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8 Things Top Practicers Do Differently

By [Noa Kageyama, Ph.D.](#) | Mar 11, 2015

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Noa Kageyama, Ph.D.

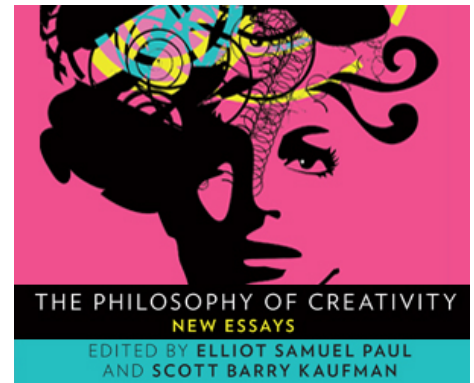
Performance psychologist Dr. Noa Kageyama serves on the faculty of The Juilliard School and the New World Symphony, where he specializes in teaching performing artists how to utilize sport...

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Synopsis

We've all heard the phrase "practice smarter, not harder," but what does that really mean? What does "smarter" practice actually look like? A study of collegiate piano majors suggests that the key lies in how we handle mistakes.

As my kids were (begrudgingly) practicing their Tae Kwon Do patterns not long ago, I caught myself telling my oldest that he had to do his pattern five times before returning to his video game.

My goal, of course, was not for him to simply plod through the motions of his pattern five times like a pouty zombie, but to do it once with good form and commitment. But the parent in me finds it very reassuring to know that a certain number of repetitions has gone into something. Beyond the (erroneous) assumption that this will somehow automagically solidify his skills, it feels like a path to greater discipline, and a way to instill within my kids some sort of work ethic that will serve them well in the future.

It's true that some degree of time and repetition is necessary to develop and hone our skills, of course. But we also know on some intuitive level that to maximize gains, we ought to practice "smarter, not harder."

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But what does that really mean anyway? What exactly do top practicers do differently?

Pianists learning Shostakovich

A group of researchers led by [Robert Duke](#) of The University of Texas at Austin conducted a [study](#) several years ago to see if they could tease out the specific practice behaviors that distinguish the best players and most effective learners.

Seventeen piano and piano pedagogy majors agreed to learn a 3-measure passage from [Shostakovich's Piano Concerto No. 1](#). The passage had some tricky elements, making it too difficult to sight read well, but not so challenging that it couldn't be learned in a single practice session.

The setup

The students were given two minutes to warm up, and then provided with the 3-measure excerpt, a metronome, and a pencil.

Participants were allowed to practice as long as they wanted, and were free to leave whenever they felt they were finished. Practice time varied quite a bit, ranging from 8 1/2 minutes to just under 57 minutes.

To ensure that the next day's test would be fair, they were specifically told that they may NOT practice this passage, even from memory, in the next 24 hours.

24 hours later...

When participants returned the following day for their test, they were given 2 minutes to warm up, and then asked to perform the complete 3-measure passage in its entirety, 15 times without stopping (but with pauses between attempts, of course).

Each of the pianists' performances were then evaluated on two levels. Getting the right notes with the right rhythm was the primary criteria, but the researchers also ranked each of the pianists' performances from best to worst, based on tone, character, and expressiveness.

That led to a few interesting findings:

- 1 Practicing longer didn't lead to higher rankings.
- 2 Getting in more repetitions had no impact on their ranking either.
- 3 The number of times they played it correctly in practice also had no bearing on their ranking. (wait, what?!)

What *did* matter was:

- 1 How many times they played it *incorrectly*. The more times they played it incorrectly, the worse their ranking tended to be.
- 2 The *percentage* of correct practice trials did seem to matter. The greater the *proportion* of correct trials in their practice session, the higher their ranking tended to be.

The top 8 strategies

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Three pianists' performances stood out from the rest, and were described as having "more consistently even tone, greater rhythmic precision, greater musical character (purposeful dynamic and rhythmic inflection), and a more fluid execution."

