Alice and her mathematical musical humps!

Discover the powerful connections between music and maths, and how to make the most of these parallels in your classroom

— by Jennie Henley, Caroline Hilton and Robert Newell

Alice the camel has got five humps. What would happen if you took one of those five humps away — would Alice still be a camel? What would happen if you took all of those humps away, what would Alice be left with?
The relationship between music and maths is much deeper than we sometimes think. It may not be immediately apparent, but when children sing Alice the camel, they are using a number of mathematical processes:

**Repetition** — The verse is repeated, the whole tune is repeated, the whole piece is repeated.

**Individual phrases are repeated** — The link between the verses is a melodic reflection of the last phrase: ‘go, Alice, go’.

**Symmetry** — The tune starts and ends on the same note.

**Reflection** — The first phrase is sung at one pitch, then sung at a higher pitch, then sung again at the first pitch.

**Prediction** — The repetition in the tune allows children to predict where the tune will go next.

**Transformation** — There is a sequence to the verses and children can predict what will happen in the next verse.

These processes are not just mathematical processes; they are also musical processes.

Try it out for yourself in this activity:

- Ask children to compose a pattern using their bodies (clapping, stamping, etc) or un-tuned percussion instruments.
- Ask them if they can play a reflection of the pattern (play it backwards).
- Ask them to play both the pattern and the reflection of the pattern.
- Ask children to translate that pattern and reflection by playing it on a different part of their body instruments.
- Ask the children to put together the original and the translated pattern and reflection.
- Continue with different transformations.

By using mathematical musical processes, you will be able to support your children in developing their musical ideas whilst at the same time deepening their understanding of mathematics and mathematical problem solving. Both teachers and children alike will benefit, so give it a go!

Think of any piece of music. You will likely find repetitions, reflections, transformations, and symmetry. You will probably be able to predict what might happen next. This happens when your prediction is not correct, how do you make sense of the music? You look for the familiar patterns.

The European Music Portfolio — Maths project funded by the EU is looking at the deeper links between music and maths. Through an exploration of the brain processes used, and mapping the findings onto maths and music curriculum, it has become clear that the two subject areas are more linked than it can be argued that the processes used in both maths and music, as Alice the camel shows, are the same. This is very powerful for Primary teachers. Through exploring music, children can develop understanding of both musical and mathematical structures, patterns, devices, and transformations. What’s more, by thinking mathematically about music, teachers can access music in a way that doesn’t require an understanding of musical cultures and genres, from classical to contemporary music. We talk to two top game music composers — Jessica Curry and Stephen Bayond — about the benefits of game soundtracks and the compositional techniques involved in writing for this medium. Jennie Henley then takes on some of the principles of game music and translates them into fantastic activities that you can try with your students.

For Jessica Curry director and composer at acclaimed studio ‘The Chinese Room’, computer games can prompt children to discover music they might not otherwise encounter. ‘Children and young people love games, so it’s a terrific opportunity to introduce them to music — and there’s such a wonderful breadth of styles and orchestration within the medium.’ This host of music ranges from the nineteenth-century Russian folk song ‘Korobeiniki’ heard in ‘Tetris’ to the elegant strings quartets of Hidetaka Sakamoto, who accompanies puzzle game ‘Torchwood’.

Jessica also emphasises the vibrant connection between soundtrack and player experience. ‘The licensed songs in the EA games do a great job of supporting the buzz and excitement of the match…’ They’re a huge hit with my 11-year-olds!’ On this theme, award-winning composer Stephen Bayond notes the challenges of composing for games, spotting devices which are used in game music. The dialogue regarding young composers can glean from listening carefully to soundtracks. ‘One of the rules of music in games is to make sure that changes in music are not jarring for the player. The composer has to be efficient and responsive to feedback from a player. This can lead to new ideas in composition that are not jarring for the player. The composer has to be efficient and responsive to feedback from a player. This can lead to new ideas in composition that are not jarring for the player.

**High score!**

Find out how computer games can take children’s musical engagement to the next level...

Computer games often receive a bad press in terms of their perceived negative impact, but their soundtracks subtly introduce children to a tremendous breadth of musical cultures and games, from classical favourites to cutting-edge contemporary music. We talk to two top game music composers — Jessica Curry and Stephen Bayond — about the benefits of game soundtracks and the compositional techniques involved in writing for this medium. Jennie Henley then takes on some of the principles of game music and translates them into fantastic activities that you can try with your students.

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**Creating soundscapes**

This activity explores narrative using captured sources. Children develop an understanding of how everyday sounds can be used to create an atmosphere, and develop their composing skills in layering and manipulating sampled sounds.

- Go on a sound walk, recording the sounds in the school environment on a digital recorder or iPad.
- As a class, listen to the recorded sounds and discuss what stories they might tell.
- Individually or in groups, import the sound clips into programmes such as Audacity, Soundpaint or Garageband and arrange them to fit your stories.
- Experiment with altering the sound clips or adding different samples (such as menacing strings, or thunderous timpani).
- Share each group’s/child’s work and discuss the narrative behind the music.
- This could be taken further with creating storyboards, animations, role-plays or dance.

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