Titanic Explosions

A few years ago I attended the Titanic exhibition at London's Science Museum. One of the exhibits informed me that great care had to be taken when bringing cast-iron objects to the surface from 4 kilonetres down on the seabed, because when they emerge from the water they can explode. Why do these objects do this?

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Warlingham, Surrey, UK

There are several phenomena involved. One is that cast iron invariably contains small gas cavities or blowholes that are formed well beneath its surfac2. Another is that it has quite low ductility, and will fracture rather than deform, Thirdly, it is a very heterogeneous material, containing about 4 5 per cent carbon and significant amounts of silicon and manganese, together with phosphorus and sulphur. The principal phases that are present are graphite, argentite and ferrite.
When immersed in an electrolyte such as seawater, electrolytic corrosion starts up at the surface of the casting One of the products of this corrosion is hydrogen in an ionic or atomic state. In this state it can diffuse through the ferrite lattice and find its way to the gas cavities. There it re-forms as molecular hydrogen, increasing the pressure in the cavities.
Because this electrolytic process takes place at great depth and pressure, the pressure build-up in the gas cavities reaches equilibrium with the external water pressure. Raising the cast-iron object from the deep seabed removes the external pressure on the iron, so the gas in the cavities creates very high stresses.
At best, the iron will develop cracks. At worst, the casting will shatter.
C. C. Hanson
Metallurgist
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Old cannon balls brought up from the sea sometimes explode after being handled. This happens under special circumstances, when sulphate-reducing bacteria that are common in ocean sediments colonise the minute cracks and crevices in the iron. The bacteria use sulphates in the seawater as a source of oxygen and excrete the resulting reduced sulphur species. In the presence of iron, the soluble sulphur species react to form iron disulphide (pyrite) or iron monosulphide minerals.
Iron sulphides, thermodynamically stable under the reducing conditions on the seafloor commence oxidation as soon as they are brought to the surface, This reaction is highly exothermic, produces acid, and involves a considerable increase in volume. Substantial oxidation can occur within hours, perhaps even faster. Within confined spaces, the rapid volume change of brittle objects during oxidation can result in potentially explosive break-up.
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Received Pronunciation

How do accents develop and change? More specifically, how do new accents form such as those that arose in New Zealand and Australia? Presumably, these are no more than 200 years old.

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Accents and dialects develop and change for two distinct reasons, one phonetic, the other social. On the phonetic side, speech sounds change because of the way they are produced and perceived. Feel the position of your tongue against the roof of your mouth when you say the K sounds at the beginning of 'key' and 'car'. The tongue makes contact farther forward in 'key' than in 'car', because it is anticipating its forward position for the vowel sound EE, This more forward position has led to changes in which K sounds became CH or SR or S sounds before EE or F vowels. The Latin word centum began with a K sound, but Italian cento begins with CR and French cent with S. These changes were among many that occurred as Latin evolved into modern Romance languages.

Phonetic changes don't happen continuously, though, because language is used to communicate. If your pronunciation is suddenly different from that of the people around you, you won't be understood. The communicative function of language provides a social brake on the phonetic causes of change. In any community, however, phonetic changes can take hold from one generation to the next. When communities are relatively isolated as Australia was from England during its development they may adopt different phonetic changes. This is how Australian and English pronunciations have diverged. Two hundred years is plenty of time for differences to develop.

This kind of divergence brings a more subtle social effect into play. The information you convey when you talk is not limited to the linguistic meaning of your words, but includes many things about yourself, such as regional origin or level of education. Speakers unconsciously (or consciously) tailor their speech to sound like the person they want to appear to be. This has an influence on the development of accents and their change: people adopt or reject specific sounds and sound changes to signal their identification with a particular community.

Bob Ladd
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Starting with a relatively uniform speech community, minor variations in sounds may acquire greater or lesser prestige by association with individuals or groups who use them.

In Australia and New Zealand, the biggest divergence from English 'standard received pronunciation' is in the vowel system. In the early 19th century, there was a tendency in southern England, where many colonists came from, to pronounce the vowel in 'bad' (known to phoneticians as RP Vowel No 4 or RP 4) in a more 'closed' position (with the mouth less open) so it sounded more like 'bed'. Later, this trend was halted and partially reversed in England. Its southern base was relatively stagnant demographically compared with the booming North and Midlands, which kept the more open A in 'bad'. Today, the very closed version of vowel 4 is increasingly stigmatised as 'hyperposh' and causes surprise when heard in old 1940s newsreels.

