

the **CrossFit** JOURNAL ARTICLES

Dissecting the Fish Plotting Progress in Multi-Mode Training

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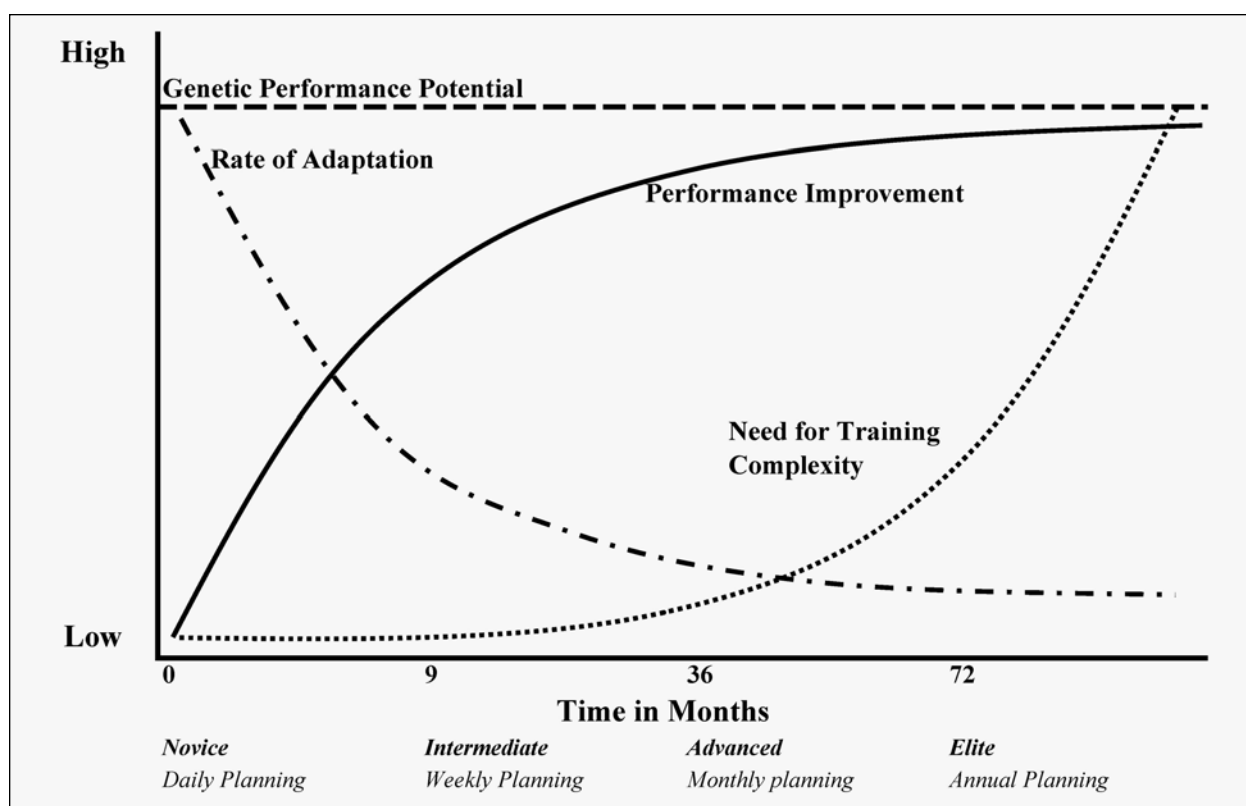


Figure 1. The fish diagram. Every time we train and disrupt homeostasis and then recover from it, we make progress toward our genetic potential. The rate of fitness gain and the need for increasingly complex training are inversely associated.

Think. Learn. Apply. Every single coach and teacher I have ever met who was worth their salt does this and does it on a near daily basis. To coach and teach effectively we must learn as much as we can, interpret what is learned as best we can, then present it to our trainees and students

in the most approachable and practical format possible so they might use what we know to achieve their particular goals. This is a tall order. In the course of our hugely complicated daily lives, the time to read and to just think and assimilate is rare. I think the public imagines that

being a coach or trainer means working with a few clients, training yourself at your leisure, drinking bottled water while wolfing down supplements and natural foods, and then going home to go do outdoorsy things in your free time. They consider only the face time a trainer has with a client as “work”; the rest of the time is just hanging out at the gym putzing. That vision is a far cry from the reality of o-dark-thirty (a.m. and p.m.) sessions in the same day, financial operations, PR duties, housekeeping, equipment maintenance, correspondence, continuing education, website maintenance and community participation, not to mention the record keeping, programming, and continual progress evaluations that must be done for each trainee.