Upon taking a closer look at the practice session videos, the researchers identified 8 distinct practice strategies that were common to the top pianists, but occurred less frequently in the practice sessions of the others:

1. Playing was hands-together early in practice.
2. Practice was with inflection early on; the initial conceptualization of the music was with inflection.
3. Practice was thoughtful, as evidenced by silent pauses while looking at the music, singing/humming, making notes on the page, or expressing verbal "ah-ha"s.
4. Errors were preempted by stopping in anticipation of mistakes.
5. Errors were addressed immediately when they appeared.
6. The precise location and source of each error was identified accurately, rehearsed, and corrected.
7. Tempo of individual performance trials was varied systematically; logically understandable changes in tempo occurred between trials (e.g. slowed things down to get tricky sections correct).
8. Target passages were repeated until the error was corrected and the passage was stabilized, as evidenced by the error's absence in subsequent trials.

The top 3 strategies

Of the eight strategies above, there were three that were used by *all three* top pianists, but rarely utilized by the others. In fact, only two other pianists (ranked #4 and #6) used more than one:

6. The precise location and source of each error was identified accurately, rehearsed, and corrected.
7. Tempo of individual performance trials was varied systematically; logically understandable changes in tempo occurred between trials (e.g. slowed things down to get tricky sections correct; or speeded things up to test themselves, but not too much).
8. Target passages were repeated until the error was corrected and the passage was stabilized, as evidenced by the error's absence in subsequent trials.

What's the common thread that ties these together?

The researchers note that the most striking difference between the top three pianists and the rest, was *how they handled mistakes*. It's not that the top pianists made fewer mistakes in the beginning and simply had an easier time learning the passage.

The top pianists made mistakes too, but they managed to correct their errors in such a way that helped them avoid making the same mistakes over and over, leading to a higher proportion of correct trials overall.

And one to rule them all

The top performers utilized a variety of error-correction methods, such as playing with one hand alone, or playing just part of the excerpt, but there was one strategy that seemed to be the most impactful.

Strategically slowing things down.

After making a mistake, the top performers would play the passage again, but slow down or hesitate – without stopping – right before the place where they made a mistake the previous time.

This seemed to allow them to play the challenging section more accurately, and presumably coordinate the correct motor movements at a tempo they could handle, rather than continuing to make mistakes and failing to identify the precise nature of the mistake, the underlying technical problem, and what they ought to do differently in the next trial.

The one-sentence summary

"Success does not consist in never making mistakes but in never making the same one a second time." -George Bernard Shaw

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**Ronny Johnston** · a year ago

It's real simple, you have to slow down to a pace where your brain can process everything it is being asked to do, then the muscles can be trained and eventually fired in real time. If you pay attention to your body, it will tell you when to slow down...the problem is our brains are programmed to go fast, "To get the nut, solve the problem now!" Even if that means guessing and not thinking.

11 ^ | v · Reply · Share ›

**BullMoose** → Ronny Johnston · a year ago

Yes--I use the analogy of programming the computer, in this case, one's brain. We must be able to play the passage absolutely accurately (notes, rhythms, articulations) at a slow tempo before we can even begin to play it quickly. AND, more importantly, playing up to tempo in the practice room is not always what is needed, especially in a large ensemble piece. If the brain is properly programmed at slow speed (and fingerings and any accidental reminders penciled in), then showing up for rehearsal and playing at tempo can produce surprisingly accurate results.

Of course, a solo work needs the repetition of clarity and accuracy at fast tempo as well. But again, the "programming the computer" method wins over blind repetitive motion, even one that involves slow building of speed with the metronome. I used to sit there for hours, methodically repeating a passage at faster and faster speeds until I got it up to tempo, then would begin the process again the next day, only a small step or two ahead of where I was the day before. Now I practice the passage meticulously at the slow speed--half tempo or less--until I have everything as I want it (tone, intonation, inflection, musical line, phrasing, oh yeah, and notes,

[see more](#)

6 ^ | v · Reply · Share ›

**Frank** · a year ago

I had the privilege of recording a number of Canada's best young pianists, at least one of whom now tours professionally after completing his Julliard studies. One of them only practiced about an hour a day and yet was one of the best. (most were practicing about 6 hours a day) When I asked how he managed, he said on his hour long drive to school each day, he would "think" through the piece as he followed the music. As your article correctly points to, once at the piano, he would slow down the problem areas and work those sections in practice, rather than spend excess time on the easy parts.

