Does the Queen speak the Queen's English?

Elizabeth II's traditional pronunciation has been influenced by modern trends.

The pronunciation of all languages changes subtly over time[1], mainly owing to the younger members of the community[2]. What is unknown is whether older members unwittingly adapt their accent towards community changes. Here we analyse vowel sounds from the annual Christmas messages broadcast by HRH Queen Elizabeth II during the period between the 1950s and 1980s. Our analysis reveals that the Queen's pronunciation of some vowels has been influenced by the standard southern-British accent of the 1980s which is more typically associated with speakers who are younger and lower in the social hierarchy.

Phoneticians have documented many types of change to the standard accent of British English known as 'received pronunciation'[3], some of which have a corollary in the changing attitudes towards social class. There was a marked social stratification in Britain in the 1950s[4], and in 1963 the phonetician David Abercrombie wrote, "One either speaks received pronunciation, or one does not, and if the opportunity to learn it in youth has not arisen, it is almost impossible to learn it in later life"[5]. But as class distinctions have become more blurred[4], so too have the boundaries between English accents that mark social class.

Although modern received pronunciation has resisted many of the stigmatized features of the London cockney accent, such as 'h' dropping, it has nevertheless been influenced by cockney — for example in the tendency to pronounce the 'l' in 'milk' as a vowel[6]. Some of these changes in pronunciation in England have been led by younger members of the population, who reject received pronunciation because of its association with the Establishment[7] — much to the chagrin of the older generation.

But can the traditional accent of older members of the community be preserved against such influences? And if not, is it still realistic to define supposedly immutable pronunciation standards[8] towards which the community should strive?

We investigated this issue by acoustic analysis (with the permission of Buckingham Palace) of the vowels from the Christmas messages broadcast every year by the Queen since 1952, comparing the vowel sounds from the 1950s with those from the 1980s. The BBC provided us with the recordings from their archives.

We also analysed whether there had been any change towards a 1980s standard southern-British (SSB) accent, which is similar in many ways to the accent of the Queen, but more likely to be spoken by most of the middle classes and by younger speakers. The SSB data[9] were taken from an existing corpus of female BBC broadcasters recorded in the 1980s[10]. Our acoustic analysis of the extent and direction of vowel changes in these three data sets was based on a well-established procedure of calculating the first two resonances or formant frequencies of the vocal tract[11].

