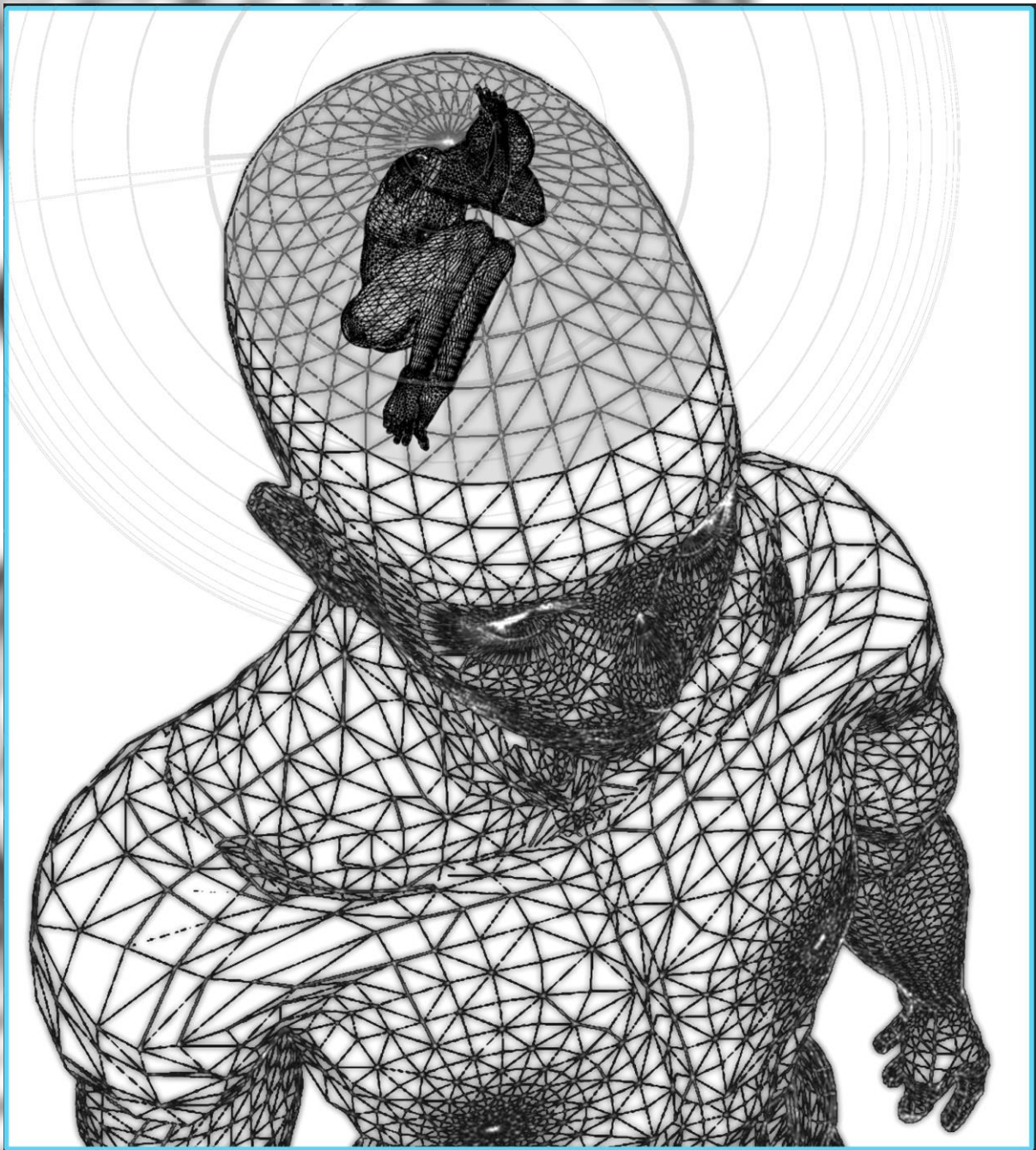


superfunctional training

By Adam "The Bioneer" Sinicki



THE BIONEER
ACTION. PERFORMANCE. TECHNOLOGY.

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PRODUCTIONS

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file 1: superfunctional

Do you work out, or do you *train*?

I certainly know what sounds cooler. Batman doesn't work out, Batman trains. Bruce Lee didn't "do his exercises," he trained.

Goku trains. Ali trained.

What's the difference you ask? Working out means exercising regularly in order to maintain basic fitness. It generally means exercise for the *sake* of exercise.

Training on the other hand usually means training *for* something. Such as a big fight, a marathon, or a hike across the desert.

Hence, most of us who work 9-5 jobs will work out or exercise. We live such inactive lives that we need to hit the gym just to bring ourselves back up to "normal."

We often refer to this as being "functional." We consider someone functional if they are able to move in all of the ways that the human body was designed to move through millions of years of evolution. You might have heard of the "seven primal movements" described by Paul Check for instance.

The fact of the matter is that many of us can't even squat down to the ground without bringing our heels up. And we're lacking in strength too: many of us can't even perform a single pull up.

So, we exercise, effectively as a form of rehabilitation!

But here's the thing: you are *not* unfunctional.

Because to be functional should really mean *to function*. It should mean being able to do all the things that you need to do.

To perform optimally would mean to be perfectly physically adapted to your current lifestyle. And if you work a 9-5 job then come home to watch TV, you don't need to squat or do pull ups.

The rounded back (kyphosis) caused by typing for so long is not maladaptive. It is *optimal* for reaching the keys. The same goes for the short, tight hip flexors that allow you to stay sat in your chair all day long.

And your short attention span - that's ideal for skimming content on the web.

So "functional" training is really misguided.

Thus, I propose to you: "SuperFunctional" training!

What is SuperFunctional Training? It means training in order to be able to do things that you *don't* need to be able to do.

Being able to do 30 pull ups is not functional. It's SUPERFUNCTIONAL. You don't need to be able to do it, but it's a goal to train for. It's beyond rehabilitation, it's aspiration.

Why train for something you don't need?

I have a few answers to that question:

1. It makes us “ready for anything.” If ever there is a zombie apocalypse, the SuperFunctional athlete will be the one who can outrun them, outclimb them, out-think them, and out-punch them. I also call this “ready for anything training” or “general physical preparedness.”
2. It is awesome. I like to put it this way: if I ever met Batman, we’d have something in common. I don’t understand why people are content to watch movies and play games featuring awesome superheroes leaping from exploding jets – and then to be completely sedentary in their own lives. Don’t they want their own action-packed hero’s journey?
3. It creates possibilities. By training, you open up new capabilities and *literally* increase your freedom. SuperFunctional Training isn’t just about training strength, but also your brain, your flexibility, your speed, your knowledge. It means expanding beyond your boundaries and creating the ability to accomplish more.

Or to put it another way:

Think bigger so you can see every possibility.

Run faster so you can travel further.

Jump higher so you can move in more dimensions.

Push harder so no obstacle can stand in your way.

I am highly motivated by comic books, games, and movies, as is likely very apparent from my blog The Bioneer. When I see Superman standing on the bottom of the ocean, or Iron Man exploring a distant satellite, I am filled with a sense of excitement and possibility. Those guys are able to do that purely because they have more capabilities *themselves*. They were fast enough, or smart enough.

I’m not saying you’ll be able to fly or withstand immense pressures. I’m not saying you will be able to explore the Challenger Deep of the Mariana Trench. But I’m saying that you can do the equivalents of those things on a far smaller scale.

Case in point: I am a full-time writer who gets paid by the word. I have been able to increase my salary therefore by learning to write *faster*. I did that by training my focus and my verbal fluency.

I increased my profits without changing my pricing or my clients. I did it by expanding what I was capable of. I call this the “Transhuman business model.”

(**Note:** On a related note, I find it strange that Transhumans are so keen to further their capabilities with technology when we haven’t even come CLOSE to unravelling the full natural potential of the human body yet!)

You are your best asset. You are your number one “force amplifier.” The more you are capable of, the more your horizons will expand.

Train: Everything

So that is why I think that everybody should **train** rather than just exercise. That is why I think there is a need for SuperFunctional Training.

But we’re not done defining the term just yet!

Because you see: SuperFunctional Training also goes beyond your typical “push ups and sit ups.”

After all, we are training to be able to do things we don't *need* to be able to do. We're going further beyond. And with that in mind, why would you limit yourself to training only strength or cardio?

This is another point that genuinely perplexes me. Most of us agree that our brains are our best assets as a species. Humanity has risen above other species in many respects because of our ability to work together, to build tools, and to hypothesize about the future.

We KNOW that the brain is plastic and responsive to training. We KNOW it is capable of change.

So, with that in mind, why do we insist on ONLY training our bodies?

Why don't we write training programs for our minds in just the same way as we do for our bodies?

Imagine a training program designed to develop creativity, focus, memory, emotional intelligence, and confidence. Something you could do three times a week that would have noticeable, tangible effects on your cognitive capacity. A SuperFunctional Training program would include this by design.

And while we're at it, why not also train for increased energy? By boosting energy capacity (through VO2 max, mitochondrial density, discipline, sleep, muscle endurance) we could gain more energy to attack the rest of our training with additional vigour.

Training mobility so as to eradicate pain and increase range of motion is a given. But how about training cold resistance (thermal regulation)? Or tendon strength?

What about training your senses so that you can see and hear better? Your reflexes should you ever find yourself in a self-defence situation? Your manual dexterity? Your balance? Your proprioception?

Did you know you could train yourself to become ambidextrous? To more easily enter a flow state? To more quickly recognize patterns?

Imagine ONE training program designed to help you train all those things.

Imagine if in a year's time, you could walk on your hands, memorize huge lists, focus like a laser, touch the ground with ease, and bench press twice your body weight. That's the goal of this book.

The Sources

The focus of this book then is to provide a single training program that will make you SuperFunctional in EVERY aspect. Not just slimmer and more muscular, but smarter, faster, more motivated, more agile, more creative...

Okay so maybe at this point it's beginning to sound as though I'm reading too many comic books. But before you dismiss this all as nonsense, I ask you to consider a few points.

Firstly, we are definitely aiming for "jack of all trades" here. While you're welcome to specialize more or less in specific areas, I am very well aware that you're not about to gain the endurance of someone who runs ultra-marathons AND the strength of Hercules. There's a little something called the "interference principle" to consider here – I'm well aware of that and it gets addressed later in this book.

Nor do I think that doing dual N-back tests and ambidexterity training is going to turn you into Eddie Morra from *Limitless* (or Eddie Spinola if you read the original book).

Recommended Resource: *The Dark Fields* by Alan Glynn

The point is though, that most people don't do ANY of this type of training. Therefore, you actually don't need to do a lot in many of these areas to gain a significant competitive advantage. And anyway, isn't doing a *little* training for your sense better than doing none at all?

And more to the point is that all this stuff is highly interconnected and interdependent. This is what many people don't realize: to train your body to the best of your ability you shouldn't *just* focus on your body. You also need to consider lifestyle factors (diet, hydration, energy levels, free time) and your mental faculties (motivation, focus, proprioception, muscle control).

Something like sleep will impact both your brain and body training to equal degrees.

Likewise, did you know that learning new physical movements is FANTASTIC for increasing brain plasticity?

The more you read, the more you'll realize that training everything altogether is actually an incredibly logical approach – seeing as every aspect of yourself you improve will have knock-on effects in every other area of your health and life.

REAL SUPERHUMANS

The other thing I'd like to draw your attention to, are the many examples of incredibly skilled human beings and the many pioneers exploring the limits of what they're capable of right now.

There are people alive on the planet today who are capable of writing separate sentences with their right and left hands simultaneously. There are people who can "see" using sonar via a skill called "ecolocation."