8 ^ | v · Reply · Share ›

**John Link** · a year ago

Good article but the one-sentence summary does not summarize the article. A better one would be as follows:

"The slower you go the faster you'll get there." -John Link

11 ^ | v · Reply · Share ›

**Saccani** · a year ago

Smart practicing doesn't mean eliminating repetition though - to develop skill into the muscle, takes a lot of repetition of....the correct procedure carefully thought out. So smart practice into multiple reps for basic skill development. If the required skill is working well, learning individual passages (learning passages as opposed to developing skill, which are two different sorts of practicing) doesn't necessarily take endless repetition, as pointed out in the article. Ofttimes what the smart practicing is doing is discovering what to think while playing the section. One thing that wasn't mentioned in the article is pattern recognition. Often, smart practicing is about finding patterns in a passage, whether patterns in one's movements while playing the passage, or audible patterns, or patterns on the

movements while playing the passage, or audible patterns, or patterns on the page. It just all adds up to recognizing and playing a passage with familiarity and comfort.

12 ^ | v · Reply · Share ›



Richard Driedger → Saccani · a year ago

Saccani, you're right that there is value in repetition, but what you're missing is that the isolations of difficult passages are, in fact, repetitions. Arnold Schwarzenegger was famous for his well developed workout technique, not wasting time and energy doing complete lifts, but micro-isolating the weakest part of the muscle and doing entire sets moving hardly an inch. In music, some parts are indeed easy for the performer; On these parts emotional connection to the phrase outweighs mechanical repetition. The goal of micro-repetition is to isolate the trouble spots

1 ^ | v · Reply · Share ›



Gary Camp → Saccani · a year ago

I think the article is trying to show that it is not the absolute number of repetitions but that the right amount to solve the problem. Each has his threshold. But more testing is needed to weed out other factors.

^ | v · Reply · Share ›



Nathan Kim → Saccani · a year ago

Repetition should happen when you get the motion, technique, or piece down first.

^ | v · Reply · Share ›



Skibarius · a year ago

Seems the study did not take into account that some musicians are actually more skilled than others and what took someone very little practice would require someone else much more practice (of any kind)...

4 ^ | v · Reply · Share ›



Joseph Erhard-Hudson → Skibarius · a year ago

That was my thought as well. A really interesting follow up study would explore pedagogy focussed on imparting these practice skills, to see if students could become more effective learners like the stars in this study.

1 ^ | v · Reply · Share ›



MotherGinger · a year ago

I have a hard time believing any real number of music majors could be found who did not do these three things. I do them and I'm just a 40 year old mom who likes to fool around on the piano after swapping a wind instrument for engineering 20 years ago, and I teach my children to practice with the same techniques.

I will say that I never learned them in any private or group instructional environment; I came up with them on my own. It is insane to me that this isn't taught by every instructor. I don't know how anyone can become good without those three, whether they do the rest or something else, or not.

6 ^ | v · Reply · Share ›



a57se · a year ago

Seems like the best practice until they can't do it any other way vs. practicing until you just get it.

5 ^ | v · Reply · Share ›



Steve Dwire → a57se · a year ago

That's a great summary. Sharing that with my kids.

^ | v · Reply · Share ›



CarltonW · a year ago

This was my revelation as a teacher. I think I learned bit and pieces of it from



this was my revelation as a teacher -- I think I learned bit and pieces of it from other teachers, but it didn't all click until I had to come up with a way to tell my own students. *Slow enough* practicing so that you're not making mistakes and then test your mastery at faster tempos. If you make a mistake slow down again to the point where you aren't. Making the mistake repeatedly it becomes engrained in your performance -- much harder to unlearn than to have learned correctly in the first place. "Slow enough" might mean deadly slow in the beginning, or it might mean only just below up-to-tempo. Hands together practice is the same idea: start one hand at a time and test hands together until you get it, backing up to hands separately if you're making mistakes.

2 ^ | v · Reply · Share ›



Teerexness · a year ago

I've been playing, selling and teaching guitar for 35+ years now, and I still practice several hours a day. For me, the key to successfully playing (and retaining) music seems to be narrowing it down by playing it wrong in several potential ways first. Like shooting arrows around the bullseye. By the time I hit the bullseye, I own it!

4 ^ | v · Reply · Share ›



pwsax · a year ago

I'd like to approach these findings from the perspective of the ethos of a musician - what Dr. Kageyama refers to, obliquely, when speaking of discipline and work ethic.

Despite what we like to think, practice is not always practical. It is also part of our ethos. Discipline is reified - made "a thing" - in our identity as musicians. It is not so much a tool to aid achievement as a quality that must imbue us and our work to make us good - artistically, technically, and morally. It is how we know we are doing "the work." It is how we "earn it."

