

Fooled By FLUENCY

UNDERSTANDING ILLUSIONS AND MISJUDGMENTS IN MUSIC LEARNING

By Steven Brundage

In March of 1888, the teenage Winston Churchill stepped foot into the prestigious boys school of Harrow, England, confident to take entrance examinations and eager to continue his academic journey. Churchill had studied for weeks, and the big day had finally arrived. He, of course, would eventually become the Prime Minister of the United Kingdom, play a central role in ending the Second World War and garner an impressive list of accolades, including a nomination for the Nobel Peace Prize and winning the Nobel Prize in Literature. To many, Churchill embodied the penultimate of determination and grit.

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But on that spring day, as Churchill took his seat and readied his pencil, he became utterly disheartened as he discovered an unexpected emphasis on Latin and Greek, not on history and geography as he had studied. Straightaway, his mind went blank and except for writing his name atop the page, Churchill sat silently for two hours, miserably failing to answer a single question. By the end of the examination, an usher mercifully collected his blank scraps of paper and showed him to the door.

Benedict Carey, a science reporter for *The New York Times*, shared Churchill's story in his elucidating book *How We Learn*, aptly concluding, "Disasters happen. To everyone. [Even] Winston Churchill."¹ But Carey's statement is undoubtedly more obvious than it is profound, reminding us of an oft-ignored truth: In spite of keen systems of intuition, cognition and perception, we are more prone to illusions and misjudgments than we care to admit.

In fact, psychologists refer to myriad cognitive biases that lead to misjudgments in our behavior and thinking, such as the *Confirmation Bias*, which suggests that we tend to "search for,

interpret, focus on, and remember information in a way that confirms [our] own preconceptions" or the circular phenomenon known as the *Dunning-Kruger Effect*, wherein we repeatedly fail to recognize the limits of our own inadequacies, our own lack of skill if exposed to training and genuine skill in others.²

As musicians, we too are prone to experience illusions and misjudgments in learning, such as overestimating the security of our memory, the effectiveness of our practice or the depth of our technical ability. As a result, we find ourselves, and our students, saying, "I could play it better at home," or "I could play it perfectly just yesterday." Truly, as the Greek philosopher Thales once said, "The most difficult thing in life is to know yourself," and yet, knowing oneself is central to musical growth.³

As such, this research seeks to understand how and why musicians experience illusions and misjudgments in music learning and performing. It explores the connections between autonomous skill functioning and misjudgments in music learning by examining motor skill acquisition and its progression from cognitive deliberate-

ness to somatic automaticity, drawing familiar associations with Paul Fitts and Michael Posner's *Three Stages of Learning*, Daniel Kahneman's *Theory of Two Systems*, and with computational theorists' notion of metacognition.

As former U.S. Secretary of Defense Donald Rumsfeld said, "There are *known knowns*; there are things we know that we know. We also know there are *known unknowns*; that is to say that we know there are some things we do not know." But he continued saying, "There are also *unknown unknowns*—things we don't know that we don't know."⁴

And so, *Fooled by Fluency* aims to illuminate *unknown unknowns* for musicians in finding that while the foundation of motor-skill learning involves cognitive engagement, the end result, very often, does not. In this way, we become "doers," not "thinkers," and are susceptible to fluency illusions and resultant misjudgments in music learning.

How We Learn

To begin, it is important to understand how we learn, for therein we discover the development of autonomous skill functioning and subsequent cognitive disengagement, the seeds from which fluency illusions and misjudgments can grow.

In 1967, American psychologists Paul Fitts and Michael Posner presented an illuminating three-stage learning model of motor skill acquisition called *Three Stages of Learning*.⁵ In the first stage, the cognitive stage, they proposed that we learn more by cognitive engagement than by physical effort—more "thinking than doing."

In the second stage, the associative stage, we concentrate less on concepts and procedures and, instead, devote more attention to the internalization of physical movements. By the third

stage, the autonomous stage, we have developed implicit skill functioning requiring little or no cognitive engagement—more "doing than thinking."

As musicians, we experience these three stages of learning throughout our entire musical development, continually progressing from one stage to the next and back again with each piece of music studied, yielding for us a stockpile of autonomous physical and conceptual skills—our intuition.

