Which comes first - beat or rhythm?

Which comes first – beat or rhythm? A new study published this month found that, as with almost all of the neuromusical research, whatever your answer was you're probably mistaken.

This study, lead by Silvia Bonocina from the Brainvolts Lab at Northwestern University, has put forward a model that shows how the development of rhythmic skills may shift and change throughout childhood. They begin by describing rhythmic skills as a multidimensional skill set which is in contrast with the idea that our brains have a single rhythmic IQ. This description got me thinking about how I see children being able to clap in time but not being able to march in time. I also thought about how children can clap along to the beat when they listen to music, but as soon as the music stops, they can't continue the beat. This study indicates that these differences may have something to do with rhythmic maturation.

As with a great deal of neuromusical research, it appears that musical skills rarely develop in a linear or straightforward pattern. They are different for every child and at every age. We do know that being able to keep a beat is an outward demonstration of a particular level of inward brain connectivity. Put another way, for a child to keep a beat, their eyes, ears and body need to be effectively and continually synchronising information and incorporating feedback. Think about playing a drum in an ensemble, a child needs to control their own body to maintain the beat, but they also need to be responding to the tiny changes that he or she may hear with the sounds made by other drums. It is a cognitively tricky task, and this is why it is so important for us to research and understand how it develops.

The research experiment looked at four different rhythmic skills – clapping in time; drumming to a beat without music; remembering rhythmic patterns; repeating them back and drumming to the beat of the music. This study is one of a series that is trying to plot the development of rhythmic skills from early childhood to adolescence and beyond.

You can see in the diagram below that the researchers hypothesised that in early childhood (0-5 years) rhythmic skills might be a global skill. This means the brain is developing the skills of clapping in time, drumming to the beat, drumming to the beat of music and remembering rhythmic patterns all at the same time. However, between the ages of 5-8 years, rhythmic skills may be more specialised.

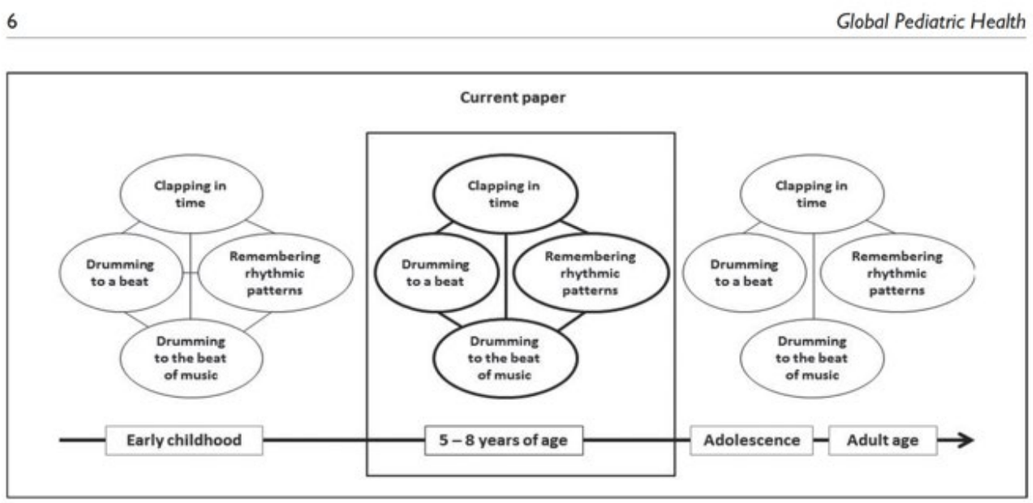

Figure 3. Schematic representation of current findings (in the square box) and hypothesized relationships motivated by the current work for future investigation.

Image source: Bonacina, S., Krizman, J., White-Schwoch, T., Nicol, T., & Kraus, N. (2019). How Rhythmic Skills Relate and Develop in School-Age Children.

As you can see from the diagram, this study revealed that the children who could drum to the beat with music could either drum to the beat or remember rhythmic patterns, but the results showed the children couldn't necessarily do both. This puzzled the researchers, but they hypothesise that maybe, instead of developing globally (or simultaneously) the brain may put more energy in developing one skill before it develops the other. The brain may pick a specific order in which to develop these skills. This finding may explain that very interesting time at the start of formal school when children seem to have one rhythmic skill firing away while another, seemingly connected skill, seems to struggle to develop.

> "Having good rhythmic skills appears to be essential not only for music or dance but also for language and communication skills."
>
> Bonacina, S. et al. (2019). How Rhythmic Skills Relate and Develop in School-Age Children.

I would also venture a theory that clapping in time requires coordination and synchronisation. These are skills children work to develop in early childhood in order to maintain a steady beat with their hands. After they develop this skill, they are able to transfer that skill to a drum and maintain a beat based on a piece of music they can hear. This is an external auditory cue that provides children with a signal for movement as well as for the coordination and synchronising of their movements. In order to confidently drum to a beat and remember a rhythmic pattern, a student needs to internalise the auditory cues from the music. This means children have to hear those cues inside their brains.

The development of rhythmic skill is not a 1-2-3-4 step process for every student. From this study we can start to see that it is a dynamic and complex process and understanding the order to learning and when the learning changes could help music educators to teach the essential skills of rhythm more effectively.

Read More

Bonacina, S., Krizman, J., White-Schwoch, T., Nicol, T., & Kraus, N. (2019). How Rhythmic Skills Relate and Develop in School-Age Children. *Global pediatric health*, *6*, 2333794X19852045.

Bonacina, S., Krizman, J., White-Schwoch, T., & Kraus, N. (2018). Clapping in time parallels literacy and calls upon overlapping neural mechanisms in early readers. *Annals of the New York Academy of Sciences*, 1423(1), 338-348.

Researcher to Follow

Dr Silvia Bonacina
Northwestern University

Which comes first - beat or rhythm?

Professional Reflection • Part 1

Personal Brain Buzz

If you do all of these rhythmic tasks one after the other, do you "feel" you brain working differently? How do you think your rhythmic processing may differ across these four tasks?

1. Clapping the beat
2. Drumming to a beat
3. Drumming the beat to music
4. Repeating rhythmic patterns

Experiment Time

Ask the above questions to two other people (students, collegues, peers etc.) and see what they say.

1. What are the main differences between your research participants?
2. Can you find at least one common "brain feeling" you share?

Which comes first - beat or rhythm?

Professional Reflection • Part 2

Teaching Brain Buzz

How do your students learn rhythm, and how do implicit and explicit teaching methods change their capacity to become independent rhythm makers?

Experiment Time

Ask your students about different methods they have experienced with rhythm learning. Can they do the four tasks, and how do they think they learned how to do them?

Put “rhythm learning” on your agenda for your next staff meeting and discuss how each teacher understands rhythm learning. Make a point of looking at the four types of skills in this study - clapping in time; drumming to a beat without music; remembering rhythmic patterns; repeating them back and drumming to the beat of the music.. What works, what doesn’t and how do we as teachers know it has “worked”?

Questioning Brain Buzz

After completing this professional reflection, write at least two questions you have about this topic.