Practical, problem-solving strategies can be threatening to the ethos. They may be a kind of disciplined *thinking*, but if they lessen sheer repetitive drill - if we do not feel the "grind" - they do not meet our expectations for disciplined *action*. If we practice smarter, not harder, have we lived up to the ethos? Have we done "the work"? Have we "earned it"?

4 ^ | v · Reply · Share ›



Dave Wolf → pwsax · a year ago

To live up to the ethos you describe is to be intentionally ineffective. Those who practice 'smarter', as the article describes, have done the 'harder' work of figuring out how to practice effectively. 'Volume of time' does not equal 'hard work'.

20 ^ | v · Reply · Share ›



Andrew Jones → pwsax · a year ago

disciplined thinking should be the first step, not the last. if mindless drilling is essentially practicing mistakes, or practicing an unmusical (ie uninspired) performance then it is totally counterproductive. I knew people in music school who practiced for hours on end with no or little improvement- the creative geniuses tend to be the ones who practice smart but don't stop when a high level of competency is achieved, they search out or invent new areas of inquiry. This requires not only hard work but a sense of play and risk- and, as stated in the article, pausing to think.

7 ^ | v · Reply · Share ›



Atlas → pwsax · a year ago

Why do you aspire to "earn" your results through miserable grinding?

Why is a person who has put in 50 hours to obtain a given result/work output "more deserving" of that output than a person who has been able to produce the same output in five hours?

If two people can play the same piece with the same skill/feelina. the

...the number of hours it took to get there is irrelevant to anyone but the person who has to live and work with the time burden it places upon them.

2 ^ | v · Reply · Share ›



Bastion → Atlas · a year ago

Oh probably because people can't stand the idea that 'hard work' doesn't always pay off. We like to think that playing until our fingers bleed is an assured path to competence, that the presence of effort trumps the application of intellect. This is actually a foolish and entitled opinion to carry, but it's everywhere (at least in America) and it's poison

3 ^ | v · Reply · Share ›



This comment was deleted.



pwlsax → Guest · a year ago

Thank you. Ingrained attitudes in the music community are very hard to negotiate or interrogate! As an individual musician, you really have to have a solid sense of your own worth even to begin trying. As a result, what we call "musicianship" is influenced very strongly by those ingrained attitudes.

^ | v · Reply · Share ›



Guest → pwlsax · a year ago

And yet, positions go to people who can *do* it the best, not the ones who worked the hardest or showed the best work ethic. "He's a hard worker" is something people say about people who aren't the best at what they do.

So the question to ask is "Do you want to be recognized by others as a hard worker, or do you want to be good?" Sometimes they are the same, but the above study indicates that they are not necessarily.

3 ^ | v · Reply · Share ›



pwlsax → Guest · a year ago

also, "best" is a concept that can be reshaped by influences like our work ethic. Maybe "best" becomes the most mechanically correct player, not the one who brings the most feeling. Just an example (alho in my experience, a real one.)

^ | v · Reply · Share ›



Mister Sparky → Guest · a year ago

"Sometimes they are the same..." Indeed. Tommy Emmanuel comes to mind. He's as hard a worker as there's ever been, and also one of the best of all time.

^ | v · Reply · Share ›



Robert → Mister Sparky · a year ago

I don't think he's all that great, frankly. But that's another discussion.

1 ^ | v · Reply · Share ›



ShitMcBeetle → Robert · a year ago

Can we have that discussion Robert? I'm curious to your thoughts, as I've never heard anyone say that before.

^ | v · Reply · Share ›



Gary Camp · a year ago

I dont so much disagree with the conclusions but I wonder how well matched the subjects were in talent and ability. Some people have music genes. as the sav. If

the 3 tops are more music people they may be more similar in learning. More controlled testing is required to prove this.

It is like walking across the street with your eyes closed once, and concluding it is safe. Not a proper sample.

