Editorial

Talent

By Benjamin Bolden

It is my belief that most of the time, when people use the word talent, they are talking about skill. But while 'skill' implies ability developed by rigorous training, 'talent' implies ability that is innate—the result of some lucky genetic chemistry—and you either have it or you don't.

When my students and I perform, and a well-intentioned colleague tells me afterwards: "That was great; you've got some really talented students!" I find myself feeling a little put out. For one thing, the comment does not recognize the students' efforts. For another thing, it doesn't recognize mine. Our performance was successful as a result of the time and effort spent in carefully and deliberately structured learning and practicing—that's what I would like to have recognized.

Fortunately, I have found some support for my curmudgeonly response.

Carol Dweck, a social psychologist at Stanford University, has carried out extensive work in the area of motivation. Dweck's (2006) research studied the effect of praise on 10-year-old students. 400 children, each working individually with a researcher, were required to complete a simple IQ test. The researcher then gave the student a single line of praise. While half of the students were praised for their intelligence "You must be smart at this," the others were praised for their effort: "You must have worked really hard." In a second round of testing, the students were given a choice between an easy test and a hard one. 90% of the children praised for effort chose the harder test. The majority of the children praised for intelligence chose the easy one.

From this result and further testing Dweck concluded that children praised for intelligence will avoid challenges so as not to risk losing the label of being 'smart.' They stop trying. Children praised for effort, on the other hand, do not fear failure; they recognize it as an inevitable aspect of their effort, and something they have the tools to overcome. Emphasizing effort gives an individual a variable he or she can control. Emphasizing something innate, like being smart, removes the individual's potential to control her success, and provides no recourse for overcoming failure.

Dweck has identified that when those with a 'fixed mindset' (those who believe that talent leads to success) fail early…they give up because the failure is regarded as evidence of lack of talent. When those with a 'growth mindset' (those who believe that success results from hard work and practice) fail…they are motivated to practice harder. No one benefits from a mindset that relies on innate ability: underachievers blame a non-existent disability, while those who are told they have an innate ability stagnate because they do not equate success with effort.

Brain science provides a useful lens for looking at skilled performance, and the dubious role of 'talent.'

Learning a complex task (swimming, singing, driving a car) requires the creation of a neural framework. In the early stages the managing of the unfamiliar skill requires explicit, conscious control. Neuroscientists associate this early development of a skill with activation of the pre-frontal cortex. But as the skill becomes more familiar—after significant practicing—it becomes encoded in implicit memory, and associated with neural activity in the basal ganglia. Performers at this level are able to perform many aspects of the skill successfully without consciously thinking about them. This frees up the brain to focus and work on other aspects of the skill. If you are playing tennis, you don't need to think about coordinating your muscles to swing the racket and hit the ball; you can leave that work to the basal ganglia and use your conscious thinking to analyze your opponent's weaknesses and strategize how best to play the next few shots. If you are playing twelve-bar blues on the guitar, trading solos with another musician, you can strum the chord progression without actively thinking about, and focus instead on analyzing the musical attributes of your co-performer's solo in order to follow with a complementary improvisation of your own.

It is understandable that some may view the ability to perform a skill at this advanced level as an example of divine intervention—an innate talent. Seemingly effortless and unconscious skill does come across as rather magical, especially if the observers are unaware of the practice that led to the development of the remarkable ability. But the truth is that no one has ever found genetic differences that equate with skill or 'talent,' while there is a great deal of research that convincingly indicates the role of external factors such as hard work and persistence.

This is not to say that natural ability does not exist—just that it doesn't matter all that much. If two very little people both encounter a ball for the first time, it is very likely that they will demonstrate differing ability to throw it (or to rhythmically bounce it in time with a caregiver singing *Take Me out to the Ball Game*). But natural ability is most significant in early stages of skill development, and becomes decreasingly significant with increased quantity of effective practice…things have a tendency to even out.

Of course, what IS significant in the development of skill is…practice.

Psychologist Anders Ericsson is well known for identifying that performance skill levels correspond directly with the quality and quantity of a performer's practicing. Ericsson found that in order to achieve an expert level of solo piano performance, 10 000 hours of solitary practice was required by age 20 (as opposed to 2000 hours to reach the level of 'serious amateur'). As anyone who has frittered away an afternoon in mindless noodling knows, however, high achievement is a result not only of lots of practice, but lots of the *right kind* of practice.

To be effective practice must be purposeful; it must be incisively focused on extending limitations. Ericsson uses the term "deliberate practice" (Ericsson, Krampe & Tesch-Römer, 1993), and defines it as activity (typically designed by teachers) that effectively improves specific aspects of performance. The role of the teacher or coach is key: supporting the performer with rigorous performance analysis in order to provide useful feedback, motivation (remember, praise the *effort*), and further develop practice procedures.

When effective practice is in place, skill develops. Neurobiologically speaking, so too does *myelin*, a substance in the brain that plays an intriguing role in facilitating expert performance. If one were to seek physical biological evidence of expert ability, myelin would be the substance to start measuring.

All mental phenomenon—memory, emotion, muscle control, sensory perception and so on—involves the firing of neurons in the brain: electrical signals are transmitted from one nerve cell to another. Specific activities involve the transmission of these signals along particular pathways; learning a skill involves the formation of an electrical circuit in the brain. And once the circuit has been formed, for *expert* performance it needs to be optimized. This is where myelin comes in. As the circuit pathways (nerve fibers) are increasingly travelled, a fatty insulation (myelin) forms a sheath around them. When electrical signals are transmitted from one nerve cell to the next through the nerve fibers, the myelin sheath helps to make the transmission efficient; it keeps the signals strong by preventing electrical impulses from leaking out.

The myelin sheath gets thicker (and therefore better at insulating) when the nerve fiber is repeatedly stimulated. The repeated stimulation happens when the mental activity that causes the neurons to fire their electrical charges through these particular myelin sheaths is repeated (for example, when practicing). The thicker they are, the better the myelin sheaths protect and enable the quick and accurate transmission of the electrical signals. Thanks to the myelin sheaths, the performer is able to carry out the mental phenomena associated with the activity more efficiently, and therefore is able to perform at an increased level of proficiency.

Not surprisingly, then, increased myelination has been associated with extensive piano playing (Bengtsson, Nagy, Skare, Forsman, Forssberg, & Ullén, 2005). Within a group of professional pianists, these researchers found a distinct positive correlation between myelin development and number of hours of piano practice.

So…the more you purposefully practice, the more myelin you produce, the more efficiently your brain works, and the more proficiently you perform. Myelin provides an intriguing metaphor for talent.

Talent is a word that music educators often encounter. It is a word that travels with a lot of baggage. It is a word we need to know how to deal with. I do not think it necessary to avoid the word altogether, but I do think it is necessary to contemporize our understanding of it. If we conceptualize talent as something that a student has (or has not) as an unalterable entity, that is problematic, and we might as well all go home. If we conceptualize talent as something that a student can develop—then we're in business. CME

References

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