But there is still another type of work time that no one sees. It consists of labors that can be done anywhere, labors that involve the mind, books, words, and brainstorming. Maybe you are considering possible solutions to a training problem, watching another trainer do something you hadn't thought of before, mentally organizing a novel training program for a specific client, discussing issues with colleagues; or maybe it's thinking about what you read in a book, journal article, or website on the science of training. It doesn't look like work, but it is. It isn't measurable, quantifiable, billable, or even visible. But this “invisible work time” is one of the most important parts of the job.

Mark Rippetoe and I did lots of reading, observing, and thinking to develop a fairly elegant explanation (if I do say so myself) of how the body adapts to training stress and how that must be considered in the programming of barbell exercise. Our works have considered adaptation in the specific context of programming for weight training, but the principles, we believe, apply to an integrated approach to comprehensive fitness as well. There is a lot of invisible work time invested in our books. In fact, I don't think it will ever end. One of the recent and ongoing issues we have been spending lots of invisible work time on comes out of the barbell training seminars we put on for CrossFitters and CrossFit trainers. Everyone wants to know how to integrate our barbell training program into CrossFit training.

The CrossFit Basic Barbell Training seminars are intended to teach a reliable, reproducible system of teaching the fundamental barbell exercises, commonly used in CrossFit training. After all, correctly performed barbell exercises are the safest, most efficient means of gaining strength. Our Starting Strength method of teaching

arms the trainer with a body of teaching information and a system of application that exists nowhere else. At the end of every seminar, we talk a little about weight training programming (if you are going to teach weight training as a professional, you should know a little about training for weightlifting, powerlifting, bodybuilding, and for other purposes). Inevitably someone in the seminar will ask if they should use the programming organization we suggest for a beginning weight trainee on top of or within CrossFit programming. This is a loaded question.

The fish diagram

How do I figure out how best to program barbell training within CrossFit? Let's look first at the basic concept we use to explain the changing program requirements of an individual trainee over a training career. Our “fish diagram” (thusly named after Becky Kudrna observed that the lines of the graph approximated the shape of a fish) represents the relationship between performance (or fitness) improvement, rate of adaptation, and the need for training complexity (Figure 1). The most important of these relationships is that as an individual's fitness/performance increases and approaches genetic potential, so does the need for complexity in his or her training program.

As helpful as this rethinking of my fitness mathematics is, it still fails to account for that considerable but immeasurable and ineffable bonus that results from the combination and interplay of the elements that is part of the “magic” of highly varied mixed-mode CrossFit training. The black box will not give up all its secrets.

For a weightlifter this diagram suggests that the best program for a beginner would be simple linear progression (i.e., increasing the load each workout) and then, once the gains from that programming are maximized, switching to increasing the load on a weekly basis and then, eventually, to increasing the load on a monthly basis. Each segment of the training progression