1 ^ | v · Reply · Share ›



chris968 · a year ago

Back in my days in music school I would spend anywhere between 4-8 hours in a practice room each day, depending on my schedule. I was majoring in trombone and minoring in piano. I would have a set period of trombone time, and a set period of piano time. I definitely learned how to practice, which was something I never thought was possible. In high school I always just took out my band music or my assignments from my private teacher and ran through them and then I was done. In college I learned there was much more to practicing and to accomplishing my goals, which was more than just to play through everything, but to master what I was practicing. I had one private trombone/piano lesson each week and then was given a week with new assignments. My piano assignments usually stayed pretty much the same, but my trombone assignments rapidly changed so but I would continue to work on previous etudes or exercises mainly because I enjoyed them. I really became a prolific musician due to college. I miss having the time and drive to practice that much now but it is just not feasible and that really sucks.

1 ^ | v · Reply · Share ›



The_Art_Vandelay · 5 months ago

Play slowly. Learn it slowly = forgetting it slowly, says one music teacher.

^ | v · Reply · Share ›



Atreides83 · 6 months ago

I'm not sure the study controlled for inherent skill though. That is, some people naturally require far less practice than others to get something. This would be reflected in them playing it incorrectly less times (in absolute numbers and relative to their total). This directly affects their conclusion that quantity is less important than quality. Perhaps the amount of practice required is proportional to how quickly you pick something up? I think they are confusing correlation with causation. I didn't read the full study but a text search found no instances of the word "control", which is telling.

That said, the three top strategies seem to make sense, and it was an interesting article.

^ | v · Reply · Share ›



Jeff M · 10 months ago

There is an OLD adage in racing, "Slow down and go faster".

^ | v · Reply · Share ›



Neil Spencer Bruce · a year ago

Great Article!!

^ | v · Reply · Share ›



jgarcia12 · a year ago

Very insightful article. The "Errors were addressed immediately when they appeared" struck a cord with me. But how do you do that in domains where it is hard to get immediate feedback?

^ | v · Reply · Share ›



George Neidorf → jgarcia12 · a year ago

record and preferable video your playing, there's your feedback.

^ | v · Reply · Share ›

**mf** · a year ago

have always told my students that each time they play a mistake, they have to execute at least three good iterations in a row in order to replace what their body learned as a mistake with what their body must now learn as the correct passage. Slowing down to do so was inherently required; they didn't want to get to correct passage number three and then start over when they flub it. yes, it's just a numbers game and one can use whatever numbers they want, ultimately, but the philosophy worked well... unlearning mistakes and focusing directly on those passages was key to their success. This resulted in several years of championship level percussion groups.

^ | v · Reply · Share ›

**Anthony** · a year ago

Lot's of great comments here about practicing. I love the idea of programming the computer/robot that plays piano, I use this analogy often with my students. Every movement makes a difference. It is important that students learn to optimize movement from a young age with easy music. Muscle memory is very powerful and use of the whole body synergistically is essential to advanced playing.

One thing I might add is that hands together practicing is ok at the beginning, but not for long. If my students are performing a piece they must at least have difficult passages memorized hands separately. The difference otherwise is often quite noticeable. Hands should not rely on each other, they should be truly independent. When we play piano we are often playing the whole orchestra and every instrument needs to be heard. When one breaks things down, you are able to see these interactions and play them appropriately.

^ | v · Reply · Share ›

**James Douglas** · a year ago

If the "practicer's" goal is simply to do a certain number of repetitions, there is little purpose to the practice.

The "practicer's" goal needs to be to deliberately get better

"how expert one becomes at a skill has more to do with how one practices than with merely performing a skill a large number of times."

^ | v · Reply · Share ›

**joel** · a year ago

check out "Playing the Piano for Pleasure" Charles Cooke

^ | v · Reply · Share ›

**Linda Diane McMillan** · a year ago

I was momentarily interested in this, but then I saw that the "research" was done by the University of Texas, home of the now infamous Regenerus Study. Until the university repudiates the study and disciplines Mark Regenerus can we trust ANYthing that comes out of UT? They simply don't care about research methods or integrity.

I am boycotting UT research,

Linda McMillan

^ | v · Reply · Share ›



This comment was deleted.

**Linda Diane McMillan** [↗](#) Guest · a year ago

The only thing I care about is reminding you of the Regnerus Study and the fact that it remains blight on UT.

^ | v · Reply · Share ›



This comment was deleted.



77 yr old piano teacher → Guest · a year ago

This closely resembles what I teach MY piano students. When they struggle during lesson, I have them go over only the tough parts, sometimes even playing each hand separately if it's bad, then, when it seems to be conquered, back up a measure or so to flow into the problem area. It is how I practiced as a youngster.

^ | v · Reply · Share ›

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