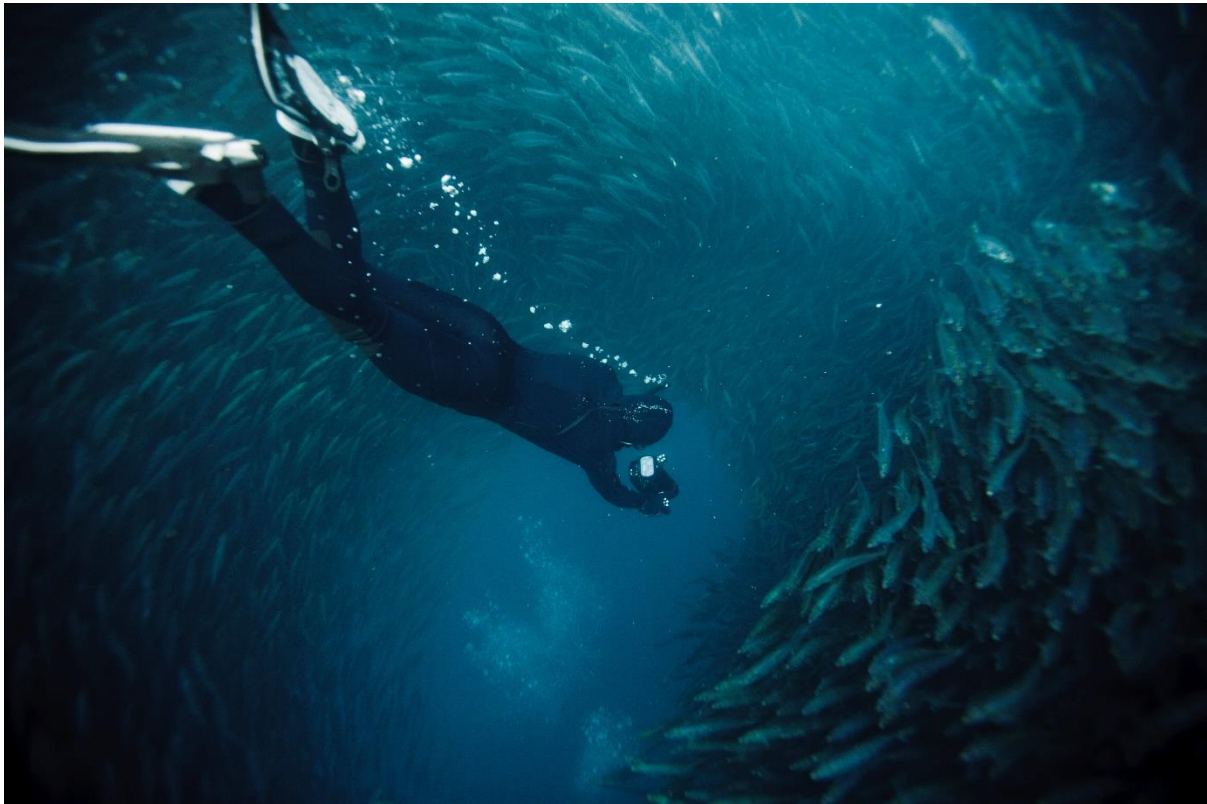
The Tarahumara tribe are indigenous humans capable of running tens of miles every single day without tiring out. The Moken people, also known as the "sea-nomads," are able to see underwater by using the muscles around their eyes to change the very shape of their lenses.

There are human calculators like Scott Flansburg or Daniel Tammet who can outperform *actual* calculators when it comes to performing math.

Some Shaolin monks can throw toothpicks through sheets of glass and perform two finger handstands. Aaron Cook is a YouTuber capable of performing a double backflip from standing. Gymnasts can perform seemingly impossible moves like the iron cross or manna.

Dennis Rogers is a strongman who can recruit more of his own muscle fibres in order to bend iron and pull cars – despite a relatively slim stature.

German freediver Aleix Sergura holds the record for the longest breath hold – 24 minutes and 23 seconds.



There are people with perfect pitch. With synaesthesia that allows them to “see math.” There are people who can write their names on the blackboard with their feet.

Some of these feats and skills are beyond us. We cannot, for example, learn to see underwater like the Moken. As far as we know, this is a capability that must be trained *in childhood*. That means that it is too late for the majority of people likely to be reading this.

But there are *certainly* things we can take from some of these other examples. For example, we can learn from the Tarahumara tribe the value of barefoot running and strengthening the feet and toes. And we can adapt the freediving technique of “oxygen packing” into our training to enhance our VO₂ max and endurance.

ECOLOCAATION: The human ability to “see” using sonar

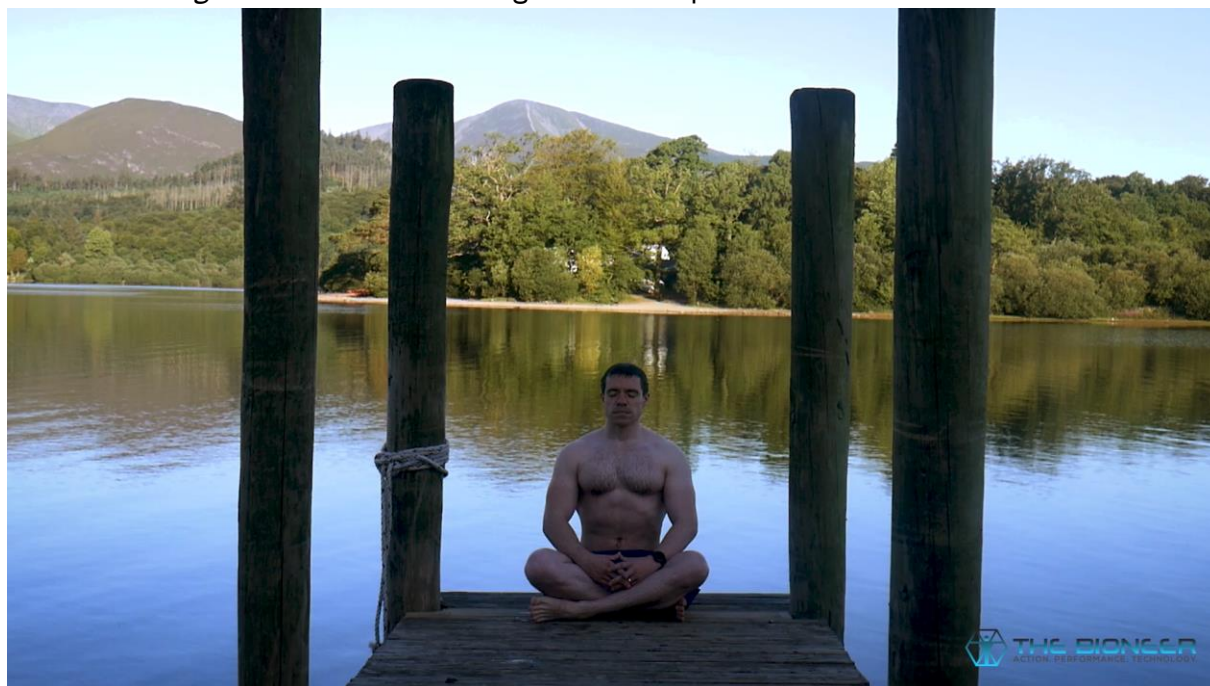
And of course, the specific training techniques of groups like the Shaolin monks are freely available to anyone who takes the time to look (I did).

And while there are many isolated examples of people and groups that are capable of seemingly absurd superhuman feats, I’d also argue that we *all* are becoming more superhuman.

Take a look on YouTube and watch just a few of the incredible parkour (free running) or martial arts “tricking” videos. Take a look at just how many people are now incorporating gymnastic strength training into their regime, in order to learn things like planche.

Consider the growing awareness of the “flow state” proposed by Mihaly Csikszentmihalyi and considered by many to be the “ultimate state of human performance.”

How about Wim Hof? Countless people are now advocates for cold showers and advanced breathing techniques based on Tummo Meditation. Speaking of which, meditation in *general* is also becoming more widespread than ever.



And consider the growing “biohacking movement” of people interested in pushing their health and fitness using ideas cherry-picked from cutting edge research.

There is SO much out there for us to draw on. And now is THE time for a program that trains much more than just “functional” movement.

SETTING OUT THE OBJECTIVES OF THIS BOOK

The objective of this book then, is to draw from as many sources as possible in order to devise a SuperFunctional Training program – one that expands your abilities in as many different areas as possible.

This program will:

- Increase energy levels
- Raise endurance
- Make you stronger
 - Including in overlooked areas such as grip strength, foot strength etc.
- Make you faster and more explosive
- Increase jump height
- Increase mobility and flexibility
- Enhance your senses
 - Sight, hearing, proprioception
- Boost your focus
- Increase creativity
- Raise confidence
- Expand memory
- Boost emotional intelligence
- Develop your knowledge
- Train a number of awesome skills
 - Hand balancing, gymnastics, martial arts, ambidexterity

- Develop muscle mass/reduce fat/improve body composition
- Increase health and wellness
- Develop balance
- Strengthen bones and tendons
- Aid sleep and recovery
- Prevent injury

There's much more too. You'll even be able remember your dreams better once we're done!

While that seems like an awful lot, the book and program are *also* designed to do this in an efficient and realistic manner. This will be achieved by using “bang for your buck” exercises that train many things at once, as well as by using “incidental training”, & “kaizen.” All will be explained.

INCIDENTAL TRAINING: Training during other tasks/in a manner that is quick and convenient

Smart programming will be employed to help you gradually introduce these concepts and training methods: so that you can safely go from whatever point you're at now, to a point where you're training like Batman.

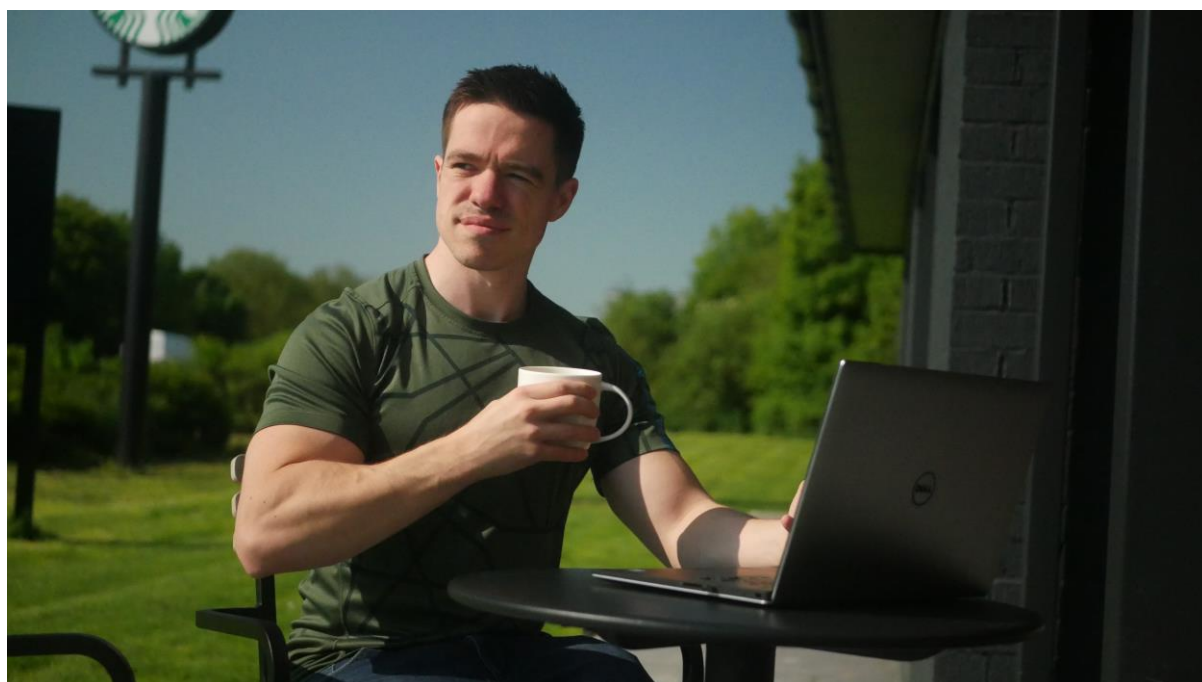
The program will be designed to be adaptable around your lifestyle and personal goals, to be fun and easy to stick to, and to guard against injury.

WHO AM I?

At this point, you might be wondering who precisely I think I am. Who is this bloke who reckons he can train you to think like Einstein and run like Sonic the Hedgehog?

I'm Adam Sinicki AKA “The Bioneer.” I was born in 1987 and grew up in Bournemouth, studied at Surrey University, and now live in Bicester, Oxfordshire with my wife Hannah and daughter Emilia. I enjoy comic books, working out, computer games, travel, and sandwiches.

Firstly, I'd like to point out that I'm not claiming to be some kind of super-genius-athlete myself. I'm actually just a guy who finds the limits of human performance to be a truly fascinating topic and who enjoys researching and experimenting in this field.