Intuition: A Theory Of Two Systems

Nobel laureate and *New York Times* bestselling author Daniel Kahneman, delves deeper into the matter of autonomous skill functioning and intuition in his book *Thinking, Fast and Slow*, proposing that we use one of two systems when processing motor-skills. Kahneman suggests that System 1 operates "automatically and quickly, with little or no effort and no sense of voluntary control," comparable to the autonomous stage, whereas, System 2 "allocates attention to the effortful mental activities that demand it," much like the cognitive stage.⁶

Kahneman says we use System 2 when telling someone our phone number, when completing a mathematical equation like $4+89+155$ or when following directions on a roadmap.⁷ Conversely, we use System 1 when completing a phrase like "bread and..." or when driving on an empty road or riding a bike. We develop System 1 automaticity through consistent System 2 effort, much like the progression from cognitive to autonomous skill functioning in Posner and Fitts's *Three Stages of Learning*.

System 1 represents autonomous skill functioning, our intuition and the muscle memory we develop through repetition—whether correct or incorrect—while System 2 remains the

method for refining and improving System 1. Therein lies the problem—the natural progression from cognitive to autonomous skill functioning can result in our becoming "doers," not "thinkers." In this way, we are prone to disengage from System 2 practice, and, as a result, experience fluency illusions and resultant misjudgments in music learning.

Fluency Illusions

Fluency illusions refer to the coupling of System 1 (autonomous) skill functioning with an assumption of correctness based on evidence of cognitive ease, not assessment. These illusions can lead to misjudgments about the depth of our technical skill, the strength of our memorization, and the effectiveness of our practice, leading us to falsely believe that "If it's easy, it must be correct."

The term "fluency illusion" is not explicitly referenced in piano pedagogy research, though it is acknowledged in learning theory by the expression, "illusion of knowing," identified in 1982 by psychologists at the University of Wisconsin as "the belief that comprehension has been attained when, in fact, comprehension has failed."⁸

According to Henry Roediger III, professor of psychology at Washington University in St. Louis, illusions of knowing concern our susceptibility to mistake fluency for mastery when reading or studying. He posits that we "develop 'illusions of knowing' based on familiarity of the content, but struggle later at test time when asked to explain underlying concepts."⁹

Fluency illusions then, like illusions of knowing, illustrate our vulnerability to subconsciously form misjudgments about skills or knowledge based solely on familiarity or ease, not self-assessment, and point to our need for improved methods of self-assessment.

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Metacognition

In 1979, American developmental psychologist John H. Flavell described a sort of self-assessment known as “metacognition,” a derivative of the root word “meta,” which means “beyond,” and is translated as “cognition about cognition” or “thinking about thinking.” In learning theory, metacognition represents an internal regulatory system that monitors and evaluates one’s understanding and control of cognitive and, by extension, physical performance.

It expresses a type of self-assessment similar to Robert Gagné’s system of internal cueing and feedback, which he discussed in *Conditions of Learning*.¹⁰ Originally published in 1965. For the musician, metacognition represents the process of self-evaluation in such a way that music learning becomes more than primitive habit building; rather it becomes a set of controllable methods and routines with knowable and predictable outcomes.

Metacognition, this self-knowledge, is an underlying and powerful force in music learning at every stage of our development. So, how can musicians develop metacognition? To reference former Secretary of State Rumsfeld, we must utilize practice methods that make *unknowns* known.

Making Unknowns Known

In 1994, University of California, Los Angeles psychologist, Robert Bjork, proposed a principle of learning known as “desirable difficulties.” He suggested that the introduction of certain difficulties into the learning process could serve to enhance the effectiveness and reliability of learning. Bjork recommends, for example, methods of spacing rather than massing practice, interleaving rather than blocking practice, and self-testing, among others.¹¹

Bjork’s principle helped transform prevailing educational emphases from “make learning easier” to “make learn-

ing harder” at a time when theories of “multiple intelligences” and “learning styles” advocated the purposeful *reduction* of cognitive load during learning by instruction that accommodates particular learning modalities. One such proponent was New Zealand educator John Flavell, who created the popular VARK Model of visual, auditory, reading/writing and kinesthetic learning modalities.

But contrary to Flavell, and others, Bjork determined that learning is generally more effective when cognitive loads are *increased*, not decreased. He suggested that certain conditions of learning “that speed the rate of acquisition during instruction can fail to support long-term retention and transfer, whereas [conditions] that appear to introduce difficulties and slow the rate of acquisition can enhance post-instruction recall and transfer.”¹²

Based on Bjork’s principle of desirable difficulties, the following are five practice methods intended to subvert the formation of fluency illusions in music learning by igniting System 2 thinking and developing skills of metacognition, in essence, connecting what the *body* is doing with what the *mind* knows the body to be doing. These practice methods also represent what Florida State University psychologist, K. Anders Ericsson, refers to as “deliberate practice,” meaning they are systematic activities with clearly defined methods and goals. For fluency illusions thrive on nothing more than aimless practice.

