



## **Sounds harmonious**

*Music and math*

### **JANICE ACQUAH**

Whatever our personal tastes we've all sung, danced or tapped along to our favourite tunes. We've probably never stopped to think what we're doing. Well what we're doing really is just following a pattern, a rhythm, the beat of the music. Now for most...most of us music is just something that goes on in the background, that's why I can never remember lyrics. But for others it's really important. And I'm off to meet Alan Graham, an OU academic. He's from the Maths and Computing department, but he's also utterly passionate about music. So, where do you find Alan when he's not at work. Well, how about in here? Hello Alan, that was excellent. So what was that?

### **ALAN GRAHAM**

That was a tune called Knocknagow, and that was a jig.

### **JANICE**

Right. So what's an OU mathematician like you doing in a place like this?

### **ALAN**

Well we play here quite a lot, we have regular gigs here. We play Irish music and the people seem to like it.

### **JANICE**

Now you find there are links don't you between the maths and the music you play?

### **ALAN**

Yes I do. Sometimes the maths helps the music sometimes the music helps the maths. Just an example of that, the music that you hear comes in through your ears, and it's enjoyable but if you really want to analyse it as a musician, there's nothing to get your hands on. You need to find a way of representing it on paper and that's where the maths comes in.

### **JANICE**

So that's what we're gonna try and do now isn't it, to analyse your music. What...what type's this?

### **ALAN**

That's right. Well this is a jig. And a jig is based on a simple structure of six notes, and goes one two three, one two three, one two three, one two three, one two three, one two three, one two three ... I found it helpful when I was first learning, to call pineapple and apricot, pineapple and apricot, pineapple and apricot ...

### **JANICE**

That's clever.

### **SHEILA KELLEY**

And now everybody we're gonna play a very lively reel called Morning Dew.

### **JANICE**

So what makes this a reel then?

### **ALAN**

A reel is a different sort of rhythm. This time there are four beats in every bar, and it goes one two three four, one two three four.

**JANICE**

Well that's great, do you want to go back and join them.

**ALAN**

Yeah, lovely.

**JANICE**

So now what's gonna be next.

**ALAN**

Well I think we'll er slow the pace down a bit and perhaps play something that you might recognise.

**JANICE**

Okay go for it.

**JANICE**

Alan I think I've guessed this one. It goes one two three, one. Is it a waltz?

**ALAN**

That's right, it's a waltz.

**JANICE**

Oh I can get something right.

**ALAN**

So, as you say three beats in a bar, with the stress on the first beat.

**JANICE**

Can you tell me a bit about your instruments.

**MAURA BARNETT**

Right, I play the fiddle or the violin. Er it's got four strings. The lowest is the G string and the highest is the E string. There's more tension on the E string, that's why it's higher in pitch. Er to make a note I use the bow which is made from wood and horse hair, and it creates friction on the string. [PLAYS NOTE] And in order to change the pitch of the note as I play, I put down my fingers on the finger board like this...[PLAYS 4 NOTES]...which makes the string shorter, and it vibrates faster, so the note's higher.

**JANICE**

So your note...your fingers control the way it vibrates then.

**MAURA**

Yes, and if I demonstrate. I can also demonstrate with one finger how I can shorten the string like this. [PLAYS NOTE]...

**JANICE**

Great. What about your instrument.

**SHEILA KELLEY**

This is an Irish drum, called a bodhran, and it has a wooden frame, and this is goatskin, which is pulled taut across it. Erm what you do of course, as with any drum, is you hit it, and the skin it's...it's flexible so it moves. With this drum you play it by putting your hand actually on the skin at the back. Now if my hand's on there and I hit it, [HITS DRUM] it's quite a high pitch, and that's because I'm stopping some of the vibrating, and also I'm lessening the area of the drum that's being hit. So, when my hand's on it, [HITS DRUM] it's quite a high pitch. When

my hand's off it, [HITS DRUM] it has a lower pitch so you can actually change the pitch of a drum.

**JANICE**

Just depending where you hand is. Okay, so again it's all vibrations that make the notes.

Great, well I'll leave you to get a bit of a rest.

Hi there. Tell me about the whistle.

**ALAN**

Well, you blow through this end and the note is produced by the vibration of the column of air.

If I cover all the holes it's the complete column of air that vibrates. [PLAYS NOTE] And as I

take my fingers off one at a time I'm reducing the size of the column of air. And the shorter

the column of air, the faster the vibrations and the higher the notes. I'll just do that. You can

hear the notes increase in pitch. [PLAYS 5 NOTES]