YOUR BRAIN ON BANJO

Lessons in Neuroplasticity— Lesson One: Baby Steps

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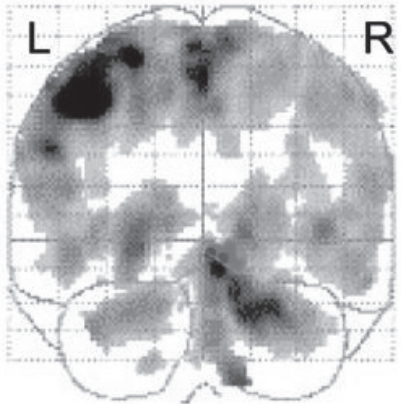
As you sit there in your easy chair breathlessly leafing through the pages of your shiny new *Banjo Newsletter* with one hand while grabbing one potato chip after another out of the bag with the other, you probably don't think there is anything special about what you are doing. In fact, you have no trouble at all comprehending the words printed on these pages while your hands are engaged in other pursuits. But, then again, turning the pages of a magazine or grabbing a potato chip is easy, right? Playing *Dear Old Dixie* up to speed, on the other hand, now that's hard!

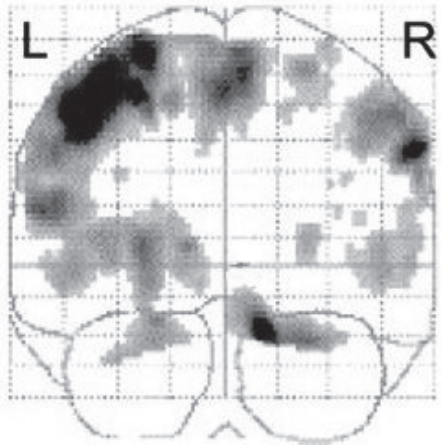
Well, as anyone who has watched a 7 month old struggling to pick up their first Cheerio can attest, things were not always so easy. In fact, as we discussed in the introduction to this series, every motor skill we develop requires the formation of a new neural network within our brains. This is true for all of us at any stage of our lives, whether it is when we are trying to pick up our first Cheerio, or trying to form our first C chord on the banjo. Eventually, during the first few years of our lives, we built quite a few neural networks, and now all those things that at one point seemed nearly impossible can now be performed automatically.

Our Brain on Autopilot

Thanks to advances in functional brain imaging, recent research on this phenomenon of "automaticity" is starting to shed some light on what happens in our brains when a skill goes from being novel and difficult to familiar and automatic. Within the context of this research, automaticity for a task is said to be present when a secondary task can be performed with minimal interference—in other words, the execution of the automatic task is not significantly impaired by the simultaneous performance of another task. In a 2004 study in the *Journal of Neurophysiology*, subjects were asked to learn a 12-step sequence of finger movements (not unlike banjo rolls!). Below is a picture of the brain activity (in cross section) during the finger movements early in the learning process, before automaticity has developed (the darker the shade of gray, the greater the activation):



After this initial brain scan was taken, the subjects then practiced the task for several hours until it became automatic. Automaticity was tested by having the subjects perform a letter counting task while executing the finger movement sequence. Once they were able to execute the finger sequence just as quickly and accurately while simultaneously counting letters as they could while performing it without distraction (thus fulfilling the requirement for automaticity), their brains were imaged again during the finger movement sequence, and the results are shown in the second graphic:



As you can see, once the task has become automatic, less of the brain is being activated. It has also been demonstrated in subsequent studies that, accompanying this reduction in activity is a *strengthening* of the connections between the areas that remain active. Furthermore, there is also a significant *decrease* in activation in parts of the brain involved with attention and information gathering. Thus, when a skill becomes automatic, it not only requires less brain activity, but it also frees up areas of our brain involved in attention and information gathering.

So why is this important? Well, consider all the things you must keep track of during a typical bluegrass jam. There is the song itself, the key and chord progression, the tempo, the melody, the chord being played at the moment, the lyrics if you are singing, the tone and volume of your banjo (yes, you *should* be keeping track of this!), who is soloing and what instrument they are playing, how vigorously to shake your head no when it is your time to solo, etc. With all that to keep track of, who can blame us for drooling! And so, as has just been shown, if your brain still has to devote all its resources to that first forward roll in *Foggy Mountain Breakdown,* then it is *biologically impossible* for it to keep track of all that other stuff. And the result is... meltdown! But, as this research illustrates, meltdown in this situation is not the result of some sort of inferior musical ability, as many might conclude, but rather the result of us placing unrealistic demands upon our brains.

Preventing Meltdown

So, then, how can we avoid meltdown? How can we help ensure that our brain is able to pay attention to everything it needs to, that its attentional resources aren't being monopolized by the technical components of banjo playing. Well, the key, of course, is to make sure that the technical aspects of playing, the right and left hand skills, have become automatic. Because as we now know, if they have become automatic then we have developed efficient neural networks devoted to their execution—networks that require less of our brains, and less of our brain's attentional resources.

The acquisition of the technical skills

of banjo playing can be viewed as a cumulative process, with increasingly complex skills being built on top of simpler ones; and relatedly, with increasingly complex neural networks built upon simpler ones. With this in mind, it should be clear that we shouldn't move on to a more complex skill until we have mastered the simpler ones it is built upon—until they have become *automatic*. For example, we should not attempt to learn the first measure of *FMB* until we are able to cleanly pick the strings with our right hand, cleanly fret a note, perform a hammer-on, and perform a forward roll *automatically*, since the neural network we build for *FMB* will require all of these foundational networks to be firmly established. And how can you determine whether a skill has become automatic? Well, just as was done in the research studies, if you are able to execute these techniques well while your attention is diverted elsewhere (watching TV, reading *BNL*, playing with a metronome), then they have become automatic. And while mastering one skill at a time might seem like a tedious and slow process, the irony is that by doing so you will progress towards becoming a complete banjo player much faster than you would if, in your haste to learn everything, you try to acquire too many new skills at the same time. In fact, many folks, particularly adults, in their rush to get better end up developing sloppy, inefficient banjo playing neural networks - a house of cards prone to collapse under the slightest pressure.

Of course, back when we were trying to grab that first Cheerio, we all did this instinctively. Virtually every human being passes through the same exact sequence of motor development during infancy, mastering one skill at a time with an almost pathological obsessiveness, gradually adding skills of increasing complexity once the ones they are built upon have been mastered. The sequence is predictable, methodical, and remarkably efficient and effective, as Mother Nature can't afford to leave this process to chance. As a result, most all of us end up becoming expert potato chip grabbers and magazine page flippers. Follow the example of the developing infant, and you will undoubtedly become an expert picker and grinner as well.