Affirming an ancient intonation

BARNABY BROWN

THERE is a track on Lismor's 1989 *Piobaireachd* album of the renowned Iain MacFadyen playing the *Piobaireachd* *The End of the Great Bridge* that Barnaby Brown — then a young music student at Cambridge University — found himself unable to appreciate.

"I hadn't played the pipes for 10 years," he said. "To my ear at that time in my life, the D on that recording sounded sharp."

Barnaby Brown graduated and became increasingly interested in the history of Scottish music and of piping.

"I ended up measuring Iain Dall MacKay's chanter from the late 17th century and taking a great deal of time and trouble with pipe maker Julian Goodacre to reproduce it, and bless me, what did it give me... a sharper than 'normal' 'D'. The Iain Dall MacKay chanter, without any shred of doubt, plays a 'D' that is every bit as sharp as Iain MacFadyen's was on that CD.

"So we have this chanter that was made in the 1680s or 1690s, and played by Iain Dall MacKay, and it has a fourth that is sharper than the perfect fourth we all like these days. And it's sharp, not just with one 'D' fingering, but with all three of the different fingerings for 'D' that have ever been recorded in Highland piping... all produce a sharp 'D'. We've done a considerable amount of experimentation with different reeds and huge staples and owe a particular debt of thanks to Tommy Johnstone and Ronnie MacShannon of Ezedrone for going to such trouble with reed experimentation... but it's quite clear: Iain Dall played with a sharp 'D'. There are no ifs or buts about it.

"And, if Iain Dall MacKay played with a sharper 'D' than we favour today, then the chances are that so did Patrick Og and Patrick Mor and Donald Mor MacCrimmon."

"So," said Barnaby Brown, "I've spent the best part of a year trying to convince myself that actually, yes, I do like this 'D'... that, if it was good enough for Iain Dall, and if it was good enough for Patrick Og, then it's got to be good enough for me."

An interesting flicker of light was cast on the historical 'D' of the great Highland bagpipe by the musicologist and harper Peter Greenhill, of the most dedicated scholars occupied in unraveling an enigmatic early 17th century manuscript of ancient bardic harp music. Around 1613, a young harpist from Anglesey, Robert ap Huw, penned a transcription of some of the music he was studying. Even then, this music was considered ancient. His manuscript was to become the only surviving remnant of a repertoire that once held the Celtic world in thrall. Peter Greenhill began working on the reproducion of Iain Dall's late-17th century chanter was made by Julian Goodacre of Peebles, in collaboration with piper and piping scholar Barnaby Brown. It rests on documents relating to the original measurements and the extrapolations that were made to correct distortions wrought by time on the original chanter, which was carefully preserved by Iain Dall's descendants in Nova Scotia, Canada.
interpretation of Robert ap Huw's manuscript in 1972 and, by 2000, had produced a monumental dissertation, deposited at the Centre for Advanced Welsh Music Studies at the University of Wales, Bangor.

Said Barnaby Brown: “It just so happened that, in the course of a telephone conversation, Peter told me that one of the pure tuning procedures he’d proposed for the Robert ap Huw manuscript was similar to the traditional bagpipe scale, with a fourth and seventh sharper than ‘pure’ (i.e. consonant with the drones). He had looked into a number of possible tunings, and assessed how relevant each one might be, based on the distribution of fifths in the manuscript.

“Medieval Europe inherited a philosophy from ancient Greece, that intonation should be fixed by mathematical ratios. The ideas of these Greek ‘Harmonists’ were spread by the late Roman scholar, Boethius, in a book that was probably read by Latin-speaking scholars in Ireland and Scotland: De Institutione Musica. All though, theory and practice are two quite different things. It is now accepted that intonation has more to do with culture, perception and nurture than with mathematics.

“The intonation of Highland bagpipes today is essentially ‘Just Intonation’ — the notes are generally tuned to be ‘pure’ with the drones,” said Barnaby Brown. “Pure intervals were also used to tune the harp, and in his Ancient Music of Ireland (1840), Edward Bunting tells us that they had a ‘drone bass’ string, known as the crònan, sounding an octave below two ‘sister’ strings that were tuned to a unison — just like the drones of a Highland bagpipe. There are different routes to tuning the harp from the ‘sister’ strings using pure intervals, however, with very different results. If you progress by fifths and fourths, the result is what’s called ‘Pythagorean’ tuning.

“The trouble with Pythagorean tuning is that the thirds and sixths sound horrible. In some medieval music, thirds and sixths are noticeably scarce in the harmony, which suggests that those composers did favour ‘Pythagorean’ tuning. However, British musicians were particularly fond of thirds, and early music groups — like the Hilliard Ensemble — generally find ‘Just Intonation’ more satisfactory. Like most modern Highland pipers, they strive to achieve perfect acoustical consonance, or the locking of harmonics.

