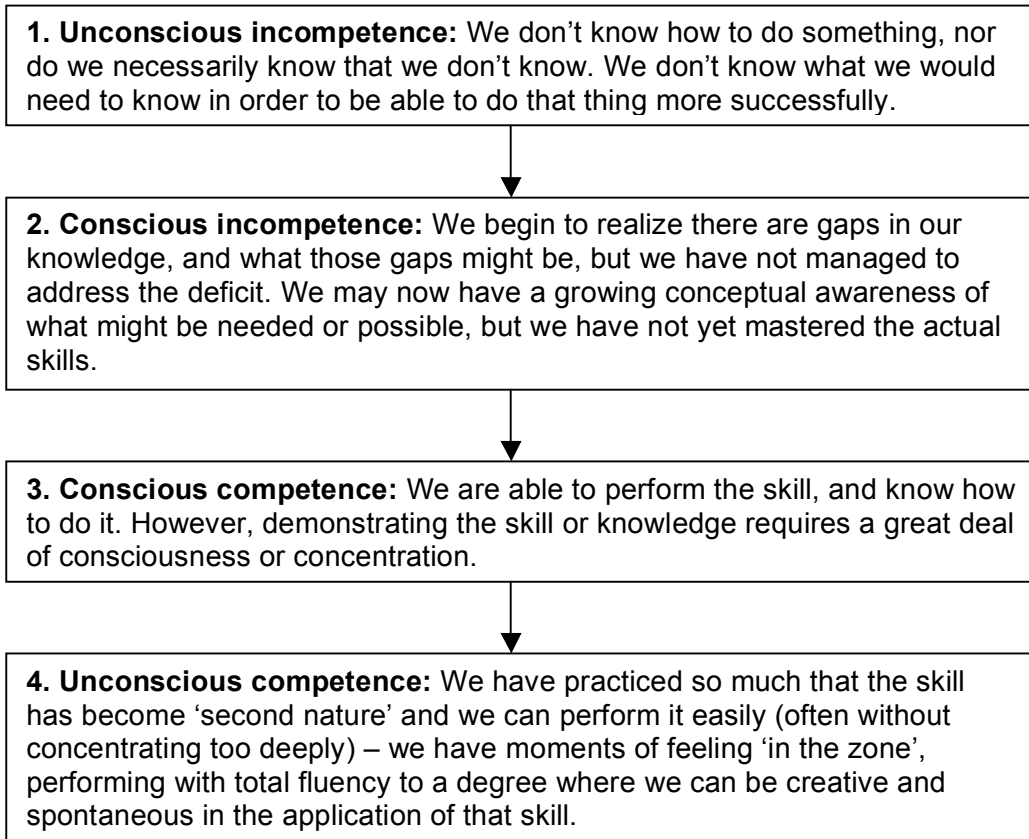


The science (and art) of learning ... and the relevance to singing

1. Developing competence – can anyone sing?

There is a model of learning that has been around in various forms since the ancient Greeks. Its modern description goes something as follows:



So, applying this model to singing, we may sing, solo or in groups, even with some feeling of success and ease, without knowing how much more we could accomplish as singers (unconscious incompetence).

We may have a sense that there are some areas of singing that we find difficult or beyond our capabilities, but we don't know how to address those vocal questions (conscious incompetence).

In the course of this article, I will talk about how we can get beyond this stage, and learn new skills, despite ingrained, inefficient habits that we may have. As learners, we all move back and forth between the first three levels of this model. Level two can be frustrating and disheartening; level three can feel like hard work, because we have to *think* so hard, and can't relax for a moment. But, with the right information, and deep practice, we can reach the fluency of level four – unconscious competence.

How do we move from the incompetence levels into the arena of competence? Is it just destiny, an accident of birth and genetic inheritance? Are great singers (or footballers, or mathematicians) born, or are they made? Is there any hope for ordinary mortals like ourselves?

2. What is skill?

Skill is a form of memory. We have thousands of skills (automated memory pathways); we can remember how to tie shoelaces, ride a bike, speak, clean our teeth, make a cup of tea, pick up a fork that's fallen on the floor. We didn't always know how to do these things – we learned them.

The learning happened first because we were motivated to acquire the knowledge or skill. It was a means to an end. We wanted something. So if we didn't quite manage to get what we wanted immediately, we were prepared to try again, and again, and again – like learning to walk. Failure was not an option that we even considered. We single-mindedly kept focussed on our goal, and on working out how to do whatever we needed to do to reach that goal. Trial and error.

