

## How Technical Mistakes During Practice Can Be Used to Enhance Performance (and Confidence Too)

### Description

The first few minutes of bringing a puppy into our home were pretty awesome. He was so tiny and cute, the kids could barely contain themselves. I felt like the best parent ever.

And then he peed on the carpet.

Because of course while I knew he shouldn't be peeing on the carpet, the little fuzzball clearly did not. And since everything I read online suggested that it was critically important to make sure the little guy did not make any mistakes, I was super stressed out 24/7. Because for every mistake he made inside, I was told that I'd have to counter this with dozens, if not hundreds of successful repetitions outside.

Of course, it wasn't very realistic to think that I could get through potty training with no mistakes. But the fear that one little slip-up could undo dozens of correct repetitions made each mistake seem really monumental.

Similarly, I think we all know that perfection in the practice room from Day 1 is impossible. Yet it still feels like we should still be striving for "perfect" practice and minimizing errors as much as we can. But could it be that this fear of building bad habits, actually ends up leading to a kind of practice that stunts our growth and learning?

### Pétanque?

A pair of Taiwanese researchers took a closer look at two approaches to teaching students how to play pétanque ([Chien & Chen, 2017](#)).

What's pétanque? Well, it's a game vaguely like lawn darts, except with hollow metal balls instead of flying metal spikes.

And what's lawn darts, you ask? If you were born in the 70's or earlier, you might remember having a set as a kid. But for reasons you can probably imagine, the game is [now illegal in the US and Canada](#). And if you can't conceptualize the game of lawn darts, you can get a sense of it in [this \(slightly morbid\) silent film](#) which is a hilariously accurate depiction of how a game of lawn darts inevitably escalates when a group of kids are left unsupervised to freely indulge in their creative impulses...

### 3 weeks of basic training

Anyhow, back to the study, 75 college students were enrolled in pétanque classes, and started out with three weeks of basic training. Partly, to review basic safety guidelines (because throwing metal balls around other people does pose a safety risk), but also to cover the rules of the game, boule grips, and throw styles.

## 6 weeks of practice

Then, the students proceeded with six weekly 2-hour training sessions on “pointing,” i.e. the various throwing techniques players use to get the boule as close as possible to the target.

Each training session began with a 5-minute introduction by the instructor, followed by 20 minutes of exploratory practice in teams of 4-5 students. During this free practice period, students were encouraged to experiment with different techniques without any instructor guidance, and to try to work out the physics of the game through trial and error.

Then, for the next 30 minutes, the teams took turns sharing what they had discovered in their practice with the rest of the class (a collaborative learning approach which in itself, actually sounds like a pretty cool way to learn).

## Two types of instruction

The first half of each class was identical for everyone. But the second half of class went one of two different ways.

### Error group

In the **guided error group**, the instructor summarized the mistakes observed in each team’s exploratory practice, demonstrated some common errors, and without showing students the correct way of doing things, described the connection between the students’ incorrect movements and their resulting effects on the flight and landing of the boule.

“For example, the teacher might point out that a low arm position would result in straight ball, which tends to roll too far away from the target, but did not teach them a desirable arm position.”

And then in the next 40 minutes of practice, the students continued their efforts to figure out how to throw the boule most effectively, as the instructor continued to focus on describing the link between their incorrect movements and the results. The hope being, that a better understanding of the cause and effect relationship of the wrong motions would enable students to figure out more optimal movements on their own.

## Correct motion instruction

In the **correct motion instruction group**, instead of demonstrating errors, the instructor summarized and demonstrated the *correct* throwing technique.

“For example, the teacher would highlight a standard arm position for throwing a parabolic curve boule (ie., raising the arm as high as the shoulder).“

Then, in their 40-minute practice session, students focused on trying to replicate the instructor’s correct motions. And meanwhile, the instructor continued to reinforce the correct motions, while mistakes were minimized, ignored, or corrected immediately to the correct way.

## Performance

So how did this affect performance?

Well, after the classes were completed, students took an accuracy test (10 throws, where they received 5 points if the boule was within 15 cm of the target, 3 points if within 30 cm, and 1 point if within 50 cm, for a max score of 50).

The guided error group scored an average of **11.92** (out of 50), with a range of 6 to 29. The correct motion group, on the other hand, performed worse, with a **9.61** average<sup>1</sup>, and a range of 6-19.

## Self-efficacy

Students were also given a self-efficacy assessment with questions like “I have confidence in exercising my wrist to make the ball spin” and “I am confident in my ability to control the ball at a certain height.”

And on a scale of 0% (no confidence at all) to 100% (full confidence), the guided error group scored 71.89 (out of 100), while the correct motion group scored 62.83.

Meaning, the students who learned by making mistakes, seemed to have more confidence in their ability to improve and get better, than those who were taught using the correct movement approach.

Why might that be?

## Takeaways for self-efficacy

Well, the researchers wondered if starting with an emphasis on correct motions may have accentuated the gap between the students' current skill level, and just how far they had to go to perform correctly. A gap that may have been rather daunting and discouraging when they continued to fall short.

Conversely, by allowing students to start wherever their skill level was, and focus less on doing things perfectly, but simply make tiny tweaks and incremental adjustments, students may have felt like they were making more progress, and encouraged to keep going.

## Takeaways for learning

I think it's important to note that students in the guided error group weren't simply practicing mindlessly, or engaging in blind trial and error. They were encouraged to approach each throw as an experiment, and the instructor was very much focused on trying to help them understand the underlying mechanics connecting their movements, and the performance outcomes.

So that even if a throw was unsuccessful, it was important for them to understand *why*, so they could make an informed adjustment based on their growing understanding of the physics of the sport.

Which seems to suggest that instead of ignoring times when we get something wrong, taking the time to explore and deepen our understanding of *why* it didn't work, could help us identify a more optimal way to perform the skill.

Like how an understanding of why shifting to a higher position with the scroll of the violin pointing towards the ground is less effective than shifting with the scroll pointed up can lead to more consistent shifts.

Our dog still makes the rare, but occasional mistake. And it still totally stresses me out.

But when it comes to learning new motor skills, maybe mistakes aren't *all* bad. Because as long as we are mindful of the link between our movements and the results of these movements, and not just mindlessly allowing errors to pass by without being curious about the underlying mechanics, maybe mistakes could be a really integral part of developing mastery. A frustrating, but crucial ingredient in the learning process that could potentially help us learn a lot more about our craft than if we were to get everything correct from the get-go, but have no clue how we did what we did, or why it works when it does.

## Additional reading

If you want to read more about using errors productively in music learning specifically, you might enjoy this article:

[Error management for musicians: an interdisciplinary conceptual framework](#)

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## Reference

Chien, K.-P., & Chen, S. (2017). The Influence of Guided Error-Based Learning on Motor Skills Self-Efficacy and Achievement. *Journal of Motor Behavior*, 50(3), 275–284.

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