“But, from the Renaissance to the 19th century, the most popular type of tuning in Europe was ‘Meantone’ — a family of tuning systems where priority is given to beautiful thirds,” said Barnaby Brown. “What’s not often understood is that, on a piano or digital keyboard — any instrument, in fact, that’s been built to equal temperament — none of the intervals are pure.

“In an orchestra, wind players will ‘lip’ notes up or down to create a pure interval, but if you are a xylophone player or a pianist, you are stuck.

“The result is a lot of fuzziness in an orchestra in terms of intonation,” he said, “and that is part of the package. On the bagpipe, we’re much more particular. There’s a lower tolerance, at least today, of beating or unsteadiness, partly because you can hear it so clearly. It’s the same on a wire-strung harp: if two strings are not exactly pure, the interference beats that cause the sensation of dissonance are clearly audible.

“What I’d never realised, before this conversation with Peter Greenhill, was that there’s not just one form of ‘Just’ tuning, but a great number of possibilities. Working from first principles, he’d come up with six that might be appropriate for the Robert Ap Huw manuscript. One of these, he’d noticed, was just like the Highland bagpipe scale measured in 1953 by Seumas MacNeill and John Lenihan: its fourth and seventh (‘D’ and ‘G’) were distinctly sharp.

“That for me was an amazing moment: the penny dropped. I thought, ‘Ah, this means that Gaelic pipers and Gaelic harpers might have shared similar intonation values.’ Perhaps there wasn’t the clash of cultures we have today: look at advertising for the R. T. Shepherd and Sons’ Orchestral Chanter: ‘At last! A pipe chanter that other musicians will love.’

“But the tuning issues that we face today when pipers work with other musicians in the Gaelic tradition may not have existed in the 17th century,” said Barnaby Brown.

“I don’t believe a repertoire with the epic splendour of piobaireachd would have been isolated from, or immune to cross-fertilisation with the Gaelic harp and song traditions. It is at least possible that the blind harper of Dunvegan, Ruari Dall Morrison, and other great musicians of Gaelic culture, used an intonation that was sympathetic with what the MacCrimmons held to be ‘good’.

“This prompts a somewhat revolutionary idea: if pipers, harpers and fiddlers playing together today want to be more in tune, then rather than dilute the tradition, homogenising with the rest of the planet, why not tune to the old bagpipe scale?

“Pianos have pulled us into Equal Temperament; the only way pianists can say ‘no’ to this aspect of globalisation is to use a keyboard that lets you set the temperament. Equal Tempera-
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— the ‘trump’ or ‘Jew’s harp’ — as a possible piper who adapts to other musicians.”

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Barnaby Brown. “It’s not a tuning that makes any sense for traditional music, which uses a fraction of these keys. Why sacrifice the beauty of a pure D major chord for the sake of an F sharp major chord that’s scarcely ever used? I am convinced that traditional music would benefit from the use of Meantone and Just tunings, particularly ‘Greenhill 2’,” he said, “which is so strikingly close to the traditional pipe scale (see Table 1).

The seven-note scale of the harp and bag-pipe contains six triads which can be tuned pure: three major chords and three minor chords. On the pipe (as written) these are: G major, A minor, B minor, D major, E minor and F sharp minor.

“In conventional Just intonation, all six chords are pure; I call this ‘Greenhill 1’, as it’s the first of the Just tunings which Peter Greenhill explored as possible solutions for Robert Ap Huw’s music. In ‘Greenhill 2’, only four of these six chords are pure; B minor and D major are slightly dissonant. This adds a certain potency because some chords have a different character, a feeling of restlessness or instability, which enables you to return ‘home’ to serene purity, stillness. It gives you another way to shape the music, to change the mood. This dimension of musical contrast was fundamental to composers before the nineteenth century, but is an aspect of music we are now de-sensitised to.

“Unequal tuning systems supply a polarity, a light and shade, between chords. For example, ‘Greenhill 2’, offers a restless D major and a tranquil A major. This is not relevant to every type of music, but might be extremely relevant and enriching to old Gaelic melodies and — why not? — new ones composed exploiting the qualities of an unequal tuning,” said Barnaby Brown.

“Intonation fundamentally affects the choice of notes in a composition; if one chord or note sounds blissfully pure, another achingly restless, then the composer will use them in different ways. This is completely lost on the piano, as all chords are an equally-good compromise. We should have more courage about asking musicians who work with pipers to consider tuning to the pipe scale (or more practically, to ‘Greenhill 2’), rather than it always being the piper who adapts to other musicians.”

Barnaby Brown points to the tromb (Gaelic) — the ‘trump’ or ‘Jew’s harp’ — as a possible explanation for the historic tuning of ‘D’.

“On a trump, you’re basically playing overtones and, as you go up the harmonic series, you find you are playing the pipe scale, except that the ‘D’ is significantly sharper, even than on the Iain Dall chanter, at 551 cents: that’s 53 cents sharper than a pure perfect fourth,” he said… “but bear in mind that theory doesn’t correspond with practice and cent values have to be taken with considerable leeway — plus or minus five, or even 10, cents.