The fundamentals of learning are:

- a) starting without knowing what works, nor what we're doing unskillfully (unconscious incompetence)
- b) motivation – wanting something enough
- c) using our mistakes to guide us towards more efficient and accurate ways of getting ourselves to where we want to be (conscious incompetence)
- d) mindfully repeating countless times the muscular and mental movements that produce the results we want (conscious competence) ...
- e) ... until they become reliably, fluently accessible to us often unconsciously (unconscious competence).

The brain science of this is truly wonderful. What we're really doing is building brain circuitry, and programming it. All the parts are there – and we assemble them in unique ways to serve the tasks that we want to accomplish. It would not be useful for all our brain to be pre-configured at birth. We simply would not be sufficiently adaptable to our environment. A distinguishing feature of humans that marks us out as different from the rest of the animal kingdom is that we can build new circuitry *throughout* our lives (though this diminishes with age) so that we can learn new skills suitable to constantly new situations in which we find ourselves. The material we use to do this is called myelin.

Daniel Coyle has described the science of this process elegantly in his book 'The Talent Code' (May 2009):

- “1) Every human movement, thought, or feeling is a precisely timed electrical signal travelling through a chain of neurons – a circuit of nerve fibres.
- 2) Myelin is the insulation that wraps these nerve fibres and increases signal strength, speed and accuracy.
- 3) The more we fire a particular circuit, the more myelin optimizes that circuit, and the stronger, faster, and more fluent our movements and thoughts become.” (p. 32)

Coyle explains how error-making is integral to successful learning:

“Q: Why is targeted, mistake-focused practice so effective?”

A: Because the best way to build a good circuit is to fire it, then fire it again, over and over. Struggle is not an option: it's a biological requirement." (p.34)

Because we don't always know that we're getting it wrong, or how we're getting it wrong (unconscious incompetence), having coaching can make a significant impact on the efficiency of our learning; the coach provides the element of consciousness, modelling it for us, until we acquire greater awareness skills ourselves; the coach also provides content knowledge that we need, the information we need to correct our course. Coyle asks:

"Q: Why are passion and persistence key ingredients of talent?

A: Because wrapping myelin around a big circuit requires immense energy and time. If you don't love it, you'll never work hard enough to be great." (p.34)

3. Deep practice

Creating the pathways in the brain, the myelinated cell structures takes repetition and time. The process has been likened to creating a path in field. When we first walk there, the grass is tall, and there is no path to follow. Each time we walk the same route, we flatten the grass a bit more until a distinct trail begins to form, the ground gets compacted, and a furrow forms, a furrow that can last for a considerable time. This is why we practise. The path must be made by treading the same route many times. It is only in this way that the oligodendrocytes in the brain trigger the wrapping of the myelin around the nerve fibres and synapses to create an enduring 'broadband' cable as Coyle calls it.

To take the analogy of the path in the field again, we do not have to be born geniuses at walking, or have university degrees in path-making. It takes no special ability to walk in the field; we simply have to be prepared to do it, enough times, and the path will form. Coyle makes two important points (p.44):

- a) "The firing of the circuit is paramount." In other words, we must be prepared to put in the repetitions of the required actions – *we must put in the practice time.*
- b) "Myelin is universal." It does not play favourites. *Whatever* we repeat enough times, our brain will build a circuit for it.

As students of singing, we need to take this second point seriously. I was at a workshop run by the New York Jazz Collective a few years back, and the drummer told us a story from his own teacher. His teacher said, "You know, don't believe anyone who tells you practice makes perfect. It isn't true. There is no such thing as perfect. But remember this: *practice makes permanent.*" Same principle. If we do anything enough times, it starts to sink in and become part of us – literally, part of our cell structure.

So, remember, the good news is that *myelin doesn't play favourites.* If we repeat (practise) the right things, enough times, we will learn the skill. For many people, that might be revolutionary information. Becoming good at something is not as much a question of genetic luck as we might originally have thought. It is the result of motivation, accurate information, repetition and persistence – which means that

singing, even very accomplished singing, can be within reach of anyone who does not have physiological malformation or damage to their vocal apparatus. I remember overhearing a PE colleague, Martyn Wright, in my first year of teaching, telling his young students that the only difference between them and the famous footballers at that time was “application”, and following the right principles.

And now the bad news. *Myelin doesn't play favourites*. Habits are simply unconscious actions that we can perform fluently because we've done them so many times and we have created a myelinated circuit to help us. If we do something wrong enough times, then we'll get really good at doing it wrong, fluently, and without having to think about it! So if we repeat inefficient muscle patterns of breathing, standing, thinking, vocalising and so on, those will become habits. And Coyle warns us that “Myelin wraps – it doesn't unwrap (p.44)”.