Spaced Practice

Since music learning depends, in large part, on muscle memory, musicians naturally tend to devote lengthy blocks of time to practice. Bjork’s research, however, suggests that intervals of practice time, as opposed to chunks, foster greater reliability of skill acquisition and accessibility of learned concepts. Known as the “spacing effect,” first discovered in 1885 by German

psychologist Hermann Ebbinghaus, spaced practice suggests that broken, not massed, intervals of practice time produce optimal improvements in learning.¹³ An example of spaced practice for the musician may include practicing for 20 minutes, breaking for 5 minutes and then returning to practice for another 20 minutes. This process serves to avoid fluency illusions in music learning by continually jumpstarting System 2 thinking as the mind’s focus turns to and from practice material.

Interleaved Practice

Not only did Bjork’s research determine long blocks of practice time are less efficient for reliable skill acquisition than short intervals, but his research also revealed the interleaving of practice material within those short intervals develops long-term retention of learned skills and concepts. This is true because long durations of practicing limited material tend to generate mostly short-term muscle memory, which has the effect of creating the illusion of mastery.¹⁴ Interleaving, on the other hand, represents the alternation of practice material, such as practicing excerpt A for four minutes, then practicing excerpt B for four minutes and then excerpt C for another four minutes. The key is to practice in relatively short, intermixed intervals, which primarily serves to continually re-ignite System 2 thinking.

Watch And Listen Practice

This method succinctly expresses the full breadth of techniques for avoiding fluency illusions in music learning. Similar to Gagné’s system of internal cueing and feedback, “watch and listen,” communicates to the musician the essential activity of self-assessment in two parts: 1.) Searching within the score for details indicating *what* one should perform and 2.) Listening for subsequent accuracies or inaccuracies of *how* one performed. Of course, the

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success of the “watch and listen” method depends on one’s capacity to correctly identify details within the score, for as Cornell University psychologist David Dunning reminds us, “The skills needed to produce a right [sic] answer are exactly the skills needed to recognize a right answer.”¹⁵ In other words, without an accurate understanding of musical details, one cannot reasonably expect to correctly identify and perform them. As an accurate knowledge is established, these three words, “watch and listen,” become a helpful reminder for students to both know the details in the score and to self-assess the resulting performance. In particular, “watch and listen” practice aims at the heart of fluency illusions by developing skills of metacognition.

Baseline Practice

It is undeniable that slow, careful practice is essential to reliable motor-skill acquisition. In this context, for the musician, the word “baseline” refers to an optimal speed, or tempo, at which one can best perform a piece of music. It generally refers to a slower tempo than is indicated by the score, thereby allowing the musician’s brain time to decode musical details and the body time to correctly perform them. With improvement, baseline speeds can be incrementally increased, and thus, in this way, practice can serve to build good habits, not bad ones.

Half And Heavy Practice

This method, similar to the “baseline practice” strategy, creates a learning environment in which physical movements are purposefully slowed for the sake of certainty and precision. “Half” refers to practicing at roughly half the indicated tempo, though not necessarily one-half the speed, and “heavy” denotes a full keystroke to the “bed” of the key, at a slightly louder than indicated dynamic, creating the sensation of a “heavy” finger. Here, the intentionality of every keystroke functions

to signal System 2 thinking (focus, attention to detail, motor-skill monitoring and the like) and, subsequently, to make one aware of accuracies and inaccuracies in one’s playing.¹⁷

Conclusions

We can be masters of self-deception, says Cortney Warren, author of *Lies We Tell Ourselves: The Psychology of Self Deception*, and musicians are no exception.¹⁸ Too often, we tell ourselves that fluent repetition, without mental engagement, will improve memorization or technical ability. Yet we return, day after day, to the same passages in our music for practice, seldom making reliable, long-term progress. Indeed, one of the greatest threats to dependable music learning is the routine failure to mentally engage in practice beyond the point of fluency

As musicians we must acknowledge that autonomous skill functioning, like habits, can be achieved regardless of correctness, and therefore at times, certainly most times, those skills require continual refinement and practice. Fluency does not equal flawlessness, nor do fluent repetitions necessarily produce mastery. We must constantly remind ourselves that our autonomous skill functioning was first developed through deliberate, cognitive engagement. To lose sight of this fact is to invite the potential of experiencing fluency illusions and misjudgments in music learning—to be fooled by fluency. ♪

Notes

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16. Scott Price, professor of piano pedagogy at the University of South Carolina, first introduced the term, “baseline practice,” to me.

17. Scott Price also introduced the term, “half-and-heavy practice,” to me.

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