As such, that is the direction that my career has taken. As a teenager I became very interested in physical training and thus began working out from home. When I was 16 I won “Teen Bodybuilder of the Month” on Bodybuilding.com, which led to a small amount of online recognition (big news for a 16 year-old!) and my first website. My friend – himself a highly successful online entrepreneur – would eventually help me develop that website into something that could earn money.

I also studied martial arts at this time: Wado-Ryu Style Karate (up to black belt), Yang Style Tai Chi (one year), and Capoeira (one year).

As I was interested in not just physical training though, I decided I would study a BSc psychology at university and learn as much as I could about the brain, while continuing my training. My dissertation was focussed on Transhumanism, and how the general population would react to “superhumans.” This course included a one-year work placement, where I worked as a writer for a magazine called *Writers’ News*.

When I graduated, I decided to work full-time online through my own website and my new-found writing skills. I therefore began working as a freelance writer, and was able to earn enough to make a living.

I chose to specialize in two areas that interested me most: health and fitness, and technology. For 10 years I have been researching and writing about these topics, which has given me a fantastic opportunity to learn. Meanwhile, being self-employed has given me the flexibility and energy (more on that in a moment) to pursue my other goals and interests.

During this time, I taught myself to program and built a successful mobile app: Multiscreen Multitasking. This caught the attention of Android Authority, where I have been blogging and vlogging for the past few years. I have also authored two books published by Springer: one on programming and one on working online.

I also used this freedom to further develop my own personal website, which evolved to become “The Bioneer.” Here I have been blogging and vlogging about human performance, and have built the YouTube channel up to a current 92,000 subscribers. Hopefully, by the time you read this I have surpassed 100,000!

Last year, the site and channel began making enough money to justify my taking one day off a week to focus exclusively on the brand. This has allowed me to explore some truly fascinating topics regarding mind and body training in real depth – including ninja training, the Wim Hof method, image streaming, flow states, and much more. It also granted me the opportunity to work with some highly skilled and passionate individuals – martial artists, yoga and meditation experts, entrepreneurs, and coaches.

I began selling training programs through my website and to my friends, and these were featured in a national paper a few years back.

Although my health and fitness knowledge was fairly comprehensive at this point, I also decided to take a Level 2 and 3 diploma in Personal Training, in order to ensure there were no gaps in my knowledge.

So, I'm not claiming to be Superman, or even to be the embodiment of all the ideas I'm putting forward in this book; I'm only human and I have my limits (I'm also extremely busy with a young baby right now!). But I am highly passionate and motivated, I know how to research a topic THOROUGHLY, and I have a lot of relevant experience that I hope you'll find useful.

This book is the sum of all my experience and research up to this point.

Some of the ideas I am presenting here and have discussed through The Bioneer blog and YouTube channel are things I have been using myself for decades. Some I recently integrated into my own training. Others, I failed to incorporate, or didn't find to be personally useful.

This is the first time though, that I have formulated EVERYTHING I have researched and tested into a single program. I invite you to join me.



file 2: brain

In order to train to become SuperFunctional, we need to train in a way that allows us to maximise our gains not only in muscle strength, but also control, range of motion, endurance, explosiveness and more. Our aim is to do all this while training a “regular” amount that the average person should be able to manage.

To that end, we need to deconstruct muscle, hypertrophy, and their relationship to the central nervous system.

To understand *this* we need to understand the brain (which of course is part of the nervous system), nerves, and neurons. Seeing as we’re also training to improve our focus, creativity, memory, and senses, it makes sense to group these aspects together.

And as you shall see, teasing them apart is actually counterproductive anyway.

THE BRAIN

We’ll be starting then with the brain, which is part of the central nervous system along with the spinal cord. The central nervous system also includes the peripheral nervous system (responsible for our limbs and extremities) and our autonomic nervous system (which handles autonomous functions such as breathing).

The entire nervous system is made up of nerves, which in turn are bundles of neurons along with their protective sheaths. Nerves run down the entire length of our body connecting our limbs to our brains, while the brain is comprised of many hundreds of billions of neurons. This has earned the brain the prestigious title of “most complex known object in the universe.”

These billions of neurons are responsible for our subjective experiences of the world. Neurons are comprised of multiple parts: the main ones being the axon, dendrite, and soma.

The soma is the body, which contains at its center a DNA-housing nucleus. Branching off of the soma are many dendrites which can reach out across the brain to form connections with other neurons. At one end is a “tail” called an axon. This ends in a terminal.

While dendrites act as “input” ports and receive messages from other neurons, the axons act as the output terminals and carry messages to subsequent neurons.

These messages take the form of electrical impulses, known as “action potentials.” When a brain cell “fires” due to an action potential, it will cause us to experience something. For instance, specific groups of neurons may cause us to relive certain memories, or to feel sensation in one part of our body. Our human experience is made up of countless neurons all firing simultaneously in response to external stimuli and our own processing of that information.

When an action potential travels through a neuron and reaches the terminal at the end of an axon, it will then attempt to stimulate nearby neurons via their dendrites. The gap between two neurons is known as a synapse, and the impulse must “jump” between this gap if the signal is to continue travelling through the brain.

Action potentials are binary. That is to say that a neuron is either firing, or it is dormant – there are no gradations of signal strength. In order for the next neuron in the sequence to fire though, it must be stimulated to a certain degree, known as the threshold potential.

This means that if a signal is not strong enough, it might not be enough to cause an action potential in a connected neuron. However, stimulation from multiple signals can act cumulatively to trigger an action potential. Likewise, consecutive signals can raise the resting potential (normally around -70mV) of the neuron so that it will be more easily triggered in future. Once the potential has crossed a critical threshold known as the threshold potential, then that neuron will also “fire” and carry a signal down its axon to the next link in the chain.

Imagine the brain like a giant mind-map of connected neurons, carrying countless messages through interconnected circuits – rising and falling in strength. As those brain networks light up, so we remember, feel, and experience.

These neurons and connections move and change shape over our lifetimes as we’ll see in a moment, but broadly, they are clustered and organised into functional regions that are largely consistent across brains. For example, the occipital lobe is a region of the brain located at the posterior and responsible for visual information. The motor cortex is located dorsally and handles movement. The hypothalamus plays an important role in memory, while the amygdala is implicated in emotion. The brain is also divided into two separate hemispheres housing different functions and connected by a thick bundle of nerves called the corpus callosum. We can also divide the brain into three regions known as the forebrain, midbrain, and hindbrain. They are responsible for higher order and more basal functions in their part, and appear to have evolved one on top of the other.

These brain regions do vary in some cases. They may grow or shrink, or even be entirely absent. Functions can even “migrate” across the brain in response to trauma or unusual development. However, the “map” of brain regions is generally reliable enough that it can be used to understand what’s going on inside our brains at any given time.

Generally, we focus a lot on the prefrontal cortex of the brain, which houses numerous other key brain areas. This region of the brain is the part that we associate with being

human, and that handles things like forward planning, decision making, and problem solving.

NEUROTRANSMITTERS

While the action potentials are binary, there is a way for brain cells to convey additional information to one another: via the release of neurotransmitters.

Neurotransmitters are brain chemicals that are often released from the neurovessicles located at synaptic knobs at the ends of axons. The electric signal will trigger the release of these chemicals, which then cross the synapse and reach the dendrites of other neurons where they can “dock” at receptor sites. These receptor sites are like keyholes specific to particular neurotransmitters. When a neurotransmitter fills a receptor, it alters the properties of the postsynaptic neuron (the neuron receiving the message).

Neurochemicals include many well-known favourites, such as dopamine (the “reward” neurotransmitter), serotonin (feel good), cortisol (stress), and epinephrine (fight or flight). While these descriptions are somewhat useful, in truth they are huge simplifications. What we can at least say about them is that they fall broadly into two categories: excitatory and inhibitory. Excitatory neurotransmitters make neurons more likely to fire, whereas inhibitory neurotransmitters make them less easily triggered. A brain awash with the inhibitory sleep-neurotransmitter melatonin for instance will be less active than one flooded with norepinephrine.



Neurotransmitters don't only change the way we feel about an experience, but also help tell the brain how we should react, and what is important enough to be stored as a permanent memory.

Neurotransmitters can also be affected by such things as diet, sleep, and even gut bacteria. For instance, when you eat carbohydrates, that creates a byproduct called tryptophan (an amino acid) which gets converted to the feel-good hormone serotonin when it reaches the brain. Serotonin is inhibitory and so helps to numb pain and reduce our activity – which makes sense from an evolutionary perspective (you are fed and so

don't need to hunt for more food). Eventually, serotonin converts to melatonin, which is why we feel sleepy after eating!

(The difference between a neurotransmitter and hormone is that hormones are carried through the circulatory system, whereas neurotransmitters are sent across synapses – however the terms are often used interchangeably.)

Increasing serotonin will also decrease cortisol, along with the muscle destroying myostatin. Serotonin will lower the heart rate, reduce the strength of muscle contractions, and help direct blood flow to the digestive system.

This is why it's a mistake to think that you can simply "become more focussed" by increasing dopamine or cortisol: each chemical is part of a hugely complex system and has multiple interdependent roles. This is a mistake made by many users of "nootropics" (smart drugs) that work to elevate dopamine, acetylcholine, or any other neurotransmitter.

What's more, is that neurochemicals can have a slightly different effect depending on the brain area they are acting upon – and whether or not that area has the necessary receptors to even be influenced by them.

Over time, neurotransmitters are either used or cleared away by reuptake transporters found on axon terminals and "glial cells" (support cells that appear to work predominantly as caretakers in the brain).

RATE CODING AND BRAIN STATES

Another way in which neurons can convey more information across synapses is with their firing rate – a strategy known as "rate coding." Seeing as action potentials are binary, they can't on their own convey intensity. Instead then, it is the speed at which a neuron fires that is used to convey this information. An action potential will typically last around 1-100 milliseconds, with a short cool off period in between. By repeatedly firing, the neuron can appear to be permanently active, and it is the rate of that firing that denotes the strength of the signal.

When lots of neurons fire synchronously, this creates a "brainwave" that can be detected with an electroencephalogram (EEG). At any one time, different brain regions will exhibit different brainwaves.

The pattern of activity and neurochemical profile across the brain can at any time give us a snapshot of what is going on inside a person's head. At any time, there will be particular brain areas that are more active than others. Sometimes these will be connected brain areas that are often used in tandem during certain activities – often referred to as networks. This will likely be influenced at least somewhat by the predominance of neurotransmitters in those areas.

For example, the default mode network is the brain's "resting state" that is associated with daydreaming. Conversely, the salience network is a large scale brain network responsible for monitoring what it deems important and helping us to switch our attention as needed.

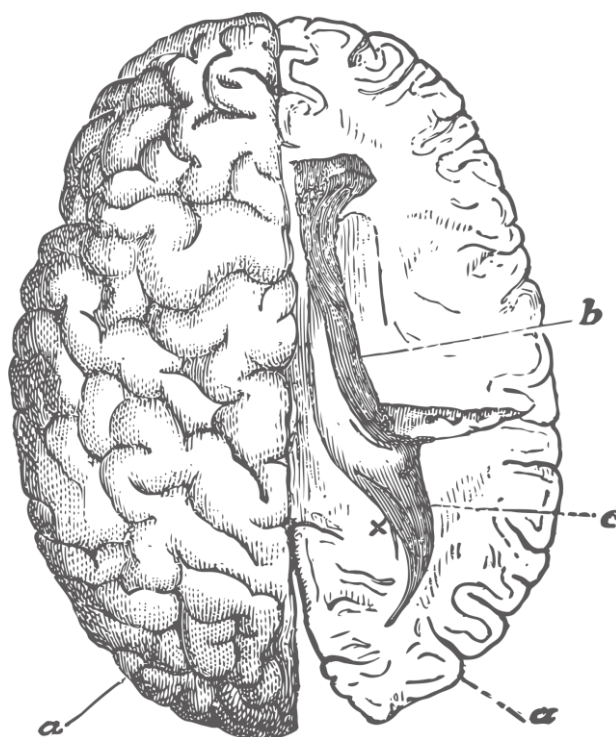
Some brain states are more conducive to action, while others are more conducive to reflection and rest. These are heavily influenced by goings on in our body at large – we've already seen how what you eat can affect activity in the brain. So too can sleep, light, temperature, and of course the experiences you are having. Broadly, our brain is more

excitatory when we are in fight or flight or a catabolic state, and more inhibitory when we are in rest and digest or an anabolic state.

