

It's About Time!: A 21st-Century Cognitive Perspective on the Pedagogy of Timing

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Concepts from the Research

Based on several different fields of scientific research, recent studies suggest the following concepts are essential to be aware of when teaching any level musician. These concepts rarely show up in traditional method books (especially the beginner methods) or conventional pedagogy.

My claim is not that they are essential for success (as scores of musicians have been successful without adopting these concepts) but by utilizing the methods described here, musicians will be successful **faster**, and more musicians will reach the same level of success.

History and Development- Time at one point was regarded as a highly important environmental constraint when developing theories of action and movement (Aristotle), but certain streams of research and philosophy gravitated away from this (e.g Newton) which has left us with pedagogy that is less optimal for human learning.

Tempo in Practice

Convention- Speed Accuracy Tradeoff by **Fitts and Posner (1967)** suggests that for perceptual motor tasks, the faster you go, the less accurate you will be.

Current Science- Research in neurodynamics suggests that as movements are coordinated and become well-learned, the neuronal pathways are streamlined, and various regions of the brain are pruned out of the process. **Ashby, Ennis, & Spiering (2007)**.

Additional Concerns-

- Physiology-** Different tempos use muscles differently.
- Phrasing-** Slower means breathing more often/changing the phrase
- Embouchure-** Different breaths cause different places to shift
- Cognitive-** Slower means more time to process (inauthentic environment)

The Problem- Conventional pedagogy teaches that the best way to learn a tricky passage is to slow things down and slowly speed them up. This goes against current research that suggests the slower versions are actually considered different neurological actions (I will expand on this in the presentation) and the process of neural re-routing is actually more time-consuming in the long run.

The Solution- Teach your students how to chunk and chain. This will enable them to take small 'bits' and work on them at the goal tempo, and slowly combine them as opposed to slowing down the metronome. Slowing down the tempo can be used as a later technique once the motor patterns are already learned in the existing context of time (though you may find it less necessary at that point).

Metronome Use

Convention- Practice with a metronome and you will improve your ability to keep time.

The Science- Neuroscience studies involving fMRI measurement suggests that synchronization tasks and continuation tasks utilize different pathways and different regions of the brain (i.e. practicing with a metronome and without a metronome require different brain functions). **Gerloff, Richard, Hadley et al, 1998; Lewis, Wing, Pope et al, 2004**

The Problem- Practicing with a metronome has been shown to be more effective than practicing without a metronome, but there is still a disconnect when students have to then perform without a metronome. How do we bridge the gap between practice and performance?

The Solution- There are several resources that enable users to have beats randomly removed from sequences, which helps keep the neuronal activation in the 'correct' regions. Apps like Time Guru, metronomics, mp3 tracks like Innovative Practice Tools, and even programming your Dr. Beat to leave some beats out can help bridge this gap.

Please feel free to contact me (jasonsulliman@gmail.com) if you have any questions regarding the concepts presented in this session. Thank you!