

Why the Progress You Make in the Practice Room Seems to Disappear Overnight

by Dr. Noa Kageyama

Have you ever been frustrated by the fact that you can take a difficult passage, work on it for a bit, get it sounding pretty good, but return to the practice room the next day to discover that you're back at square 1? That nothing has really changed? And despite how good it sounded yesterday, now it sounds just as bad as it did before you worked on it?

Most of us can live with “two steps forward, one step back.” It's the “two steps forward, two steps back” that makes us want to tear our hair out.

So what are we to do?

Are we just supposed to keep at it and learn how to be more patient? Or is there a different way to practice that can make these improvements more permanent?

Enter Christine Carter

Dr. Christine Carter is a clarinetist who teaches at the Manhattan School of Music, and did her dissertation on the contextual interference effect – a phenomenon that can help you make your daily progress in the practice room actually stick. In this post, she shares a few suggestions on how we can make the most of our practice time.

Take it away, Christine!

Making the most of your hours in the practice room:

One simple change that could drastically increase your productivity

When it comes to practising, we often think in terms of time: How many hours are necessary to achieve optimal progress? While this is a valid concern, a more important question is how we can make each hour count. What is the most efficient way to work so that what is practiced today actually sticks tomorrow? There is nothing more frustrating than spending a day hard at work only to return the next day at the starting line. Unfortunately, our current practice model is setting us up for this daily disappointment.

Repetition, babies, and brain scans

Early on in our musical training, we are taught the importance of repetition. How often have we been told to “play each passage ten times perfectly before moving on”? The challenge with this well-intentioned advice is that it is not in line with the way our brains work. We are hardwired to pay attention to change, not repetition. This hardwiring can already be observed in preverbal infants. Show a baby the same object over and over again and they will gradually stop paying attention through a process called *habituation*. Change the object, and the attention returns full force. The same goes for adults. Functional magnetic resonance imaging has demonstrated that there is progressively less brain activation when stimuli are repeated. The fact is, repeated information does not receive the same amount of processing as new information. And on some level, we all know this. Constant repetition is boring and our boredom is telling us that our brains are not engaged. But instead of listening to this instinctive voice of reason, we blame ourselves for our lack of attention and yell at ourselves to “focus!” Luckily, there is an alternative.

Blocked practice schedules

In the field of sport psychology, the continuous repetition discussed above is called *blocked practice*. In a blocked practice schedule, all repetitions of one activity are completed before moving on to a second activity. For example, a baseball player who must hit fifteen fastballs, fifteen curve balls, and fifteen change-up pitches in practice would complete all of the fastballs before moving on to the curve balls and so on. This most resembles the way the majority of musicians practice, especially when it comes to challenging passages. We work on one excerpt for a given amount of time and then move on to the next excerpt until all tasks for the day are complete. A blocked approach seems logical. Muscle memory requires repetition and why wouldn't we do all of the repetitions in a row? After all, if we are working on a difficult passage, it feels a lot more comfortable 10 minutes into practice than at the beginning. It is precisely this feeling of comfort and improvement that reinforces our reliance on blocked practice. The problem with this kind of practising, however, is that the positive results we feel in the practice room *today* do not lead to the best long-term learning *tomorrow*. Practising in a way that optimizes performance in the practice room does not optimize learning.

Random practice schedules

What if we took the blocks of practice on particular tasks and broke them down into smaller segments on each task? In the baseball example above, the players could hit the three different types of pitches in an alternating fashion, instead of doing all of one kind in a row. Two breakdown options are a repeating order (e.g., abc abc abc...) or an arbitrary order (e.g., acb cba bca...). In either, the net result will still be 15 practice hits of each of the three types of serve, exactly the same as the net result in the

blocked practice schedule. The only variable that changes is the order in which the pitches are practiced. This type of interspersed schedule is called a *random practice schedule* (also known as an *interleaved* practice schedule).

In a random practice schedule, the performer must keep restarting different tasks. Because beginnings are always the hardest part, it will not feel as comfortable as practising the same thing over and over again. But this challenge lies at the heart of why random practice schedules are more effective. When we come back to a task after an intervening task, our brain must reconstruct the action plan for what we are about to do. And it is at this moment of reconstruction that our brains are the most active. More mental activity leads to greater long-term learning. In the blocked schedule above, the baseball players must only construct the action plan for each type of pitch once, at the beginning of each block. In the random schedule, they must construct and later reconstruct an action plan fifteen times for each pitch. Although a blocked schedule may produce superior performance *during practice*, study after study has shown that a random practice schedule consistently produces superior retention *following practice* a day or more later (i.e., the amount actually *learned*). This phenomenon is called the *contextual interference effect*.

How much better is a random practice schedule?