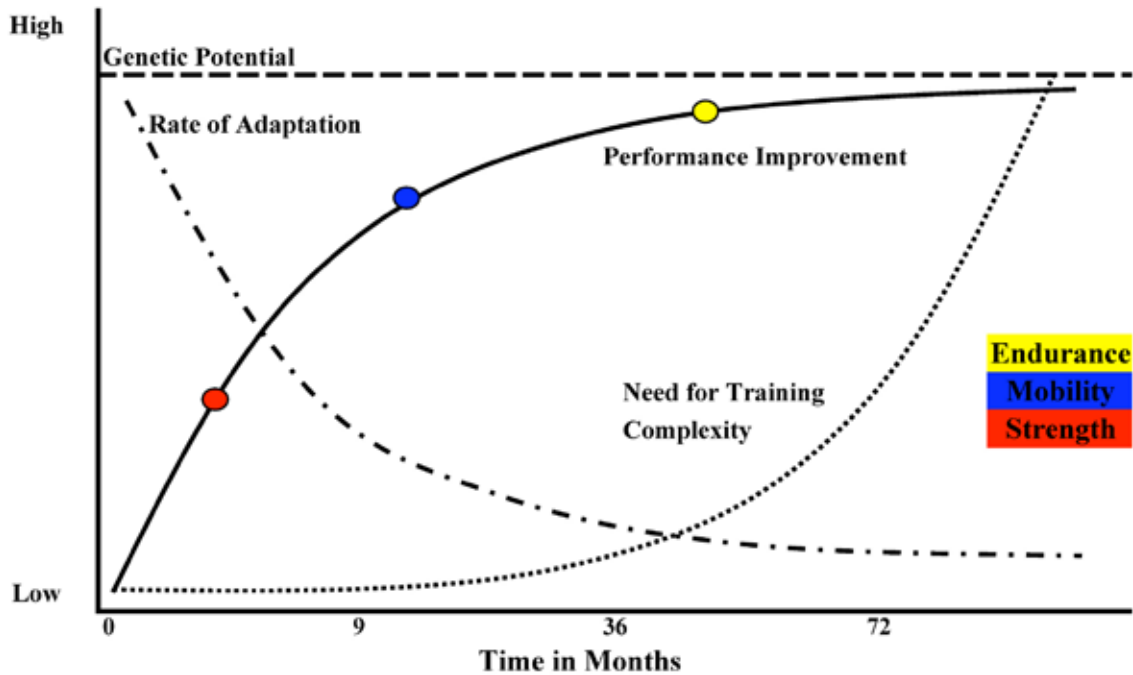


Figure 2. Different components of fitness can exist at different levels of training progression. This means that the programming needed to maximize gains in one area may be different from that for another. In this example strength is poorly developed, mobility is moderately developed, and endurance is well developed.

line is associated with a progressively more complex training organization. This is a fairly simple concept and it works well to explain maximal progress toward any fitness component, whether it be strength, cardiovascular endurance, or mobility (or whatever element you care to examine).

Fishing for answers

But how does this sound theory apply to the CrossFit model of training? That's the question we need to address to give a good answer to the question about appropriate programming for CrossFit and more specific strength training. I tried to dissect CrossFit training activities into three types—strength, metabolic conditioning, and gymnastics—and hit the wall. The answer always came back that if we want to improve any one of the constituent elements of fitness as fast as possible, more time needs to be spent training just that particular element. So, for example, the potential rate of strength gains possible from CrossFit would be slower than that possible from a specifically focused strength training program. Of course. But this was not satisfying, because it

meant that if I was to advise a CrossFit trainer or trainee on how to get stronger as fast as possible, it meant messing with the successful CrossFit model. Don't get me wrong; if something works better, I'm all for changing it. But in this case, if we completely focus on one element of fitness, the others do not improve and may even regress somewhat, and that entirely defeats the CrossFit goal of broad capacity across all domains. It seemed that the fish and CrossFit were at odds. I knew—at least I thought I knew—that the fish was right, and I also knew that CrossFit was right. But I couldn't explain why I couldn't explain or establish the connection. Argh!

Fast forward to a CrossFit Basic Barbell seminar we put on in Santa Cruz last fall. During the lunch break on Sunday, we were eating at Cole's BBQ, a fine little Kansas City-style BBQ joint. Our conversation turned to the upcoming programming segment we were about to go present and we continued our ongoing discussion of how to field the inevitable question. We really didn't come to any further consensus beyond what we already knew. So it was back in the car and back to the seminar. Maybe it was the sugar content of the sweet BBQ sauce, maybe it