By contrast, in Australia and New Zealand it flourished, perhaps cementing solidarity among the older settlers as against the later-arriving Poms, who had the more open vowel. The

'closedness' was exaggerated further, causing more closed and sounding like 'bid'. The vowel in 'bid' (RP 2) in turn had to become still more closed, to sound like RP 1 'bead', which in turn tended to become a diphthong, sounding something like 'buyd'. In New Zealand, the process was similar, except that RP 2 ('bid') was pushed into the centre of the mouth, to sound like RP 10 as in 'bud' or RP 12 — the sound in the second syllable of 'cupboard'.
This phonetic musical chairs, caused by an initial point of imbalance in the system, is known to linguists as a 'push-chain' RP 4 'pushed' the others to make room for itself.
There can also be a 'pull-chain' in which a departing vowel leaves a slot into which a neighbouring sound can expand. This also happened in Australia. Once RP 4 'bad' had moved over to 'bed', the long back-vowel of 'bard' RP 5 was free to drift to the front of the mouth, without fear of confusion.
Thus, RP 4 has 'pulled' RP 5 after it. In support of this, in Australian soaps like *Neighbours,* older characters tend to have accents closer to received pronunciation, but younger ones have a pronunciation typical of the system outlined here.
Steve Tanner
Carmarthen, UK

It is often assumed that accents in countries that see large-scale immigration will diverge from the accents of the settlers' original country The reverse may be true, however. The original accent can remain in the country now occupied by immigrants, while the accent in the nation of origin develops along new lines. This has occurred in the development of American English.
The first permanent English immigrants to North America settled in Jamestown, Virginia, in 1607, while 13 years later the Pilgrim Fathers landed further north at what is now Plymouth, Massachusetts. The Cambridge Encyclopaedia of the English Language *by David Crystal tells us that these two settlements had different linguistic consequences for the development of American English. The Jamestown colonists came mainly from England's West Country and spoke with the characteristic burr of these counties. This pattern can still be heard in some of the communities of the Jamestown region, especially Tangier Island in Chesapeake Bay Because of the relative isolation of this area, this 'Tidewater' accent has changed only slightly in 400 years and is sometimes said to be the closest we will ever get to the sound of Shakespearean English.*
The Plymouth colonists, by contrast, came from eastern England These accents dominated in what is now New England, and their speech patterns are still the main influence in this area, An outline of the development of English in all its forms can be found on the BBC website www.bbc.co.uk/routesofenglish — Ed.

(from *Does Anything Eat Wasps*)

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/6376421.stm
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Sexualisation 'harms' young girls

BBC NEWS

The media's portrayal of young women as sex objects harms girls' mental and physical health, US experts warn.
Magazines, television, video games and music videos all have a detrimental effect, a task force from the American Psychological Association reported.
Sexualisation can lead to a lack of confidence with their bodies as well as depression and eating disorders.
Such images also have a negative effect on healthy sexual development in girls, the researchers said.
The task force was set up after mounting 'public concern' about the sexualisation of young girls.

EXAMPLES OF SEXUALISATION
- Young pop stars dressed as sex objects
- Dolls aimed at young girls with sexual clothing such as fishnet tights
- Clothing, such as thongs, for seven to 10-year-olds
- Adult models dressed as young girls

Research on the content and effects of television, music videos, music lyrics, magazines, films, video games and the internet was analysed.
Recent advertising campaigns and merchandising of products aimed at girls was also scrutinised.
Sexualisation was defined as occurring when a person's value comes only from her or his sexual appeal or behaviour, to the exclusion of other characteristics, and when a person portrayed purely as a sex object.
They gave examples of a trainer advert that featured pop star Christina Aguilera dressed as a schoolgirl with her shirt unbuttoned, licking a lollipop.
According to the research identified by the task force, such images and promotion of girls as sexual objects negatively affects young girls in many ways.

> We need to replace all of these sexualised images with ones showing girls in positive settings - ones that show the uniqueness and competence of girls
> Dr Eileen Zurbriggen
> Task force chair

'The consequences of the sexualisation of girls in media today are very real,' said Dr Eileen Zurbriggen, chair of the group and associate professor of psychology at the University of California, Santa Cruz.

‘We have ample evidence to conclude that sexualisation has negative effects in a variety of domains, including cognitive functioning, physical and mental health, and healthy sexual development.’
The task force called on parents, school officials, and health professionals to be alert for the potential impact on girls and young women.
And it advised that schools should teach pupils media literacy skills and should include information on the negative effects of images portraying girls as sex objects in sex education programmes.
Governments also had a responsibility to reduce the use of sexualised images in the media and advertising, they said.

Teenage magazines

Dr Zurbriggen added: ‘As a society, we need to replace all of these sexualised images with ones showing girls in positive settings - ones that show the uniqueness and competence of girls.
‘The goal should be to deliver messages to all adolescents - boys and girls - that lead to healthy sexual development.’
Professor Andrew Hill, professor of medical psychology at the University of Leeds, said it was hard to disagree with any of the reports conclusions.
‘If you look at teenage magazines, it's all about sex.
‘We are a visually absorbed society - our views of people are dominated by how they look.’
He added that the use of women as sex objects in the media and advertising was a difficult issue to deal with.
‘Only 18% of children's television viewing is in their designated viewing time and legislation can't be the answer for everything.
‘One of the key things here is social responsibility - advertisers and other media need to be aware that the products they produce and images associated with them have an impact and it's not always a good impact,’ he said.