BIOHACKS AND FLOW STATES

We can try to manipulate our brain states by altering our “inputs” (this is one form of biohacking). Likewise, we can heavily influence brain states by changing our thought patterns and our focus.

One of the most popular examples of this is the attempt to enter a “flow state.” Sometimes referred to as the “ultimate state of human performance,” this is a mental state that sees us so engrossed in what we are doing that all other distractions melt away and time even seems to slow down. This is when we are at our most productive during certain types of work, and it is when our reflexes are sharpest. Flow states are characterised roughly by “transient hypofrontality” meaning that our prefrontal cortex falls quiet – we stop second guessing ourselves and start moving on instinct (yes, it’s like Ultra Instinct for you Dragon Ball fans).



Sports psychologists are very interested in using mantras, cognitive restructuring, and similar techniques to attempt to help athletes enter this flow state. Biohackers likewise see the benefit in improving productivity.

But again, it’s crucial to understand that no single brain state is “ultimate.” Flow states are not particularly useful for creative problem solving for instance, which is actually often the result of the default mode network, or even REM sleep (itself a brain state!).

All brain states exist for a purpose, and the most effective brain is the one that can easily change between them as needed.

PLASTICITY

But perhaps the most exciting and interesting capability of the brain, is its ability to change shape and even grow in response to experience and challenge. The brain is like a muscle, and as you use it, it adapts to become more well-suited to that use.

This occurs in several ways. Neurogenesis is the birth of entirely new neurons, while new connections can also form as neurons reach out their dendrites to find the axons of other neurotransmitters.

What guides the formation of these new connections?

A simple rule: neurons that fire together, wire together.

What this means, is that if any two neurons fire at precisely the same time often enough, they will eventually start to form connections. Over time, those connections will become strengthened and the signal will travel more quickly and efficiently from point A to B. This strengthening occurs via the increase in receptor sites at the dendrites, as well as

through the insulation of axons via myelination. Myelin is a kind of sheath that helps to protect them and increase the rate of electrical impulses.

So when you practice dance moves in sequence, you start off struggling to remember the order. But as you repeatedly use specific neurons relating to those movements, the corresponding brain regions start to connect. Eventually those connections will become increasingly myelinated, boosting “long term potentiation.” You’ll eventually find that you can perform the movements automatically with no conscious thought, probably while reciting the alphabet backward!

This is skill acquisition, and during this process, it appears increasingly likely that the procedural memories (a term for these kinds of neural maps) are “moved” to the hippocampus for long term storage ([study](#)).

NEUROPLASTICITY: The brain’s ability to adapt and change shape in response to its surroundings and experience.

Plasticity enables far more than simple skill acquisition however. Thanks to plasticity, our brains will literally change shape in response to the world around us – and even our own thoughts. For example, if you were to lose your sight, then your occipital lobe and other visual areas would actually atrophy and shrink. At the same time, brain maps corresponding to your hearing and smell would grow to fill that area, increasing your sensitivity and even allowing you to use this information to create a “vision-like” understanding of the world around you.

Thanks to brain plasticity, it is also true that cellists have larger brain regions in the motor cortex representing finger dexterity and sensitivity.

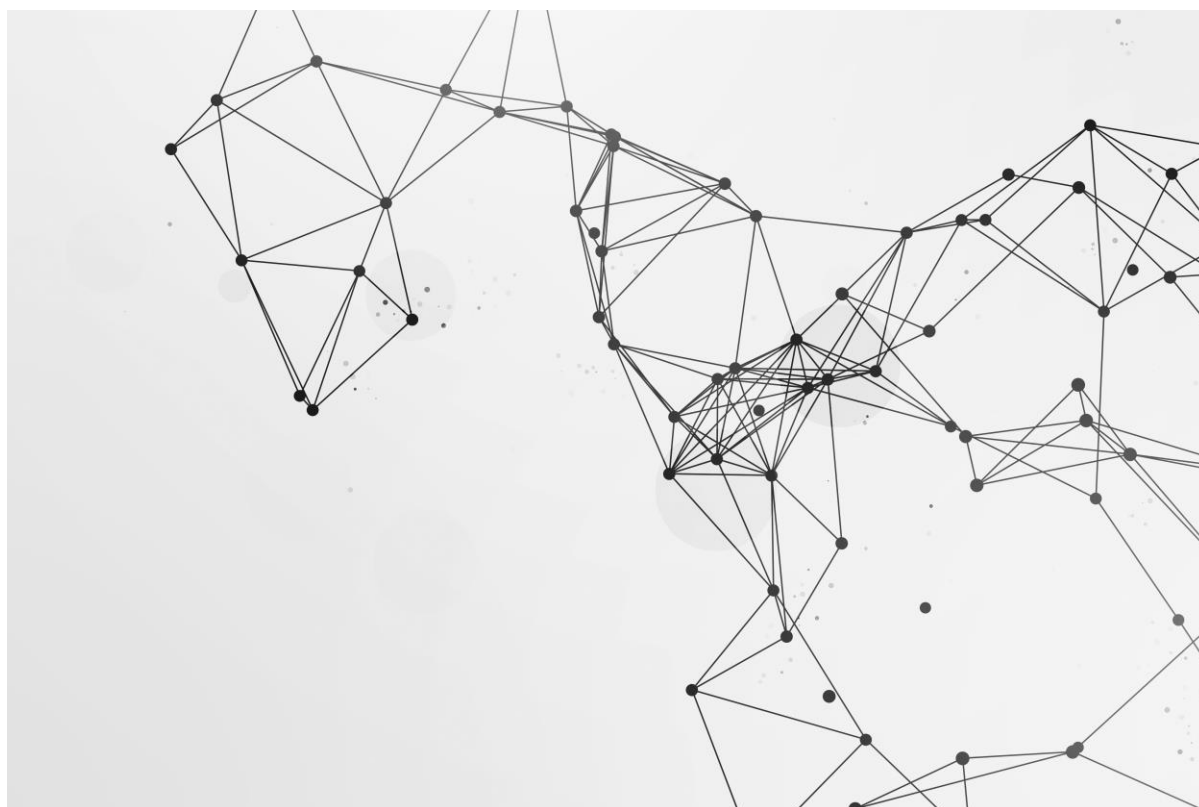
Ultimately, it means you are able to *design* the brain you want.

ENHANCING PLASTICITY

Enhancing brain plasticity may just be one of *the* most effective ways to increase our overall brain function and intelligence.

There are many theories of intelligence. Some, such as Gardener’s Theory of Multiple Intelligence, postulate that there is no “single intelligence” but that rather we have different “types” of intelligence – such as maths intelligence, literary intelligence etc. If this were the case, then we might expect someone with higher than average intelligence in a specific domain to have a correspondingly larger brain area in that region. Indeed, Einstein’s brain reveals that he actually had larger inferior parietal lobes to provide him with superior spatial intuition ([study](#)). It has even been suggested that a lack of space might force our brain areas to “compete,” which would explain why suppressing the language centres of the brain with transcranial magnetic resonance would enable “savant” type math intelligence ([study](#)).

Others suggest that intelligence is really the ability to utilize different brain regions together. It has often been said that true genius comes from combining ideas and skills from different areas in new and novel ways.



Lots of studies show that “global brain connectivity” is a key indicator of intelligence ([study](#)) and have linked IQ to overall cortical grey matter ([study](#)) and even brain size and weight. Einstein’s genius has also been attributed to his smaller Sylvian fissure (the gap between the two brain hemispheres) and thicker corpus callosum (the bundle of nerves that connect the two sides).

Greater plasticity would benefit *both* these qualities. With greater plasticity, you could train specific skills and brain areas more quickly and see them grow and adapt. We’d have larger brain regions and more connectivity between them!

There are methods to increase brain plasticity, which will be discussed in the techniques section of this book.

Brain plasticity is greatly encouraged by sleep and research is outlining more and more how this is a prime opportunity for the brain to engage in the growth of new neural tissue and the “pruning” of unwanted connections.

Recommended Resource: *Why We Sleep* by Norman Doidge

DIRECTING PLASTICITY

Wanton brain plasticity is *not* however a desirable situation. Too much plasticity means that your brain changes shape in response to every experience, thereby preventing you from effectively adapting to your regular routines. Likewise, it can lead to the formation of bad habits and traits.

The good news is that we can help guide plasticity through focus, motivation, and passion. These are not just abstract nouns in this context, but the experience of specific neurotransmitters like dopamine.

When we are highly engaged in what we are doing, or when we think something is very important, we release excitatory neurotransmitters, including the “reward hormone” dopamine (which actually is released in *anticipation* of reward). These neurotransmitters

aid our salience network in directing attention to that thing, and also speed up long-term potentiation. The more excitatory neurotransmitters, the more deeply ingrained the memory.

Increasing dopamine has been shown to elevate brain derived neurotrophic factor (BDNF). This neurotrophin (a brain “growth factor”) has been shown to help increase child-like wonder, while also encouraging the formation and strengthening of new neural connections. The same is true for nerve growth factor.

So if you are barely paying attention during a lecture, you will recall less than if you are completely engaged and find what’s being said to be truly fascinating.

Meditation and cognitive behavioural therapy (more on this later) can help us to guide our attention and to *choose* how we react to things emotionally, thereby helping us to only form the permanent connections that benefit us. We can also benefit by making our training *genuinely* more interesting.

Skill acquisition allows this to happen naturally. When we picture the way that we want to move first of all in the premotor cortex and other brain regions, we set an ideal version of what we want to accomplish. When the actual movement matches this vision, the brain automatically releases dopamine to reward our successful movement, thereby helping us to move more efficiently in future. This is how a baby is able to learn to walk over time, through countless attempts to stand. Each correct movement and adjustment is reinforced, while the twitches that cause them to fall get forgotten and “pruned.”

This has a few more implications too. For example, it means that you need to be very careful about how you think and the thought “habits” that you get into. If you constantly panic and stress, you’ll create more neurotransmitters that correspond to those negative emotions. Over time, this results in more receptor sites for those neurotransmitters appearing when the brain cells reproduce through mitosis. In other words, if you constantly feel anxious, you will condition your brain to *feel more anxious*.



MOVEMENT

What happens when you decide to consciously move a muscle in your body? First, you need to assess your current position and surroundings. This is so that you can orient yourself in order to move as you wish.

Data from proprioceptors is routed to the brain via the posterior column medial lemniscus pathway (for conscious proprioception) and the dorsal spinocerebellar tract/ventral spinocerebellar tract (for unconscious proprioception). Specifically, this will be sent to the cerebrum and cerebellum respectively, which we will see play an important role in movement in a moment.

The body can now begin to pre-plan its movement using a mental model of its current position and the world around it. This movement essentially begins in a region of the brain called the posterior parietal cortex. Here, we visualise movements and perceive the way we want them to go. Damage to this brain region causes ataxia, and it has even been suggested that the posterior parietal cortex is required for our sense of free-will. That is to say, that the belief that we “pre-planned” movements gives us the sense that we are in control.

Note that only conscious movements need go through this process. A “knee-jerk reaction” is a movement that relies on a “monosynaptic connection” – an input/output circuit comprised of only two neurons that need not pass through the higher areas of the brain.

It’s another area called the basal ganglia that will then select the action it wants us to carry out. This brain region is known to play an important role in task switching, allowing us to stop doing one thing and to start doing another.



The cerebrum now takes the aforementioned proprioceptive information to help prepare the next brain regions in order to carry out the movement as intended. These include the premotor cortex, which uses “sensory guidance” to prepare for a movement (setting up proximity and orientation), and the cerebellum which uses a feedback loop of information incoming from the spine to help with balance and fine motor activity – remember, this is the part of the brain that receives the unconscious proprioceptive information. It is looking for tiny twitches and changes in the supporting muscles throughout the body and then readjusting in order to help you remain upright throughout the movement. The cerebellum is also crucial for timing, which is an often overlooked aspect of physical performance.

Finally, the motor cortex sends the messages to the various parts of the body to move as instructed. The motor cortex acts as a one-to-one map of each body part, where there are different areas reflecting specific different parts of the body.

Depending on the amount of sensitivity and control a body part has, it will take up more real estate in the motor cortex (it has a higher “resolution” if you will). Thus, the hands are significantly more gigantic in this map than the elbows (a depiction of what this looks like is sometimes affectionately known as a homunculus).