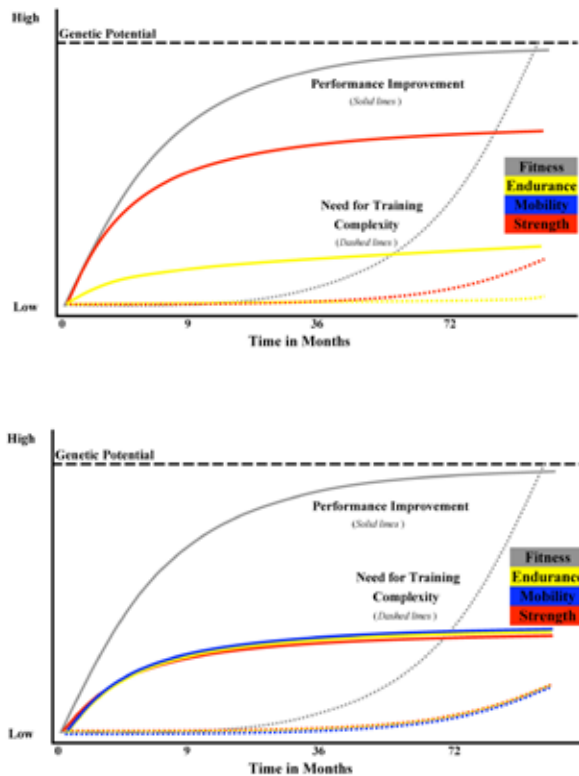


Figure 3. In these two versions of the fish diagram, the curved solid gray line (top) represents the total fitness improvement possible from training at an individual's maximal and recoverable work tolerance. This absolute quantity of possible fitness gain is unaffected by the bias of training among the three elements of strength, endurance, and mobility. However, the magnitude of gain for those individual elements is affected by bias toward any one of them. In the top version of the diagram, splitting training effort into 80 percent strength and 20 percent endurance yields a faster gain in strength compared to endurance. Summing the gains in both elements represents total fitness improvement. In the bottom panel, the training is split evenly in thirds among strength, endurance, and mobility. Fitness gain in all three elements is slower than if either a single- or dual-element program were used, but again the cumulative gain in each element sums to the same overall fitness gain. It is informative to note that every time a fitness element is added in, the complexity line for each individual element flattens. As elemental complexity is increased, the complexity of the program required to improve fitness is reduced (in other words, the more elements you train, the simpler program organization you can use). This is why the basic CrossFit model of training can sustain steady increases in fitness longer than any model of single-element training.

was the satisfaction of consuming a heap of finely sliced beef, or maybe it was the quiet and cavernous back seat of the great white whale of the rental car we had, but some invisible work time happened on the way. It occurred to me that when we consider CrossFit in the context of the fish diagram we have to not dissect fitness but to reconstruct it anew.

Each component of fitness really has its own independent plot on the fish diagram (Figure 2). You can be at an advanced level in your strength progression and thus require complex strength training, while at the same time be at a beginning level of endurance progression and require a simple training program for that and also be at an intermediate level of gymnastic or mobility development and thus require moderate-complexity gymnastics training. (This particular description describes my personal current condition, in fact.) [Kelly Starrett](#) and [Nicole Carroll](#), in contrast, probably exist at the heady advanced-advanced-advanced(strength-endurance-mobility) level on the fish diagram. Every individual will have their own unique profile, and the fitness element that is least developed will always improve fastest under the even-handed approach to fitness that is CrossFit. As the elements reach similar levels of progression relative to the individual's genetic potential, the gains in each of the elements will even out and occur at similar rates.



Fitness, as defined by CrossFit, fits on the fish diagram if we consider overall fitness as a single entity. Previously I had been considering the component elements separately and struggling to see how the training progression of each component matched the loading scheme of CrossFit. But a full belly of beef and a comfy car ride put me on track. Overall fitness itself—not just one of its components—is the entity that CrossFit develops; all other elemental considerations are derivative. We use combined strength, endurance, and mobility training to develop the single entity of fitness. This means that the line labeled “performance improvement” on the diagram actually represents fitness as a whole, not merely a derived element. This little realization moved my understanding of the CrossFit puzzle forward.