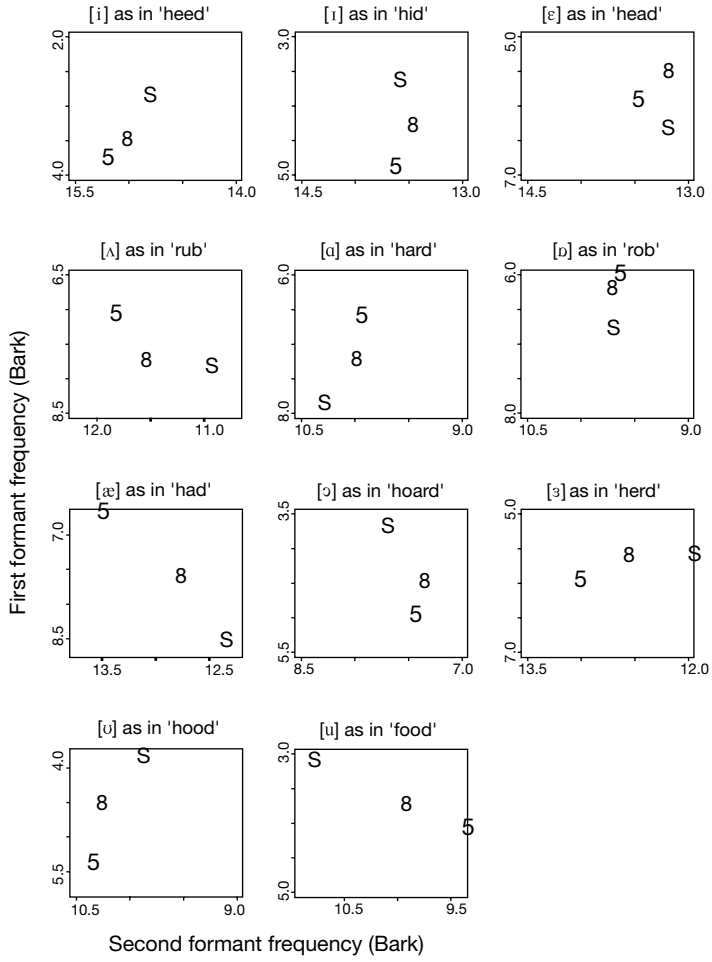

Figure 1 The three symbols '5', '8' and 'S' represent the average positions of different vowel types in the Christmas broadcasts of the 1950s and 1980s, and in standard southern British of the 1980s, respectively. The axes are the first two formant frequencies in Bark, a scale used to model the way listeners perceive vowels[12]. Positions towards the top of each square correspond to less mouth opening; the left corresponds to sounds made by constricting the vocal tract nearer the lips rather than further back[11].

Our results show that there were significant changes in at least one formant for 10 of 11 vowel sounds and in both formants for 5 of 11 vowel sounds from the 1950s to the 1980s Christmas broadcasts. Moreover, the average position of the 1980s vowels in the formant space is between those of the 1950s and SSB positions (Fig. 1). These results indicate that the vowels in the Christmas message have moved towards, but not attained, their SSB equivalents from the 1980s. Thus, there has been a drift in the Queen's accent towards one that is characteristic of speakers who are younger and/or lower in the social hierarchy.

We conclude that the Queen no longer speaks the Queen's English of the 1950s, although the vowels of the 1980s Christmas message are still clearly set apart from those of an SSB accent. The extent of such community influences is probably more marked for most adult speakers, who are not in the position of having to defend a particular form of English (the Queen's English in this case). The chances of societies and academies successfully preserving a particular form of pronunciation against the influence of community and social changes are as unlikely as King Canute's attempts to defeat the tides.

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Ecophysiology

Penguin fathers preserve food for their chicks

The king penguin *Aptenodytes patagonicus* feeds only at sea and must live off its reserves when it comes ashore to breed. We found that male penguins returning to their egg between three weeks before and ten days after it hatches bring food for the chick in their stomachs. This food can be preserved in the stomach for two to three weeks while the male fasts, enabling him to feed the chick if the female's return is delayed.

A penguin pair take it in turns to incubate their egg during the 54 days before it hatches[1]. The non-incubating partner goes off to sea to feed, mainly on myctophid fish[2]. This entails a journey of 400–500 km south from the birds' colonies in the Crozet Archipelago[3], which, combined with the variable availability of food[4,5], makes the duration of foraging trips unpredictable. Either mate may therefore be with the egg when it hatches[6]. To survive, the newborn chick needs regurgitated food from the parent in attendance, so how does a breeder cope with a delay in its mate's return?

We measured the changes in the stomach contents of breeding king penguins in relation to four hatching schedules (Fig. 1). After laying, the females went to sea with an empty stomach (weight of stomach contents, 24 ± 4.5 g; $n = 5$) while the males took over the incubation. When females returned more than one month before hatching, their stomachs were empty apart from a few pebbles (41 ± 9.8 g; $n = 10$). Relieved males left with empty stomachs for the sea (22 ± 3.6 g; $n = 5$); the length of this foraging trip varied considerably. Returning males had more in their stomachs the closer they arrived to the date of hatching ($r = 0.64$, $P < 0.001$, $n = 31$) but less if they came back later ($r = -0.57$, $P = 0.003$, $n = 28$) (Fig. 2).

Ninety per cent of males that returned more than 10 days before hatching (Fig. 1a) had food in their stomachs (stomach contents, 210 ± 28.0 g; $n = 18$). By hatching time, 40% of all males had not been relieved by the returning female and so needed to give this food to the chick (Fig. 1b, c). During three weeks of incubation, males lost 160 g in weight per day, amounting to 20% of their initial body mass, but the amount of food in the stomachs of relieved males (248 ± 32.3 g; $n = 21$) was not significantly different from that of birds arriving at the colony (Mann–Whitney test, $U = 115.5$; $P > 0.05$).

Prey that had been stored in the stomach for 20 days was in a similar state of preservation to that in penguins arriving from the sea — fish remains were mashed up and squid parts intact. But the proportions of lipid and protein in the dry stomach contents differed (lipid: arrivers, 23 ± 1.2%; leavers, 16 ± 1.1%; Mann–Whitney test, $U = 44$; $P < 0.01$; protein: arrivers, 56 ± 1.7%; leavers, 68 ± 0.8%; $U = 14$; $P < 0.01$; 17 arrivers and 13 leavers).