Finally, the signal will then be sent to the relevant body part via the spinal cord, out to the peripheral nervous system, and then across the “neuromuscular junction” into the muscle cells.

Visualization

As you can see then, visualization plays a critical role in movement, allowing us to rehearse and select the correct movement in a fraction of a second.

The exciting thing is that research now suggests that visualizing an activity *alone* might have many of the same benefits as actually moving.

As we rehearse a movement over and over, brain plasticity ensures that the neurons and pathways responsible are reinforced in order to become stronger and stronger. The signals begin to travel faster, and there is a reduction in activity in surrounding areas. In short, the movement becomes more efficient thanks to rehearsal of the responsible neural pathways. This is how you develop the perfect golf swing, or roundhouse kick. This is our procedural memory.

Or as Bruce Lee put it: *Fear not the man who practiced 10,000 kicks once, but the man who has practiced one kick 10,000 times.*

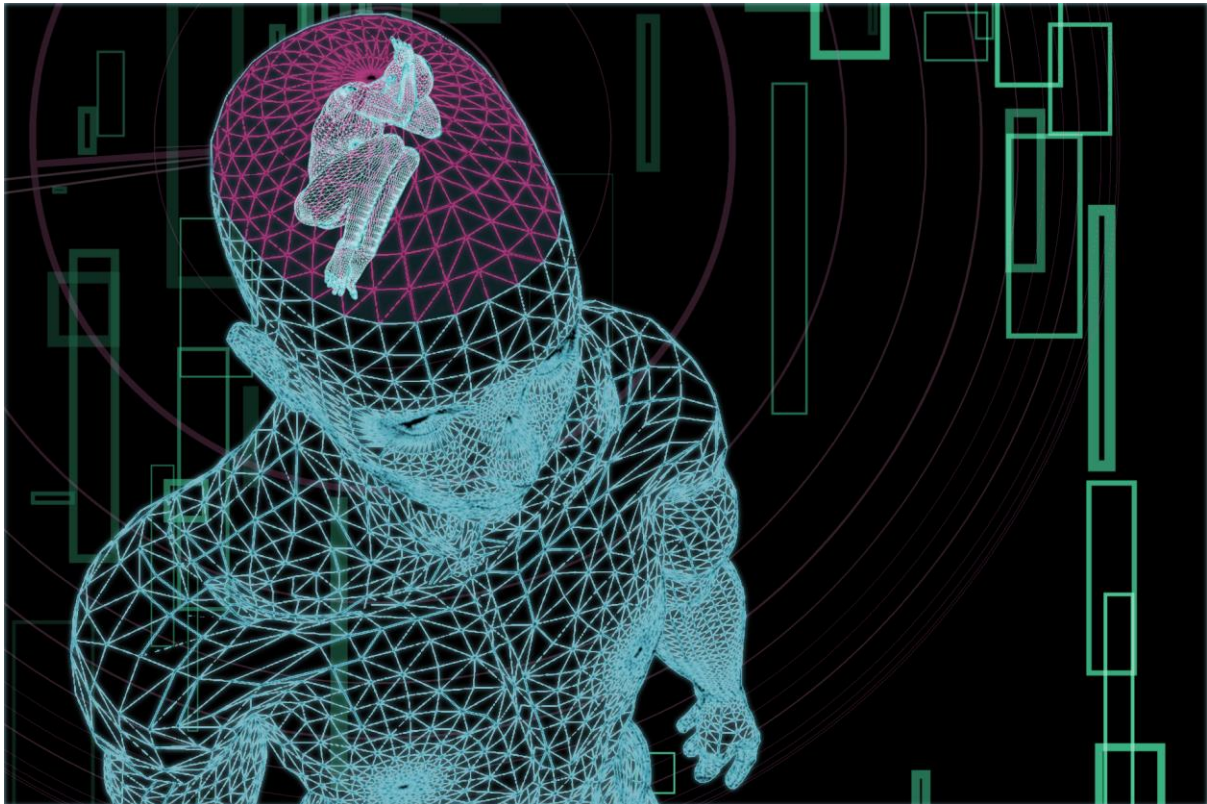
But simply *imagining* a kick or golf swing as though you are about to engage in the movement, you can actually trigger activity in the premotor cortex, cerebrum, cerebellum etc. This visualization has actually been shown to be enough to stimulate plasticity, allowing those relevant pathways to strengthen and become more efficient. Much more on this later.

Embodied Cognition

Remember how I said that it was futile to try and tease apart the difference between the brain and body? This is never more clear than when trying to explain the concept of *embodied cognition*.

Embodied cognition explains how we might actually understand the world around us by using our understanding of our own bodies in space and our own senses.

The question this seeks to answer is: where does understanding come from? When someone explains something to you in English, how do you make sense of those words and convert them into meaning?



It was once suggested that there was a kind of universal “machine language” of the brain, called “mentalese.” The notion was that in order to understand any language, we must first convert that into some kind of brain code.

Embodied cognition proposes a new theory: that we understand meaning by relating it to our own experiences. And we do *that* through visualization. So if someone tells you that they walked through a cold forest, you understand this by picturing the cold forest, by remembering what it feels like to be cold, and by even “feeling” the crunching of snow underfoot. All these sensations help you to paint a picture and actually *understand* what being in the cold is like – and thus empathise with the person telling the story. And this is all possible because brain regions relating to movement and sight are lighting up *just as though* you were actually in that cold forest yourself!

Likewise, we only understand math because we have experienced quantities and we can draw on memories in order to “visualize” those memories.

Keep in mind, that this is not visualization in the sense that many of us think of it. Someone without sight, or without the ability to visualize (aphantasia) will still have internal experiences whether those are kinaesthetic memories or sounds that exist in the “phonological loop.”

EMOBODIED COGNITION: The notion that our understanding of language and our own thoughts arises from our physical experiences and visualization thereof

A good example of embodied cognition can be seen when someone physically winces when being told about something painful or gross. We can even see it when someone throws a bowling ball and then contorts their body in an attempt to try and “steer” the

ball. They understand the position of their ball by “projecting” themselves into its location, and thus they try to move it by changing the shape of their own body!

This is only a theory for now, but it is one that makes a LOT of intuitive sense. And it means that by creating a better mental model of our bodies and our environments, we could potentially become better at understanding different concepts, at communicating, and at planning. It could boost our intelligence, and even provide us with entirely new ways of thinking.

WORKING MEMORY

As a side bar, this is all also very relevant to the concept of working memory.

Working memory is often described as being the shortest-term memory and is depicted alongside short-term memory, and long-term memory. The classic view of memory describes these as “boxes” where memories are stored. Working memory is where we keep the information we are immediately using, such as the numbers we’re carrying over when doing math, or a phone number we need to write down. Short term memory is the memory that we keep during the day – the name of a character in a film for example, or what you had for breakfast. Long term memory is the memory that we have committed to long-term storage, including our autobiographical memory

(Procedural memory is a fourth type of memory describing skill acquisition.)

Working memory can also classically be broken down into different categories based on the nature of the input. There is the “visuo-spatial scratchpad” which allows us to hold onto images we have seen or visualized, and the “phonological loop” which lets us replay sounds and phrases to ourselves – such as when you repeat a number over and over to try and keep it in your mind.

The working memory has a very limited capacity. When it comes to storing digits, it is describes as being 7 ± 2 . That means it has a minimum of around 5 and a maximum of around 9. Memory masters can get around these limitations though by using techniques such as “chunking” (remembering 36 instead of 3 and 6) and mnemonics.

Working memory in its purest form is your “RAM” and it is today easier to think of your working memory as the limits of your visualization. This is the amount of information you can conjure or retain in your mind and focus on at a given time. Thus, working memory is a bottleneck not only to your understanding, but also to your ability to understand the work around you: a footballer uses working memory to know where all of their teammates are on the pitch for example. It could also improve your ability to execute a movement efficiently by giving you a greater resolution with which to mentally rehearse.

Working memory is *tightly* related to focus and attention, as it refers to our ability to keep certain brain networks active by attending to them. There are ways to train working memory, with one of the only proven strategies being the Dual N-Back test.

Games that involve forward planning such as chess can also train working memory. So too can meditation, which is actually merely a form of intense concentration. Practicing visualization with exercises like image streaming may also be useful.

file 3: body

This file will continue our exploration of the brain and body, this time focussing on the muscles, connective tissues, and “body.”

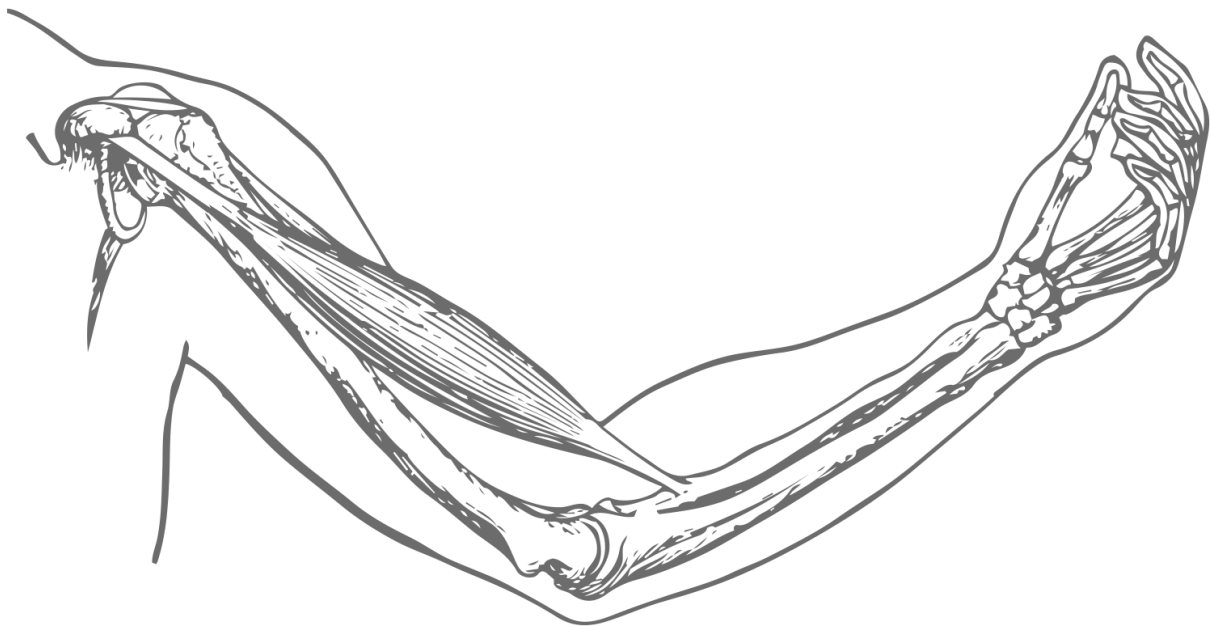
MUSCLE CELLS

Now to the physical muscle itself.

We’ve seen how the body plans to move and how signals are carried from the motor cortex. Once a signal has left the brain and travelled to the muscle cell, we start to move.

Muscle cells (myocytes/muscle fibres) work much like neurons in that they receive electrical impulses, but they are shaped somewhat differently. Firstly, muscle cells are unusual in that they have multiple nuclei – more on this in a moment.

Secondly, muscle cells work very much like telescopic poles. They are made up of bundles of myofibrils, which in turn are comprised of myosin and actin filaments. When an action potential reaches the neuromuscular junction and excites a muscle fibre, it will then contract. This occurs as the myosin filaments move inside the actin filaments, via a chemical reaction.



When enough muscle cells contract this way, it leads to the visible shortening and contraction of the muscle.

While any given muscle is made up of many hundreds of thousands of muscle fibres, we only have so many nerves controlling each of them. Therefore, a single nerve in the peripheral nervous system must be responsible for contracting large groups of muscle cells, which are known as “motor units.”

If a nerve fires, then all of the motor units it is responsible for will also fire and contract.

TYPES OF MUSCLE FIBRE

Another key difference to understand is that there is more than one type of muscle fibre. In fact, there are generally considered to be three types of muscle fibre:

- Type I
- Type IIa
- Type IIb (sometimes called IIx)

Type I muscle fibres are also known as “slow twitch.” They are slower to contract and therefore less explosive. However, they are also highly endurant thanks to high quantities of mitochondria. Mitochondria are the “energy factories” of the cells that use oxygen to make adenosine triphosphate (ATP), which is the primary fuel source used across nearly all cells in the body. Slow twitch muscle fibres are used for endurance challenges like marathon running or cycling. They are also used for everyday tasks, such as holding a spoon up to your mouth.