It turns out that the hypothetical baseball example used above is not hypothetical. In a 1994 study by Hall, Domingues, and Cavazos, elite baseball players were assigned to either the blocked or random practice schedules discussed above. After twelve practice sessions, the baseball players in the random practice schedule hit 57% more of the pitches than when they started. The blocked group only hit 25% more of the pitches, meaning that the random practice schedule was almost *twice as effective*, even

though the two groups hit the *same number of practice pitches*. Similar results have been found across a wide variety of fields. Most pertinent to our interests as musicians, my preliminary research at the Brain and Mind Institute in Canada provides empirical support for the use of a random practice schedule in music. Not only does this research suggest that a random practice schedule is more effective than a blocked schedule for practising musical passages, participant interviews also reveal that random practice has positive effects on factors such as goal setting and focus.

How to use a random schedule in the practice room

Rather than spending long uninterrupted periods of time woodshedding each excerpt or section of a piece, pick a few passages you would like to work on and alternate between them. If you want to spend a total of 30 minutes on a particular excerpt, practice in shorter segments, continually returning to this excerpt until you have achieved your 30-minute goal. Experiment with lengths of time. If you are practising excerpts that are very short, you may be able to switch between them at a faster pace than would be required for longer sections. You can use a small alarm clock to time specific intervals or switch after each repetition. At its most basic level, random practice might look like this:

Length	Material to Practice
3 minutes	Excerpt A
3 minutes	Excerpt B
3 minutes	Excerpt C
3 minutes	Excerpt A
3 minutes	Excerpt B
3 minutes	Excerpt C
	Etc.

Practising passages in different rhythmic variations is a great way of introducing contextual interference on a smaller scale. But instead of doing all rhythmic variations on a single excerpt before moving onto the next, do one variation on excerpt A, one on excerpt B and then return to excerpt A for a second variation etc. Technique can also be interspersed into the random schedule, instead of doing all of it in one long block. An example of a more complicated random practice session might look something like the following:

Length	Material to Practice
2 minutes	Long tone, scale, long tone, scale...
3 minutes	Excerpt A (using first rhythmic variation)
2 minutes	Third progression, arpeggio, third progression, arpeggio...
3 minutes	Excerpt B (using first rhythmic variation)
2 minutes	Long tone, scale, long tone, scale...
3 minutes	Excerpt A (using second rhythmic variation)
2 minutes	Third progression, arpeggio, third progression, arpeggio...
3 minutes	Excerpt B (using second rhythmic variation)
	Etc.

The permutations are endless and the exact division of time is not important. What is crucial is that you are keeping your brain engaged by varying the material. More engagement means you will be less bored, more goal-oriented (you have to be if you only have 3 minutes to accomplish something), and substantially more productive. Most importantly, when you return to the practice room the next day, you can start from where you left off. This type of practice *sticks*.

About Dr. Christine Carter



Canadian clarinetist, Christine Carter, has performed with orchestras around the world, including concerts with the Montréal Symphony Orchestra under Kent Nagano, the National Arts Centre Orchestra under Pinchas Zukerman, and performances at the Sydney Opera House with Michael Tilson Thomas and the 2011 YouTube Symphony Orchestra. In 2011, she completed her third season with Maestro Lorin Maazel's Castleton

Festival, including over twenty concerts and a tour with Academy Award® winners, Dame Helen Mirren and Jeremy Irons. Most recently, she was invited to play bass clarinet for gala performances with the New World Symphony in Miami and as a substitute with the Metropolitan Opera Orchestra.

In addition to her orchestral pursuits, Christine has performed extensively as a chamber musician. Highlights have included performances with members of the Chicago, Toronto, Quebec, and Vancouver Symphony Orchestras, and engagements ranging from contemporary music at Carnegie's Weill Recital Hall to staged performances of Stravinsky's *A Soldier's Tale* with Lorin Maazel and violinist, Jennifer Koh.

Having worked in both neuroimaging and music cognition labs, Christine has coauthored several music psychology journal articles and was recently commissioned to write an article on practice techniques for the December 2012 edition of *The Strad Magazine*. She has presented performance psychology workshops

at universities and conservatories in both Canada and the US and is currently pursuing research as a visiting scholar at the University of Western Ontario's Brain and Mind Institute. She holds a Master of Music degree from McGill University and recently completed her Doctor of Musical Arts at Manhattan School of Music.

About Dr. Noa Kageyama

Performance psychologist and Juilliard alumnus & faculty member Dr. Noa Kageyama teaches musicians how to play their best under pressure through live classes, coachings, and an online course. Based in NYC, he is married to a terrific pianist, has two hilarious kids, and is a wee bit obsessed with technology and all things Apple.

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