

Chapter #2 - Psychomotor Domain - How We Learn Physical Skills Can Teach Us Something

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The truth in: "You never forget how to ride a bicycle," reveals a powerful kind of learning. We are just beginning to understand how learning to ride a bicycle can inform the learning we seek to achieve in college.

In Chapter 1, we saw that learning involves creating and stabilizing synaptic networks. When you learned to ride a bicycle, you created and stabilized neural networks in your brain that enabled the coordinated physical movements that you now have for life. Driving a car, skiing, playing a video game, riding a surfboard, playing a musical instrument or assembling something mechanical all require such learning. The collective neurology of the brain most heavily involved in coordinated physical movement is *the psychomotor domain*.

One of the best ways to understand the biological nature of learning described in Chapter 1 is through experiencing new psychomotor learning. Consider the first moments when you started to learn to drive. Compare your actions then and now. Were they initially tentative and awkward? Did you need to devote all of your attention to the step-by-step actions just to start and operate the car?

Now, think of your driving situation, as it exists presently. You no longer concentrate on step-by-step actions to start and operate the car. You simply choose to drive and you do so without effort. You can pay attention to what is happening around you in the flow of traffic and control the car as needed. Moreover, you can also easily talk with a passenger or sing along with the music. How is this possible?

Once the needed networks form and become myelinated, the brain no longer needs to devote the immense energy needed to build them. Our conscious mind then becomes available for other things. If you had to continue to focus completely on step-by-step actions required to start and operate the car, there would be no capacity left over to allow you to react to the road or traffic. However, after you myelinated the networks needed to operate the car, you could safely navigate through traffic and still have enough capacity left over to talk with your friend or sing along with the music. The transition from beginning awkwardly to gaining control comes *only* from creating and stabilizing the necessary neural networks through practice.

Reflect on some learning of a physical skill. As you practiced playing a certain video game or musical instrument, did you discover that after a few months of practice sessions that you could more quickly accomplish the tasks required? Could your fingers and arms move more quickly than at the start? Did your movements become more coordinated and effective?

In the case of the video game or musical instrument, faster movement of arms and fingers becomes possible as repeated use of developed neural networks causes the brain to coat

these particular networks in myelin. As a result, the electrochemical signals that pass through the networks to the arms and fingers don't leak away. The signals can flow stronger, faster, and produce greater focus. When we don't continue to use these networks, the myelin gradually dissolves away. We then get "rusty" or forget how to play.

Because all learning involves building and stabilizing neural networks, the act of developing our psychomotor domains can tell us much of value about learning in general

Roles and Responsibilities in Psychomotor Learning

Any teacher achieved his/her expertise by devoting most of his/her life acquiring that cumulative knowledge from earlier teachers and perhaps adding some new improvements. Imagine trying to learn to play a piano with no teacher. Without such a teacher, we would need to discover on our own what it took generations of experts and centuries to develop as effective ways to make music with a piano. In comparison with that knowledge, the practices we would devise through trial-and-error on our own would construct myelinated networks with deficits, misconceptions and errors. In short we could *never* become real pianists without a teacher.

In psychomotor learning, the main responsibility of a teacher is to show the student how to practice effectively. Informed practice builds expert performers; uninformed practice cannot do this. Never forget: teachers bring learning informed by the cumulative progress of many experts, and the students who become experts are those passionate enough about learning to do informed practice regularly.

In the end, the only learning that benefits a student is that which takes place in the brain of the student through the efforts the student chooses to make. Experiencing psychomotor learning reveals that there are no shortcuts, no compromises, and no substitutes *via* cheating to develop real expertise. Only informed practice can produce mastery.

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Reflective Exercises

1. Try writing your name with a pen/pencil as you normally would.
Then switch the pen/pencil to your other hand and try writing your name.

Note the difference in concentration required between accomplishing the same task done by the two hands—one with a neural network that is myelinated and the other with a neural network that is barely formed.

Try it again and note your ability to try to carry on a conversation or sing a tune when you write with the hand less favored. Can you see how learning something new requires more energy and may be accompanied by feelings of frustration?

2. If you have never done so, visit a formal class that conveys psychomotor learning, but with one caveat. *The class you visit MUST be taught completely away from your university.* For examples, choose a class in a dance studio, a yoga studio, or a martial arts dojo. Try to discern: How is the instructor fulfilling her/his responsibility to the students? How are the students fulfilling their responsibility to their learning? How is the learning atmosphere of that class similar to and different from the classes you attend in your university?

Interview the instructor and a student in the class about their views on the relative responsibilities of instructor and students. What can psychomotor learning teach you about your own learning in general?

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