Conversely, fast twitch muscle fibres are lower in mitochondria and higher in ATPase. These are more explosive and capable of generating greater force. However, they also run out of steam much more quickly, making them useful for things like explosive jumping or bench press. Superfast twitch muscle fibres (IIb) are simply even further to this end of the spectrum. Fast and superfast twitch muscle fibres are larger than slow twitch muscle fibres, which is why bodybuilding – which thickens fast twitch muscle fibres – makes your muscles much bigger as compared with endurance exercise like long-distance running.



It *is* possible to convert muscle fibres from type IIa to type IIb, and some evidence suggests that it is also possible to convert type I into type II, though this is still unclear. We all have a genetic predisposition for more or less of each muscle fibre type however, which is why some people are naturally better sprinters and others are naturally better at endurance events. Different muscle groups will also typically have more or less of a particular muscle fibre type. Muscles that are responsible for keeping us upright for example (such as the erector spinae), will need more slow twitch fibre as they are required to work harder all throughout the day consuming energy as a result.

It is *not* generally thought possible to create entirely new muscle cells (a process called hyperplasia) though some studies suggest that there may be loop holes. In particular, weighted stretching (extending the muscle into the stretched position under resistance) does show some promise.

This is a good time to point out that what we hold to be true about the body is constantly being overturned by new evidence and theories.

MUSCLE FIBRE RECRUITMENT

All muscle fibres in a motor unit are just one of these types. So the fibres in a motor unit may be entirely type I for example. Likewise, a motor unit can have more or fewer muscle fibres.

A muscle fibre contraction works in many ways just like an action potential. That is to say that this is a binary state, so a muscle fibre will either fire or not fire: there is no such thing as “half a contraction.” And as with action potentials in the brain, a “twitch contraction” will only last for 100 milliseconds.

This might then lead you to question just how you are able to hold your arm at a 90 degree angle, or even keep your arm in any position for longer than those 100 milliseconds.

RATE CODING: The nervous system's method of encoding intensity by altering firing rate of nerves.

The answer is that your muscle fibres are actually twitching extremely quickly, such that there is no noticeable lull in the tension. In fact, these muscle fibres can begin a new twitch contraction before they have even completely finished relaxing (there is a roughly 10 millisecond pause prior to a contraction, and a 60 millisecond relaxation period).

At the same time, motor units can use asynchronous firing in order to ensure that there is *always* some tension in the muscle. So, if motor units A, B, and C, all pause for a fraction of a second, it's okay because D, E, and F will be handling the heavy lifting at this point. This may be why improving synchronization across muscle fibres does not yield the increase in strength that has been hypothesized ([study](#)).

This apparently continuous contraction is what we refer to as a “tetanic contraction” – a static contraction that is actually the result of countless instantaneous contractions. This tetanic contraction is the result of rapid rate coding, whereas slower rates might result in visible muscle twitches.

Of course, when you move your arm through a range of motion, you will see motor unit involvement change as the joint angle opens and closes. As you lift heavier weights further, you need to increase the amount of power you are exerting and you do this by recruiting *more* motor units.

You see, you will never be able to “recruit” 100% of your muscle fibre. Your body will only ever utilize as many motor units as necessary to complete a job, while always leaving some in reserve.

When you lift a teaspoon for example, your body will recruit only the smallest motor units comprised almost entirely of slow twitch muscle fibre. This allows you to exert just enough force to move the spoon toward your mouth – which will involve increasing the number of motor units involved marginally to close the joint angle of your elbow.

Now let's imagine you go to curl a dumbbell in the same way, weighing about 70% of your one rep max. This requires significantly more effort, and so your body will recruit a larger number of large motor units comprised of type IIa and type IIb muscle fibre.

The size of the motor units recruited will *always* be small to large. This is called Henneman's Size Principle, and it ensures that no more energy than necessary is exerted.

The other thing to note about this, is that you have far more small motor units than large motor units, with each small motor unit representing a much smaller increase in strength. This is why you have a lot of fine control and dexterity when you are manipulating something small and light, but far less when lifting something heavy. In other words, you could not write your name with a 100KG pen!



Were you to hold the 70% weight at 90 degrees for as long as possible, you'd find that your motor units began to fatigue and that you would start recruiting more motor units to take over from them. As more of your smaller motor units began to drop out and more large ones started taking their place, you'd start to see the weight begin to shake, before you were forced to put it down.

Muscle fatigue is the result of numerous factors including nervous fatigue (enervation), reduction in fuel, and the build-up of metabolic substances within the muscle that prevent the action of calcium in stimulating the contraction.

Now let's imagine that you're trapped beneath a car, and you need to draw upon *all* of your reserve power in order to lift that car off of yourself. To do this, you would need to recruit 90% of your muscle fibre, but unfortunately nobody can do this. Many of us will only ever be able to recruit 20-30% of our muscle fibres at any one time, whereas highly trained athletes might manage to reach about 50%.

MIND MUSCLE CONNECTION: The ability to "feel" and control muscles individually through training.

This is what bodybuilders refer to as the **mind muscle connection**, whereas old-time strongmen referred to it as “muscle control.” Using the right training, it is possible to increase motor unit recruitment, so that you are capable of utilizing *more* of your muscle fibre for any given movement, thus increasing your maximum strength. This is a response to training at maximum strength and practicing recruiting as much muscle as possible. Over time, the body adapts by increasing acetylcholine receptors at the neuromuscular junction (acetylcholine being one of the key neurochemicals that are used to stimulate muscle fibres) and potentially by creating entirely new connections.

Likewise, by repeating movements over and over, the neural maps in the brain can become increasingly more efficient, thereby allowing us to move more quickly and powerfully with less waste.

This is one of the primary ways we can train to increase max strength: by increasing nervous system efficiency through repetition and through maximum muscle fibre recruitment.

Crisis Strength AKA Hysterical Strength

If we *were* ever to recruit 100% of our muscle fibre, we would be able to tap into a huge amount of hidden strength potential.

This is apparent when someone receives an electric shock. This jolt sends them flying across the room, not because of some kind of explosion, but because the electric current forces maximum muscle contraction across every single fibre simultaneously. Imagine if you could use this to leap meters into the air at will!

Another time we see the hidden potential of true muscle power, is in times of great need. We’ve all heard stories of mothers who have been able to lift cars off of their children, and many researchers cautiously suggest this could be due to a sudden increase in muscle fibre recruitment. This may in turn be the result of a sudden surge in excitatory neurotransmitters such as adrenaline, which may increase excitability in the muscles, while also overriding some of the natural safety switches that exist in the body to prevent us doing injury to ourselves (via feedback from the golgi-tendon organ).

This is why it is sometimes observed that mentally unwell patients exhibit greater than average strength, and may also explain the awesome legends of Nordic Berserker warriors.



HYPERTROPHY

Muscle fibre recruitment and neural efficiency is one means through which we get stronger. Another is hypertrophy: physically increasing the size and thus strength of the muscle.

The jury is still out on precisely how hypertrophy works, and there is a fair amount of disagreement regarding the most important influences. However, coaches and researchers alike generally agree that there are three main factors: muscle damage, mechanical tension, and metabolic stress.

Muscle Damage

Muscle damage occurs when tiny microtears affect the muscle fibre. This means that you have placed the muscle fibre under so much strain, that it becomes slightly damaged. That damage in turn then triggers growth, with the muscle fibre recovering



during rest and coming back thicker than before. In order to repair the damage, existing amino acids (the building blocks of protein) will be incorporated into myofibrils (chains of sarcomeres) to build them back stronger. This is protein synthesis.

Note that fibres come back thicker and stronger but do *not* multiply. Increasing the number of muscle fibres is referred to as “muscle hyperplasia” – as discussed earlier - and is as-yet unproven (it has only directly been observed in pregnant women after the tearing of the abdominal wall and in the aforementioned birds hung by their wings for days on end). Some extremely early studies suggest that weighted stretching may have the potential to cause muscle hyperplasia, but this is certainly not proven. That said, one recent study has shown hyperplasia to occur in steroid using, high-level power lifters ([study](#)).

Certainly, the greatest amount of muscle damage likely occurs during the eccentric (lengthening) portion of any exercise, which is why bodybuilders use techniques such as “slow negatives” to try and trigger growth.

The importance of muscle damage is uncertain, and some theories suggest you can signal a fair amount of muscle growth *without* the need for muscle damage. That said, most bodybuilders would intuitively disagree with this statement – and that includes yours truly. Muscle damage, apart from anything else, might contribute to inflammation, which is an important signaller for growth and tissue repair. The use of NSAIDs following training to treat DOMS (delayed onset muscle soreness) has actually been shown to limit and impair hypertrophy.

Mechanical Tension

Mechanical tension simply means placing the muscle under a physical load, which often goes hand-in-hand with muscle

damage - though not always. Muscle fibres are able to detect the presence of

mechanical tension through receptors called mechanoreceptors, which signals the release of various muscle building proteins and pathways. *Repetitive* muscle contraction for instance encourages the release of myokines, which are proteins that help to encourage subsequent growth. Interestingly, different types of muscle fibre have been shown to produce different types of myokines!

All this has led to muscle being labelled as a “secretory organ.” Eww.

This is especially true when the muscle is in a stretched position, or moving through a dynamic range of motion. Studies show that isometric training (contractions in a static position) is less effective at signalling growth (though it is useful for other things, as we will shortly see).

The importance of mechanical tension essentially means that if you want to get stronger and bigger muscles, you need to lift heavy stuff. There is some debate as to what the best way to utilize mechanical tension is. Bodybuilders and strength athletes will argue about the importance of “total time under tension,” the amount of time you spend under a heavy weight in the gym, versus “continuous tension,” which is the time you spend under heavy weight without pause. Keep in mind that during a bench press, your muscles are not under heavy load when the arms are locked out, or when the weight is rested against your sternum. Therefore, if you subscribe to the “continuous tension” school of thought, then you might train keeping your arms slightly bent at all times and preventing letting the bar rest.



Conversely, if you believe that TTUT is more important, then you might simply increase your training *volume*.

Metabolic Stress

Muscle fatigue occurs after long sets of repetitions, which is likely due in part to the accumulation of lactate and/or hydrogen ions (acidosis). These ions interfere with the release of calcium ions and contribute to the discomfort that lifters refer to as “the burn.”

This “peripheral fatigue,” (fatigue that is not due to the failure of the CNS) is then hypothesized to result in an increased hormone and myokine release. That’s where the increased growth factors come in, such as testosterone and growth hormone.

Additionally, because long sets induce fatigue, this might also encourage the recruitment of more fast twitch muscle fibre to take over from the slow twitch fibres. And we know at this point that fast twitch muscle fibre is the thicker type that contributes more to muscle size.

There is a good amount of evidence for a role for metabolic stress. One of the most compelling arguments is that bodybuilders who tend to lift lighter loads (as compared

with power lifters) but for longer durations (sets), have a large amount of mass. This is because the longer sets allow more blood to pool in the muscle, and thereby increase the amount of metabolic stress. This is another argument for continuous tension – because once you relax the muscle, some of that blood is allowed to escape and drain away the metabolites. This is why an exercise like “21s” burns so much compared with 21 regular curls. It’s also why some lifters will use tourniquets training and actually restrict their blood flow via the use of a piece of material tied around the top of the working muscle to trap blood.

When performing 21s, the lifter will perform 7 curls in the lowest third of the ROM (range of motion), 7 curls in the middle portion, and 7 at the top. Or they might do 7 in each half and 7 more full curls. It’s brutal and highly effective.