Actually, *eventually*, myelin can break down – so perhaps we become a little slower, a little less fluent in the skill. (So if you want to stay good at what you do, then don't ever stop practising. Keep flattening the grass.)

Singing uses many different ‘sub-systems’ of muscle groups, and these sub-systems have to be coordinated in very precise ways. So we have to learn something about the mastery of each group separately, and then learn to synchronise the groups with each other. The repetition of the required actions for a muscle group eventually leads to the building of a reliable, ‘automated’, myelinated circuit. With careful planning, we can then practise (with trial and error) synchronising the action of two or more muscle groups, and these then get myelinated into one ‘broadband cable’. And then of course, we can combine and synchronise these with more groups, until, over hundreds or thousands of carefully orchestrated repetitions, they become bundled together in one ‘cable’ – and we have built our automated system for singing, just as we built one for walking, or being able to chew a sandwich at the same time as driving and talking to the passenger in the backseat.

4. Can we unlearn bad habits?

If we have bad vocal habits, then the message that myelin doesn't unwrap is perhaps a bleak one. However, other recent brain science of the last 5 to 10 years is providing some encouraging findings.

In the second half of the 20th century, the British psychiatrist and psychoanalyst John Bowlby did pioneering work on how children ‘attach’ successfully (or not) to their primary caregivers in the early weeks, months and years, and the long term impact this has on their ‘internal working models’ (or IWMs) of relationship and emotional patterning. These become pervasive in the young person's worldview and continue to affect them throughout their lives – the brain builds and myelinates circuits that endure. And if the child has bad experiences and creates dysfunctional IWMs, these persist.

However, those helping children to overcome bad experiences that have fundamentally affected the ability to function healthily are discovering new possibilities. (You may have guessed by now ...) By receiving the right information, the motivational input, the coaching, and the repetition, children and adults can create new, healthier IWMs that can become the ‘foreground’ model. If the new IWM is constantly reinforced, the old IWM can fall into disuse. Some researchers at the

Great Ormond Street children's hospital in London believe that while the old IWMs remain (remember, myelin doesn't unwrap), and can be re-activated, a person can learn to reinforce their new IWM. For singers, this means that we can regress to our old bad habits, but the principles of deep practice and conscious competence mean that we can reinstate the more efficient habits if we catch ourselves in time.

And there may be more good news. Candace Pert PhD, on her work on the "Molecules of Emotion" (1997) has shown how the brain cell structures that were once believed to be so solid can gradually become less secure in the absence of being used. So if we consciously curb the bad habits, they can lose some of their hold on us.

5. Developing good habits

So, as singers, we need to source *good* information on how to sing, and how to *learn* singing, and start using that information, a lot, in deep practice. We need to stay *conscious* to what we are doing with our muscles.

If we have a one-hour lesson, once a week, or a fortnight, what will we do in between? Without a patient, skilful observer giving corrective feedback, how will we know we are doing it right? Sportspeople and athletes train every day, with close coaching throughout. They are prepared to train over a long course of study, spanning months and years. Dancers go to the studio every day. They do hours of technique, *every day*. They monitor how they move, stand, sit, lie, and breathe, wherever they are, even when they aren't dancing.

Vocal skills, and the performing and artistic skills that accompany them, require mental and emotional mastery, and physical awareness and precision. Singers need to be finding ways to embed the necessary patterns of thought, feeling and physical movements in their systems – in short, to myelinate the right circuits – by living and breathing them *all the time*. Rarely do singers do this, which is why, while there are many who sing, there are not many who sing to their full physical and artistic potential. Perhaps it also explains the widely held, erroneous, perception that great singing is something magical or mysterious, or a lucky and rare quirk of genetic fate.

If I sing for an hour in a lesson, then do a couple of well thought out practices in the week, what will happen? I will definitely do some useful learning. And what if for the rest of my waking hours in that week, I stand with poor posture, push my voice in loud environments, use my voice with inadequate breath support? All those hours of repetition of *those* patterns will get myelinated, so I will be undermining the good work I have been doing in lessons and formal practice times. Learning a skill must be an all-embracing, deep immersion process. Be creative. Work out how to make the acquisition of the skill a 24/7 experience. One of the patterns that Coyle discovered in his researches was that great achievements *always* came from those who had been deeply immersed in their field of endeavour. It was not luck. Luck was removed from the equation.

So if we want to sing, it's actually quite simple. A) We need to want it enough, b) we need to know what we're doing wrong and stop it, c) we need the right information on what to do instead, d) we need to implement it, e) repeatedly f) enough times, so that it becomes a cell structure in our brain that *we* have built ourselves, and that we can depend on to give us unconscious competence.