I had been approaching the problem like this: a beginner who wants to work toward maximal strength, endurance, or mobility has to work that element in every training session, and each workout should be progressively harder. While every training day in CrossFit is a push-the-body-as-hard-as-you-can day, it fits the concept we would use

for a beginner program. However, the presence of single-, double-, and triple-element days (simultaneously training strength and endurance, for example, or endurance and mobility, or all three) made the organization seemingly more appropriate for an intermediate trainee, since the magnitude of loading was cyclical (i.e., along the lines of weekly periodization). This approach to analysis quickly

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dead-ended every time. But if we consider “fitness” overall, each training day in CrossFit represents a significant and progressive stressor that disrupts systemic homeostasis and provides the stimulus required for “fitness” gains. In every workout, the CrossFitter is asked to lay it all on the line, leaving nothing in the tank. Always heavier, always higher, always faster, always progressing. This puts us analytically back on track again (phew!): understood in this new and improved way, the fish diagram does indeed relate to the way CrossFit rapidly improves fitness.

Putting it all together

Still, though, I am left to think about how to resolve the problem of different rates of fitness gains in different elements of fitness. If you train more with weights, won't the other components suffer? Yes, they will, but look at it this way: your body can recover effectively from only a finite amount of training stress. (This is a notion that resulted from another bout of invisible work time in Santa Cruz in the evening after the seminar concluded.) Let's say I'm a beginner and my body can tolerate and recover from 100 work units in 72 hours. If 80 percent of those work units takes the form of weight training, 20

percent is done in the form of endurance work, and 0 percent is gymnastics work, obviously the fastest gain is going to come in strength. Consistently using this same organization will develop endurance at a tremendously slower rate than strength. Gymnastic ability would not be directly affected (except, of course, in terms of the roles that strength and endurance play in it, and not accounting for the increases in body control and awareness, active flexibility, and other qualities that necessarily come with improvements in strength and endurance). When combined, the total gain from all three elements represents “fitness” gain (Figure 3). The CrossFit template generally includes roughly equal numbers of fitness element stresses within the training week, such that the composition of the training is more like 33 percent strength, 33 percent endurance, and 33 percent mobility. This means that although the distribution of work and the resulting magnitude of individual element progress are different from the previous example—in this case, there is less strength gain but greater endurance and mobility gains—the total “fitness” gain is about the same, but with a differing profile bias.

As helpful as this rethinking of my fitness mathematics is, though, it still fails to account for that considerable but immeasurable and ineffable bonus that results from the combination and interplay of the elements that is part of the “magic” of highly varied mixed-mode CrossFit training. The black box will not give up all its secrets.

So, back to the original question: If you wanted to do a program of more focused strength training along the lines we suggest in our Basic Barbell certifications, how would you integrate that into CrossFit training? It's not hard. But keep in mind these three principles:

1) Teach everyone—or learn yourself—how to do every barbell exercise correctly. If you do nothing else, you will have made a tremendous change in each of your trainees' ability to improve their fitness. They will thank you for it.

2) Trust in the program. CrossFit is an exceptional program that will produce exemplary fitness gains. Yes, I think that strength is particularly important and deserves to receive a lion's share of attention, but then again I'm an old musclehead and pretty much everyone who has trained CrossFit for a month can kick my ass in everything but weightlifting. Rip and I hate it when people want to

substitute rows for power cleans in the Starting Strength programming for no apparent reason. Anytime that a time-tested, physiologically sound training system is altered for convenience or because some online self-appointed fitness guru decided he or she knows more than the originators, the resulting gains tend to be diminished. We take pride in the results people see from training the way we describe; we take no responsibility for the lesser results that come from beginners who don't use the program as written. Coach Glassman has developed an amazing system that produces remarkable increases in fitness very rapidly. He developed the system to evolve, and a certain amount of tweaking and twiddling is thus expected as part of making the system progressively more effective. Tweaks and twiddles are OK, but we don't want to change the focus on broad-spectrum fitness. Trainees who ignore their least favorite fitness component are executing unacceptable modifications. If you train the component but do less than you are capable of—as when running geeks insist on scaling down WOD weights, or when old lifters won't run, for example—you cannot expect to reap the full results CrossFit can elicit.

3) Think about what you learn from what you do, and from the CrossFit education system, and apply it with perspective and with patient progressive effort. Put in some of that invaluable invisible work time of your own. You can get stronger faster by biasing your training toward strength work, but consider the larger picture of fitness before you do.



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