“The science of sound is full of traps for the unwary,” he said.

“Until I read about mode locking, I had presumed that stretched harmonics, or ‘inharmonicity’ within the drone spectrum, would influence chanter tuning — and that this would vary from pipe to pipe… but not so. Although I was correct that the harmonics making up the colour, or timbre, of drones are not perfect multiples of the fundamental frequency, mode locking means that the chanter sounds pure at the theoretical values of the drone harmonics, rather than at their actual (stretched) frequencies, which are often as much as 20 cents higher. That really did my head in.

“I was also confused by trump tuning. The trumpet’s natural overtone might be sharper than you want to hear but, just as a trumpet player will ‘lip’ a note into tune, so a trump player can modify the intonation, to an extent, by altering his mouth.

“Intonation is a complicated thing,” said Barnaby Brown. “You’re really dealing with culture and the human mind, as much as with acoustics. Evidence of historical intonation is always problematic. With a pipe chanter, you can always adjust the intonation by scraping the reed in particular ways and we can’t rule out the possibility that Ian Dall applied a bit of beeswax here and there. All we do know that is he never under-cut any of the holes: they’re all beautifully sharp-edged to this day. The ‘high A’ hole is even angled towards the foot of the chanter, giving an acute corner that would have been tempting to under-cut, had its player ever been bothered by a flat ‘high A’.

“And it wasn’t just Iain Dall: that chanter was clearly played over several generations and none of its players ever took a knife to the holes. That’s significant. It could mean that intonation tolerance was higher, that people accepted a wider range of tuning; or that they were more skilled with reed manipulation and achieved their goal that way.”

BARNABY Brown teaches “world musics” at the Royal Scottish Academy of Music and Drama in Glasgow and, for his third-year Bachelor of Education students, he arranges various workshops. One was with the Javanese gamelan: a tuned ensemble of various metallophones, drums, and gongs.

“And so began a wonderful voyage of discovery with Gamelan Naga Mas (Golden Dragon),” he said. “The great thing about gamelan, is that it’s often pentatonic and shares a similar musical mentality to piping.

“It’s mesmerising. I found that by putting tape on a couple of holes, I could tune my Hamish Moore ‘A’ chanter to the gamelan scale and begin improvising. We had a development weekend and gave a premiere in May last year in the beautifully-refurbished Eden Court Theatre in Inverness, then at the Kibble Palace for Glasgow’s West End Festival, and again at the Edinburgh Mela.

“Playing pipes with gamelan is lovely; it’s like playing with an orchestra — even nicer,” he said. “There’s a deep cultural sympathy and the sound quality complements the pipes perfectly. It feels very appropriate; everything just seemed to work.

“With gamelan, you have a very small number of notes being used, usually repeated in cyclic patterns, with temps that ebb and flow. This puts you in a similar sound world to piobaireachd. What is great is the way it’s built up, with many layers of sound combining in complex cycles to create a hypnotic and deeply beautiful texture.

“In Java and Bali, every court has its own gamelan, each subtly different from the others. Great care is taken to tune the instruments within each gamelan to each other, but you encounter substantial differences — or intonation dialects — once you start moving from one court to another. I wonder whether we had a similar situation in Scotland with the intonation of the pipes, where you would recognise a piper by his distinctive intonation… something which we’ve almost entirely lost. Before mass production and greater homogeneity in bag-pipe sound, intonation played a much more powerful role defining an individual piper’s aesthetic.

“A sharper intonation on ‘D’ and ‘G’ is the norm on recordings of John MacDonald of Inverness, Willie Ross and Donald MacLeod. When we hear their distinctive scale, it is fair to say, ‘that’s out of tune,’ or has fashion in
intonation simply changed? Is piping any more refined today?

“The way I overcame my prejudice, winching at a sharp ‘D’, was through Norwegian folk music.

“In Norway, young musicians are positively cultivating not only sharp fourths but neutral thirds and sixths, and colourful sevenths as well. The authorities recognised that old intonation dialects were endangered, and started encouraging them in competitions, with the result that young singers and instrumentalists are now proud of what used to be regarded as uncool.

“I wonder if that could ever happen in Scotland. Would we, as a community playing ancient bagpipe music, want to reinstate a sharp ‘D’ for the sake of sounding special, or true to the past?

“Or are we better off staying with the norm we’ve moved into since the 1950s?

“There’s a big difference between a perfect fourth — 498 cents, or 2 cents below Equal Temperament — and the fourth you hear recorded at the 1999 Edinburgh Festival by Willie MacDonald of Benbecula, or that of Iain MacFadyen.

“The colourful ‘D’ is still within living memory,” said Barnaby Brown, “but are any young pipers keen to resurrect it?

“Will it have died out completely in 25 years’ time?

“Or could it be cherished again, the wheel of fashion turning full circle?”