THE EARS HAVE IT

What does it mean to have perfect pitch? **Charlotte Gardner** asks whether this mysterious musical attribute is attainable by everyone, or just the fortunate few

Can you sing an 'A' off the top of your head? Or can you, without any help from the piano or whatever musical assistance may be at hand, identify specific notes as soon as you hear them? If so, you belong to an elite club. 'Perfect pitch', or 'absolute pitch' as scientists call it, has long been considered proof of musical brilliance. An anonymous letter sent to the *Augsburgischer Intelligenz-Zettelin* in 1763 described how the seven-year-old Mozart could name the key of a chiming pocket watch. However, other great composers such as Haydn and Schumann didn't have absolute pitch. In fact, less than one in 10,000 of the general population is believed to possess it, compared to 98 per cent possessing absolute colour recognition. The question, therefore, as to who has it and why, has had geneticists and psychologists scratching their heads for years.

Absolute Pitch (AP) carries distinct advantages for musicians. Paul Robertson, first violinist of the Medici Quartet and a musical psychologist, remembers performing with the soprano Jane Manning, who specialises in contemporary music. 'She had absolute pitch and could sight read scores of a horrific nature, picking notes out of the ether,' he recalls. Harpsichordist and conductor Laurence Cummings finds his AP invaluable for understanding music quickly. 'It helps you to read scores in your head,' he says, 'and it's good when you're listening to a piece of music for understanding the structure.'

No wonder, then, that the hunt is on to acquire the ability. Search the internet and you'll unearth numerous expensive teach-yourself courses aimed at determined adults. For children, some people suggest that certain musical teaching methods help, particularly ones based on exact repetition of simple songs such as the Japanese Yamaha method, or the repeated association of syllables with notes of a scale, such as France's *solfège* system. However, while scientists disagree on much to do with AP, they do agree that teaching methods aren't important, and that it is impossible to acquire genuine AP as an adult. Many studies shows that it is not the type of musical training a person has, but starting early enough which counts – ideally, before the age of six. They also agree that no one can have AP without a musical education of some sort. This doesn't mean that there aren't people for whom pitches resonate in a certain way – but, without being able to identify them as certain notes, this isn't AP. Here the consensus ends, and the debate is one of nature versus nurture – whether AP is innate in us all, or an inalterable genetic predisposition.

> It is impossible to acquire absolute pitch as an adult

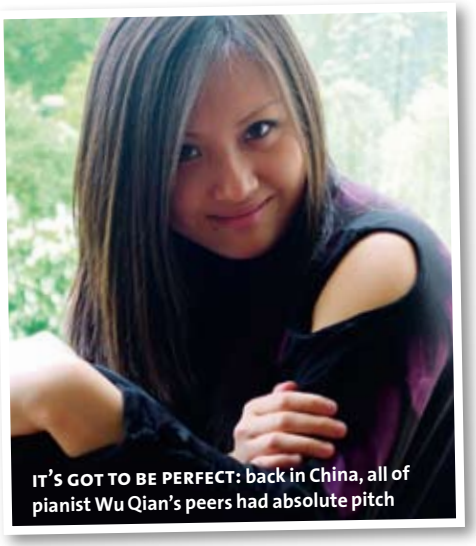
A champion for genetic predisposition is Dr Jane Gitschier, a geneticist at the University of California Genetics of Absolute Pitch Study. 'There are many people out there who've had early music training, and the number of people with AP is small,' she argues, 'so it cannot be simply music training per se. It's got to be something else.' Her team is attempting to prove that there is a genetic predisposition for developing AP which, when coupled with early enough musical exposure through music lessons, can then lead to the actual acquirement of the ability. Without early musical exposure, even a genetically predisposed person won't acquire it. Anyone can take part in the ongoing study by sitting the AP test on her website (see link at foot of article), which asks individuals to identify a series of tones. The results are grouped into people with AP and those without. Next, spit kits are sent to the individuals so they can provide a saliva sample for DNA analysis. The findings so far make a strong case for a genetic link. Firstly, of 2,213 people who took part in the study during one three-year period, most scored either very low or very high, indicating that AP is a distinct trait rather than the higher end of a universal ability. The second finding is that AP appears to run in families. 'We found that a sibling (with early musical training) of an AP possessor is about 15 times more likely to possess AP than someone else with early musical training but with no family history of AP,' reports the team.

Although Gitschier doesn't feel able to state a conclusion publicly yet, she does say that they are moving in the direction of stating that there is a genetic link, and thinks that they'll have the answer in the next couple of years. Meanwhile, she has unearthed some other interesting traits. Firstly, as people with AP age, their pitch perceptions tend to get sharper. 'We have one 44-year-old guy who was a semitone sharp for every note,' she recalls. 'It turns out that he recognised he was going a semitone sharp when he was 22 and thought he was already compensating, so in fact he was a whole tone sharp by the time he was 44.' The other phenomenon is that AP possessors ▶

ILLUSTRATION: DAVID MCCONOCHIE/THE ART MARKET

make the most errors at G sharp. 'Either they just fail to guess it, or they guess it as an A,' says Gitschier. 'We suspect the reason may be something to do with the use of A as a universal tuning frequency and that people with AP may have learned to accommodate a wide range of As. So for early music, A isn't [a frequency of] 440 Hertz, it's around 415Hz, which is really almost a G sharp, whereas people in some European orchestras might have learned to adapt the other way. The Berlin Phil, for instance, tunes to A=446Hz.' Laurence Cummings has noted his own range of As 'because I play a lot of pitches in my professional life as a historical performer. Although I can always sing an A, I don't know what pitch it will be.'

