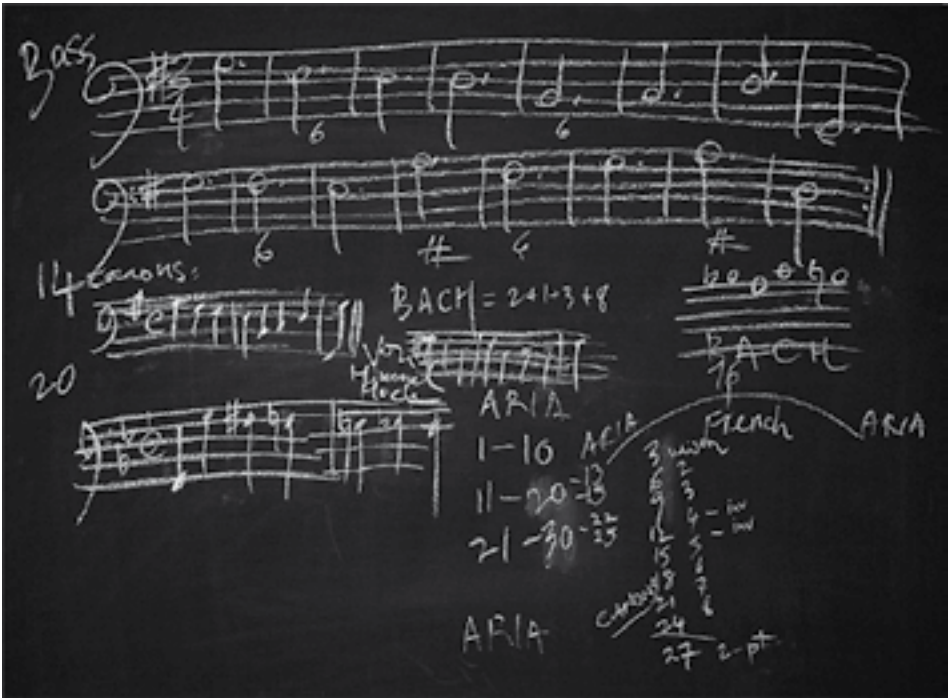
## Astronomer Royal



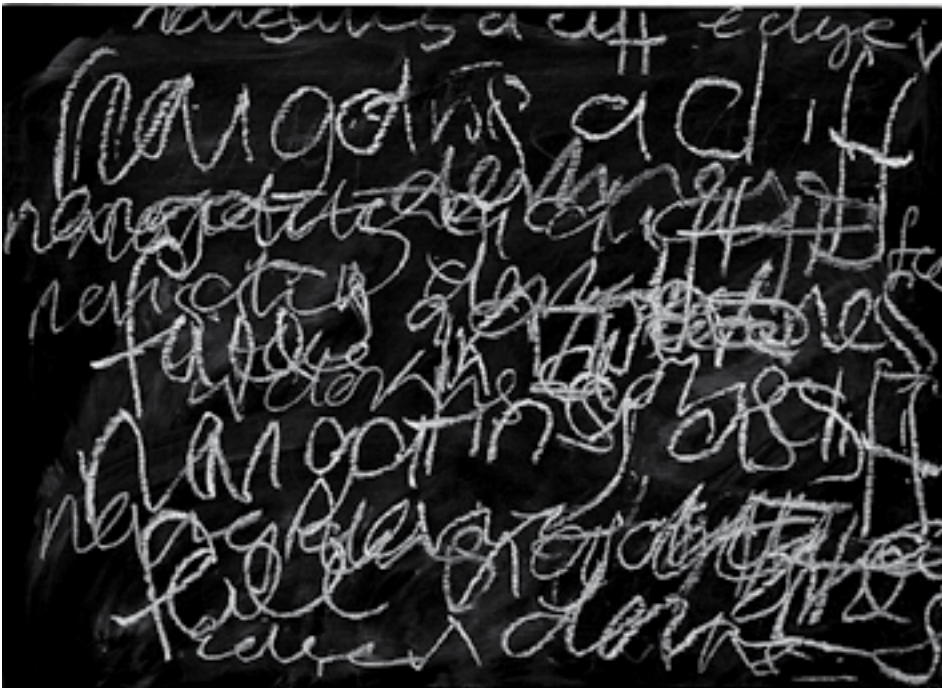
## President of the Royal Society



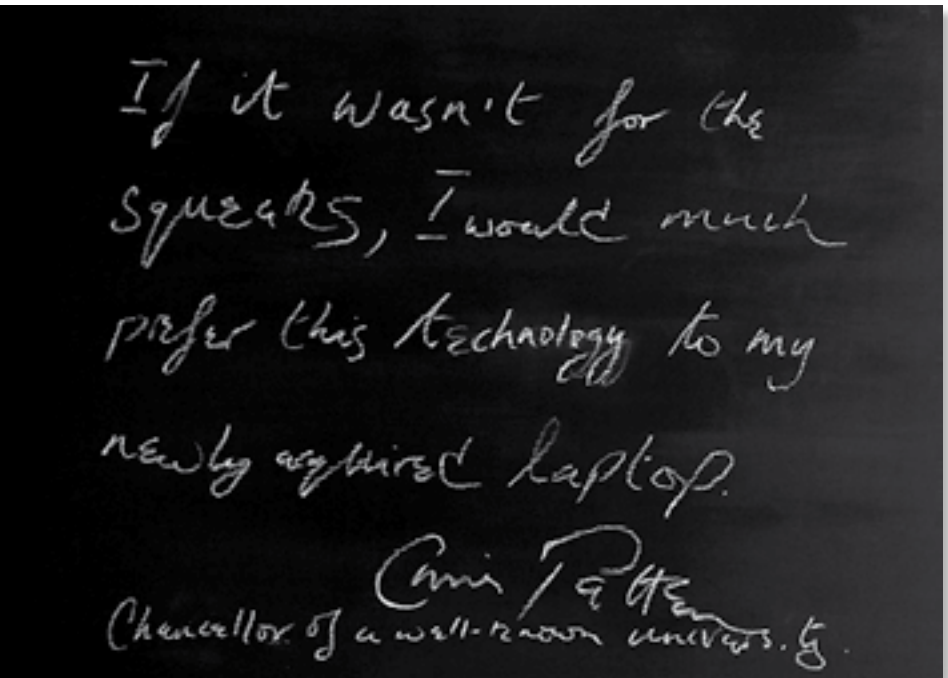
England international footballer and



## Pianist



## Artist



## Politician and statesman

## Politician

## Artist