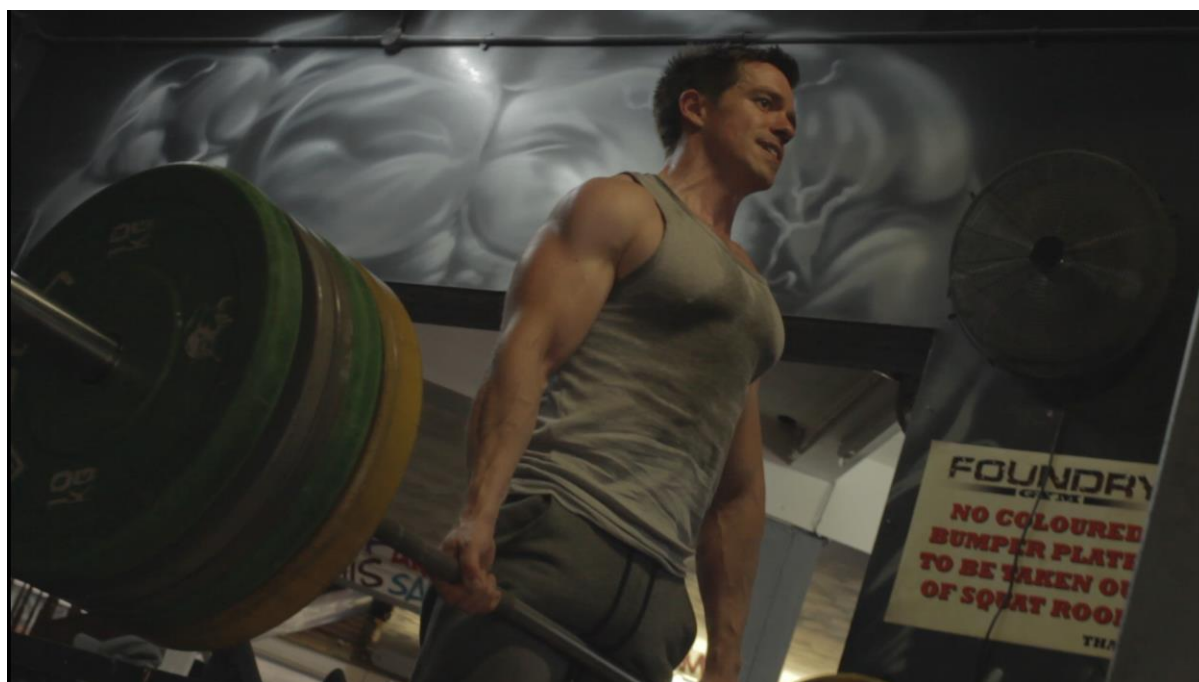
Interestingly, the contraction of muscle appears to increase the amount of metabolic stress *more* than the eccentric lengthening phase. This may be partly why it is possible to build a comparable amount of muscle with a concentric-only exercise (such as a rope climb) while not causing any muscle damage, or sending the optimal signals with regards to mechanical tension.

An argument has also been made that metabolic stress leads to muscle cell swelling. This involves increasing the retention of water and potentially glycogen within the muscle cells, thereby encouraging them to “balloon.” This is sometimes described as a secondary form of hypertrophy called “sarcoplasmic hypertrophy” (because muscle cytoplasm = sarcoplasm (as opposed to myofibrillar hypertrophy)).

This argument is a fairly controversial one, as the evidence for differing types of hypertrophy is limited. Nevertheless, anecdotal evidence does seem to suggest this. And it would explain a one potential mechanism for improved muscle endurance without additional muscular strength, that correlates with hypertrophy. There are other potential explanations for those however, such as improved delivery of blood and increased resistance to fatigue.

The “SAID” principle reigns supreme here: if you want to have more explosive and powerful muscles in the short term, then you should train with explosive movements and very heavy weights to increase fast twitch muscle fibre, strengthen your muscle cells, and increase your neural efficiency.

But if you want to be able to exert strength over a long period of time, then you should move slightly lighter weights for longer. Don’t be fooled into thinking that moving lighter weights is not functional either: chances are that you more likely rely on muscle endurance than max strength.



When was the last time you had to put something down because your muscles were burning?

When was the last time (outside of training) someone asked you to lift something that was 100% of your one rep max?

Any workout is going to combine all three of these methods to some degree, but the specific ratios will vary a lot depending on goals and preference. Our aim of course is to maximize the benefits of all three simultaneously.

Biphasic Hypertrophy and Anabolism

Testosterone and growth hormone are two examples of anabolic hormones that are related with the “rest and digest” state. These then encourage protein synthesis, so long as mTOR signalling is present ([study](#)) – which it should be so long as we are in caloric surplus.

We are highly anabolic post-workout and when in a postprandial (meaning post meal) state. We are even more anabolic during sleep, at which time the body is awash with growth hormone and testosterone.

We describe muscle hypertrophy as being “biphasic” in that it requires both a stimulus (muscle damage) and a recovery period. The muscle actually grows during that recovery period, making it just as important as the training when it comes to hypertrophy. Moreover, a positive energy balance and abundance of amino acids is also necessary – which is why bodybuilders are encouraged to maintain a calorie surplus and to simultaneously maintain optimal protein input. That optimal protein input is largely agreed to be 1 gram of protein for every 1 pound of bodyweight – but we’ll discuss this further in an upcoming chapter.

To further anabolism, you should do anything you can to avoid stress. That includes both psychological and physiological stress. A stressful journey to work will increase your production of adrenaline along with cortisol, which in turn will raise myostatin (which breaks down muscle) and AMP-activated protein kinase (AMPK). This shuts down protein synthesis and encourages catabolism.

In short? Your body is stressed and wants to fight, therefore it stops building muscle and starts burning fuel instead.

When we are rested, happy, well-fed, and warm, we increase the opposite enzyme: mTOR which ramps up protein synthesis and thus muscle building.

SATELLITE CELLS

One of the potential drawbacks of any kind of training, is that it is temporary. You can get into the best shape possible, but if you take a few months out of your training, you'll slowly return to your original shape. This can be disheartening if you have put a lot of time and effort in.

If only there was a way to *retain* that strength!

Well, the good news is that there sort-of-is. While you might return to your original shape after a period of inactivity, you will also find that you are never quite the same as you were before. You always hold onto some semblance of that strength. Apart from the fact that connective tissue like tendon stays stronger for *much* longer, or that the neural pathways and muscle recruitment will likewise linger for a long time... you also have your satellite cells.

With enough stimulation, satellite cells (a type of glial cell located between the outer and basement membranes of the cell) will be “donated” to the muscle cell. This allows the muscle cell to upregulate protein synthesis.

The reason for this is that muscle nuclei (myonuclei) are responsible for that protein synthesis, with the DNA acting as a blueprint for where the raw building blocks (amino acids) need to go in order to restore and strengthen the damaged muscle fibre after training.

But myonuclei only have a specific “area of effect” also known as the “myonuclei domain.” That is to say that as the muscle gets bigger, it also needs more nuclei in order to look after more area and continue to rebuild it.

What's really fascinating about all this, is that when we stop training, our myonuclei *remain*. This increased myonuclei count seems to last indefinitely in fact! (At least researchers have yet to find the point at which they disappear again.)

That explains why people who have previously been very large, will find it easier to *regain* that muscle (versus gaining it the first time).

This is great news for anyone who is recovering from a setback due to injury. And it's also great to know that all the benefit of our training isn't immediately lost when we stop working out – some of it hangs around and ensures we can grow much more easily in future.

This has led to one somewhat controversial (yet inevitable) conclusion: that a single steroid cycle could be a useful tool for an athlete. The idea is that they would do a single steroid cycle, get as big and strong as possible in order to create all of those satellite cells, and then follow up with PCT (post cycle therapy) to avoid long-term hormonal damage.

The athlete could then reap the benefits of the increased satellite cells indefinitely, reaching greater levels of mass more quickly.

This book does not recommend the use of steroids due to the potential risks that would render you very much *not* SuperFunctional. But what we can take from this is that there may be benefit to chasing after one type of training and then following up with another.

What do I mean by this?

Well consider for a moment that you are interested in training calisthenics and bodyweight moves. These are fantastic for building strength in terms of muscle fibre recruitment, intermuscular coordination, core stability, and more. For various reasons though, it is not *as* effective when it comes to hypertrophy.

So what you might choose to do instead, is to spend a few months using bodybuilding-style “pump training” to facilitate hypertrophy, and then switch to calisthenics. You may find that your body responds differently to the stimulus, and that you build more muscular strength and endurance as a result. This is an important concept in the SuperFunctional Program, so I hope you’re taking notes!

EPIGENETICS AND GENE TRANSCRIPTION

There’s another way in which the results of resistance training “hang around” though. This is through epigenetics, also referred to as gene transcription.

When you train your muscles and subject them to stress, you increase the thickness of your muscle fibres, so that more protein is used to make them tougher and stronger. But the question this should prompt is *how*? What mechanism underlies this change? How does the body “know” to create thicker muscle fibre?



The answer has to do with gene transcription and epigenetics. While every cell contains your full DNA code, only certain elements of that code are “active” at any given time. Thus the DNA is “expressed” differently throughout the body.

One method of epigenetic regulation is methylation. Here, chemicals called methyl groups attach themselves to DNA strands and thereby prevent certain genes from functioning. It’s like having a full alphabet but scribbling out the letters you don’t need to spell a word.

The genes that are active get transcribed when the code is copied into the RNA by an enzyme known as RNA polymerase. RNA is ribonucleic acid and is also found in all cells. It's job is to control protein synthesis using the instructions from DNA. RNA looks like DNA but has one strand rather than two.

So if you're struggling to build muscle, then it could be because some of your muscle building genes have been switched off.

What's really interesting, is that even after you finish training, your muscles "remember" being larger. Even when the muscle loses size, many of the genes remain expressed or untagged by methyl groups, making it easier to return to that larger size in future ([study](#)).

This is yet another example of how we can potentially get around the limitations imposed by the interference principle.

The good news is that nearly everything you do affects your genes in this way. Your exercise, your diet, and even the things you think, all physically alter your DNA. These changes also directly correlate with the amount of activity you engage in. If you train harder and longer, then you will see more alterations in gene expression.

This means that the "lasting benefits" of a short training program don't only apply to muscle, but also to things like dieting, and cardiovascular training. Gene expression is also what enables neuroplasticity and the formation of new neural pathways.

What's also fascinating, is that these epigenetic changes can also hang around *after you're gone*. That is to say, the changes get passed to your children, meaning that your efforts to be fitter and healthier might actually benefit your offspring, and maybe their offspring too!

Interestingly, a few different things can actually impact on the amount of gene expression you experience. Caffeine for example might help to encourage gene expression.

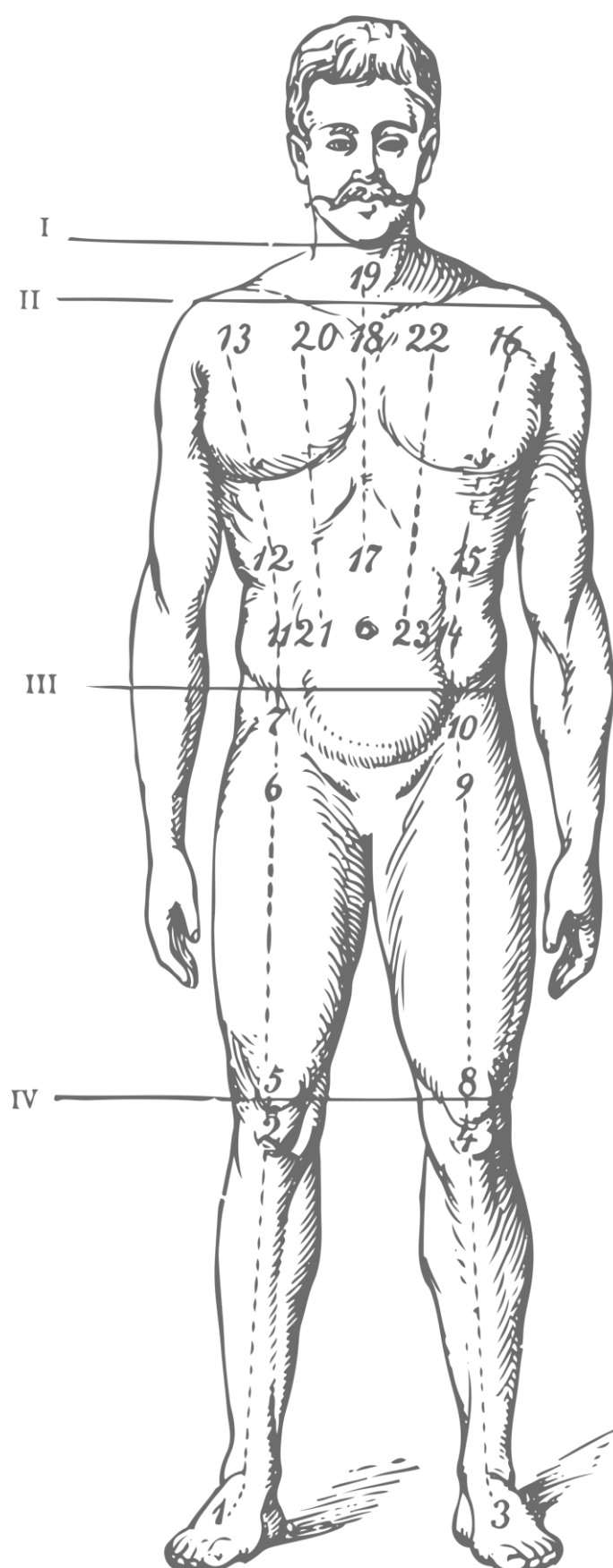
INTER-MUSCLE COORDINATION AND MOVEMENT TRAINING

Let's go back to movement. We had just seen how the muscle contracted in response to signals.