The opposing view that AP is innate in us all is led by the English music psychologist Professor Diana Deutsch. The results of her studies suggest a strong link between AP and speaking a tone language: a language where the same words take on a totally different meaning depending on how they are enunciated – Mandarin, for example. Her team tested 203 students at the University of Southern Carolina Thornton School of Music. The students were divided into four separate groups: Caucasians who only spoke a non-tone language such as English fluently, and three groups of East Asian descent who were divided up according to their fluency in a tone language. Each group was further divided according to whether they started musical training aged between two and five, or between six and nine. While the students who had earlier musical training did better in the subsequent AP test, the effects of tone language on performance were more striking. The fluent tone language speakers scored an average of over 90 per cent, compared to under 30 per cent among the Caucasians and under 40 per cent for East Asians who were non-fluent in a tone language. For Deutsch, this proves a link between AP and language that outweighs both genetics and age of musical training.



IT'S GOT TO BE PERFECT: back in China, all of pianist Wu Qian's peers had absolute pitch

The question is whether we should want absolute pitch

Deutsch's research rings true for Chinese pianist Wu Qian, who is fluent in Mandarin. She has perfect pitch, but the ability wasn't remarkable among her classmates at the Shanghai Conservatoire: 'Every student in my class of 25 had perfect pitch. I didn't even realise this was an issue until I arrived at the Menuhin school in the UK and people asked if I had perfect pitch.' This was despite the majority of her Menuhin classmates having started musical education aged six or below.

So, how can an English-speaking parent help their child to develop AP? 'Expose them to notes together with their names in the first year of life as much as you can,' says Deutsch. 'One shouldn't expect it to work out as well because there's no substitute to presenting them with a language, but I think the prevalence of AP should definitely increase.'

Deutsch's work doesn't convince Dr Robert Zatorre, a professor of neuroscience at the Montreal Neurological Institute and co-director of the International Laboratory for Brain, Music and Sound. 'First of all,' he reasons, 'tonal languages do not use AP. They use relative pitch. It's the *pattern* of sound not the absolute level. Secondly, it is true that there is a greater incidence of AP in Asian people but the evidence we have seems to indicate that that's true regardless of whether they speak a tonal language or not. There's a greater incidence of perfect pitch in Koreans, but the Korean language is not tonal, so I think that's an argument for a genetic factor.' His own brain-mapping studies have revealed that, when listening to notes, people with AP use a different section of their brain to non-possessors – the posterior dorsolateral frontal cortex, which is used when memorising associations. His team has also discovered that the cortex in that part of the brain is slightly but significantly thinner in the people with AP. Importantly for his argument against Deutsch's research, his AP group were not all tone language speakers. 'We had some,' he says, 'but the majority of students would have been either of French Canadian descent or Anglo-Scottish ethnicity. In any case, while studies on Asian brains show there are some differences (although it's controversial), the differences are not in this particular region.' Disagreement reigns supreme, then.

The most important question for those of us without AP might be not how to acquire it, but whether we should want it. Wu Qian hasn't played much Baroque music yet, but when she hears it, her ability presents problems. 'Sometimes they have crazy higher or lower than 440Hz pitching and it actually does disturb me, because I feel like something should be an A when it's a B flat, or a G sharp.' While Laurence Cummings has adapted to Baroque pitch, he has known singers who've had to write out whole arias down a semitone in order to sing them at Baroque pitch. He cites everyday irritations as well: 'Consistent noises such as the hum of lights in theatres can be a bother, because you hear them as a pitch rather than just a background noise.'

As with anything, the grass is always greener on the other side. Those who don't have AP crave it; those who have it, often wish they didn't. But let's face it – if Haydn managed without absolute pitch, it can't be that vital to musical success. Perhaps we just shouldn't mind either way. ■

Test Yourself: Do you have absolute pitch?
Try Professor Diana Deutsch's test at:
www.aip.org/148th/deutsch.html
or Dr Jane Gitschier's University of California Genetics of Absolute Pitch Study:
www.perfectpitch.ucsf.edu/survey/page1.php

ABSOLUTELY PERFECT
A GUIDE TO THE TERMS

SPOT ON: the young Mozart had absolute pitch

ABSOLUTE PITCH (AP) is the scientific name for what most people call 'perfect pitch', ie the ability rapidly to name, or identify on an instrument, a note that has been played in isolation, or to sing a note without any assistance (from, say, a piano).

RELATIVE PITCH is the ability rapidly to name or sing a note if given a reference note to start from. For instance, if given an 'A', someone with relative pitch would immediately be able to sing a 'D'.

PERFECT PITCH is, by and large, the term used when people mean 'Absolute Pitch'. It is sometimes, rather nebulously, used to refer to the ability to hum a familiar song at roughly the correct pitch.

GETTY