

## Music-induced synchronization of biological systems

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Music is known to boost motor performance. Running while listening to rhythmic music is not only pleasurable, but propels people to run longer and more efficiently. Yet, it is unclear where this ergogenic power of music comes from. It can be merely due to music's tendency to drive attention away from people's feelings of fatigue. Alternatively, music may foster efficient coupling of biological rhythms that are key contributors to performance, such as locomotion and respiration. Here, we show that running with music enhances performance (i.e., it lowers motor and respiratory variability), increases the coupling between locomotor and respiratory rhythms, and reduces energy consumption (Bardy et al., 2015, Hoffmann et al., 2012). Music is more efficient than a simpler rhythmic stimulus (i.e., a metronome), which is itself more efficient than silence. This beneficial effect of music is equivalent to reducing by 3 min the time to complete a marathon, and is associated to lower perceived effort. The propensity of auditory rhythms to entrain biological systems, and stabilise their synchronisation, is thus a key factor in increasing motor performance. This finding is robust and extends well beyond the science of running, with consequences for rehabilitation of movement disorders, efficiency in daily work, and the development of new music technologies.

### References

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- Hoffmann, C. P., Torregrosa, G., & Bardy, B. G. (2012). Sound stabilizes locomotor-respiratory coupling and reduces energy cost. *PLOS ONE*, 7, e45206.

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