Based on the energy requirements of a newly hatched chick[7], we found that there was enough energy (1,660 ± 156 kJ, $n = 30$) in the stomach contents to sustain a newly hatched chick for about ten days. This fits with our observation that five of the 12 males that left with an empty stomach fed their chick for 9 (± 1.3) days.

Breeding king penguins evidently have some kind of internal clock that tells them to return from the sea bearing food only if their arrival falls within the hatching schedule and fits with the probability that the mate has not yet deserted. This storage and conservation of food in the stomach during several weeks of fasting, in anticipation of a possible delay

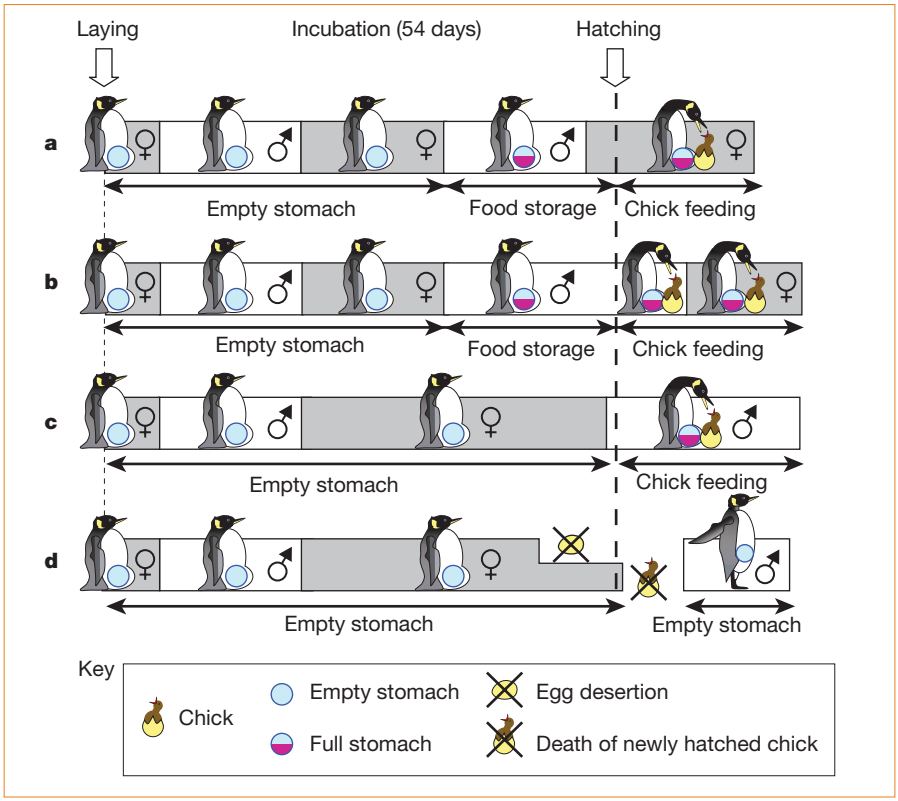

Figure 1 Stomach content of king penguins from Possession Island, Crozet Archipelago, in relation to the date of egg hatching and possible outcome of incubation due to the variable duration of the mate's time at sea. **a,** The female usually relieves the male a few days before hatching and his stored food is not needed; **b,** the chick hatches before the female returns and the male can feed it with the food stored in his stomach; **c,** arriving just before or soon after hatching, the male brings more food in his stomach (Fig. 2); **d,** the female has deserted the egg or the chick has died from starvation and the male, arriving long after the hatching date, has an empty stomach.

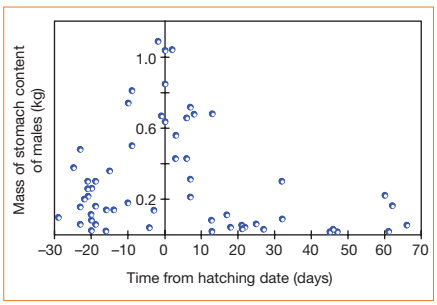

Figure 2 Relation between the mass of the stomach contents of male king penguins returning to the colony for the fourth shift and the time of egg hatching. Stomachs were flushed and their contents drained and weighed[8]. The bird was fed after stomach sampling so as not to disrupt chick feeding.