Once *all* of this has transpired and the muscle has received the build-up of tiny contractions in the muscle fibres will result in the entire muscle shortening. It will then pull against the connected tendon, which will pull against the bone to close or widen the joint angle. The point where the tendon attaches to the bone is called the insertion, and this is an entirely genetically-determined aspect of strength: an ideal tendon insertion is one that shortens the lever, thereby allowing you to exert more force more easily.

Nearly all muscles in the body will have an antagonist. This is a muscle that performs the opposite action on that joint. For example, the tricep straightens the arm, while the bicep bends it. When we are standing normally, an equal amount of tension in each muscle helps to keep the arm straight. The same goes for the torso, which is held upright

by equilateral tension between the erector spinae (muscles that straighten the back) and abdominals (muscles that crunch the torso forward).



Meanwhile, numerous supporting muscles will be called into action. The ability of our nervous system to recruit the necessary muscle fibres is also called intra-muscular coordination. Inter-muscular coordination meanwhile refers to our ability to adopt the optimal movement patterns by utilizing lots of different muscle groups all at once.

Very rarely does any movement require just a single muscle to work. If you are in the gym curling a dumbbell in a resistance machine, then this might be the case. However, in any other scenario, you are going to need stabilizing muscles to help keep your body in position at the very least. For instance, a curl when standing up will require you to brace your core to avoid falling forward from the front-loaded weight of the dumbbell. Most movements in the real world are also what we refer to as “multi-joint” movements. An example might be picking something up from the floor, which involves squatting down with our legs, then moving our fingers into position, and then lifting with our arms, legs, and maybe even back. It is the effective coordination of all these joints that allows us to execute such a movement without falling over or injuring ourselves, and while wasting the minimum amount of energy.

This has led to some dispute within the fitness/strength training community. There is a divide between what is perceived as “functional training” and “non-functional training.” We also call the latter “isolation training,” as we are isolating a single muscle group and joint. That said, some critics of

bodybuilding-style training will call some multi-joint movements non-functional too, claiming that we simply never use those movements in real life.

Someone who uses only functional training will tell you that a movement like the deadlift is superior to one like the curl for this reason. The same goes for movements like handstand presses, or even just good-old push ups. These movements are more taxing on the central nervous system, more challenging for our brains, and teach us to use our bodies as single functional units: pushing through the floor with our feet as we explode our upper bodies upward.



While it's true that training this way might translate more to real-world movement, it is a mistake to assume that one type of training is entirely useless. Isolation training has its place as a highly effective method of stimulating a single muscle group to grow. The reason for this, is that by placing all of your emphasis on a single muscle group, you are able to create more muscle damage, more metabolic stress, and more mechanical tension. When you perform a squat for instance, any one of your leg muscles could fatigue and therefore force you to stop lifting. Let's say you lose strength in your glutes first. If this should happen, that would then prevent you from performing any more repetitions, while another muscle – such as the quads – might still have plenty of juice left in the tank. Go beyond this point though, and you risk the breakdown of technique and potential injury.

There is also a risk/reward aspect to consider when considering using a big multi-joint movement with a lot of heavy weight. This is why in the SuperFunctional Program, I generally recommend trap bar deadlifts over traditional deadlifts.

Likewise, it is very hard to achieve continuous tension in any given muscle when performing full-body exercise, or to cause significant metabolic stress. It also doesn't lend itself particularly well to advanced techniques such as negatives (which we'll address later).

That said, isolation training on its own is also very misguided and will indeed result in a less "usable" strength. Moreover, it will prevent the development of many smaller or less obvious muscle groups that *can't* be isolated. Later in this book, we'll be discussing the importance of "forgotten" training and forgotten strength. That means things like foot training, straight arm strength, grip strength, and more. Functional training allows us to train muscles that we didn't even know we had.

In short, functional and isolation movements work best when combined in a smart way.

MOBILITY, TENSION, AND POSTURE

What happens when you *don't* use a muscle group, or a range of motion? The muscle atrophies yes, but other adaptations occur too. In situations where you aren't even practicing the full range of motion, you will find that the muscle-tendon-unit shortens and becomes tighter. Likewise, other muscle groups might be forced to compensate. We may also lose some conscious control over the muscle, as the neural pathways likewise get pruned. The "tonus" (resting amount of muscle fibre recruitment retained to maintain posture) might alter resulting in muscles becoming firm and rigid.

Seeing as a huge percentage of modern people spend a huge amount of time sitting down, this can be a serious problem when it comes to training. Simply put: we are now *adapted* to this posture, which results in shortened hamstrings, weak and elongated quadriceps and glutes, and more. The result is that most adults have lost the basic ability to get into a deep squat without falling over (for those not aware, this means the heels should be planted firmly on the floor at all times).



In remote parts of the world, tribal cultures actually use squatting as their preferred method of resting – and yet most of us can't even reach that position! This should tell you something about just how much of our natural fitness we have lost or fail to tap into. As I said at the start of this book, these changes don't make you "less functional," because they are perfectly adapted to our modern lifestyles. But they do make you less *SuperFunctional* by significantly limiting the movements and performance you're capable of.

Some movement patterns meanwhile actually are "unfunctional." When one muscle group is allowed to atrophy or become overly tight, this can force compensation in other parts of the body in order to move "normally." For example, many people drive through the quads too much when squatting because their glutes are weakened. This actually prevents them exerting maximum strength and can also negatively impact on things like jump height and gait.

In fact, poor posture has led many of us to breathe incorrectly: starting by expanding the lungs rather than relaxing the abs and letting the lungs enter the empty abdominal cavity to fill up from the bottom first. This is a result of being in a seated position for so long and thus being less able to breathe properly.

It can also lead to postural issues. For example, kyphosis is a hunched forward appearance at the top of the spine that results from sitting at a desk and looking down at a monitor. An anterior pelvic tilt means that the pelvic bone is actually tilted forward due to uneven tension pulling it that way. That in turn results in a protruding behind, and even a loss of physical height!



The good news is that this adaptation is predominantly neural: the muscle hasn't physically shortened and thus you should be able to regain much of your lost mobility with training.

There is a distinction to be made between mobility and flexibility. Whereas flexibility describes your ability to get into a position with the potential help of outside force (for example, pushing your leg up against a wall or stretching it over a bar), mobility refers to your ability to get into a position without any external help. The ability to perform a full squat is an example of missing mobility therefore, and flexibility. The same is also true for your ability to bend down and touch your toes.

Flexibility and mobility go hand in hand a lot of the time, but they are not always perfectly correlated.

HOW TO REGAIN MOBILITY AND FLEXIBILITY

So, how do you get back your missing mobility?

The first thing you need to do, is to convince your nervous system to ease off the tension on the muscle and to slightly alter that myotatic stretch reflex. If you completely refrain from moving through a full range of motion, then eventually, your body starts to guard against that range of motion – thinking that it might cause injury. Thus, when you try to perform the splits or a squat, your muscles will tighten up, and this will prevent you from moving further.

This is why Pavel Tsatsouline, author of “Relax Into Stretch,” recommends not just stretching into position and holding it, but also consciously “relaxing” the muscle and trying to be as comfortable as possible in that position. This also requires you not to try and force yourself into extremely uncomfortable positions. Just get into a slight stretch – just beyond the point of comfort – and then “hang out there” for 30-60 seconds. Gently massaging the muscle where you feel the tension is also useful.

Recommended Resource: *Relax Into Stretch* by Pavel Tsatsouline

Another, similarly useful tool, is something called “proprioceptive neuromuscular facilitation.” This means contracting the muscle in order to override the myotatic reflex

intended to prevent injury. For instance, if you try and touch your toes and feel tightness in your hamstrings, you would then try to contract and squeeze for a couple of seconds, and then release and relax. This can help you to get slightly deeper into a stretch and may also encourage the mind muscle connection. Use it sparingly though and stop if you feel pain in the connective tissue.

Keep in mind that this kind of “static stretching” is not recommended prior to training. The reason for this, is that by stretching and relaxing the muscles and tendons, you may actually lose some of the tension intended to help keep you upright. Studies suggest that this makes us slightly more inclined to injury.

Dynamic stretching is safer to use prior to training. This uses momentum to reach a greater range of motion, for just a moment. It’s ideal for limbering up and can work as a form of “supramaximal training” (more on this later) to “trick” the nervous system into thinking those positions are safe. Things like leg swings, high kicks, rotating the arm in the socket etc. are all safe ways to loosen up prior to training. This is NOT the same thing as “ballistic stretching” which involves “bouncing” yourself into a deeper and deeper stretch – which is likely to lead directly to injury and should be generally avoided.

The other way we do this, is by training with a more diverse range of movement. The greater the range of movements you practice, the less the chance of your body becoming too “set” in a certain range of motion. This is a fantastic way to keep both your brain *and* your muscle plastic.

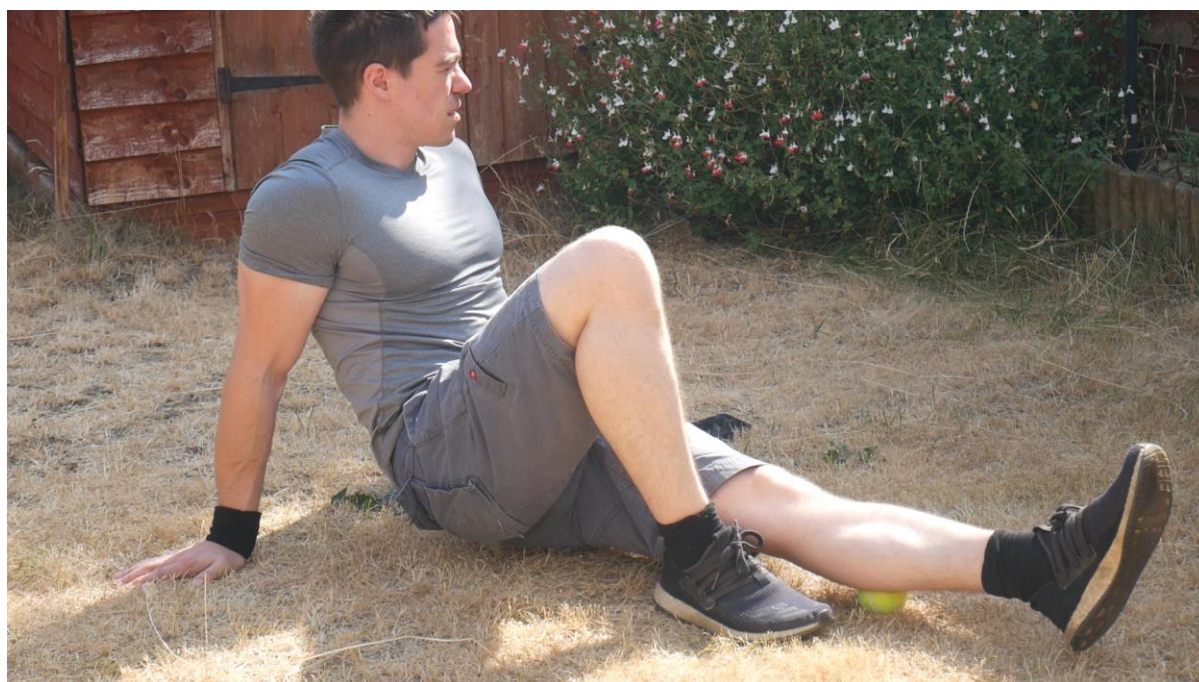
MUSCLE FASCIA

But what if I told you that muscle perhaps isn’t alone in exerting strength? That there may be another force at play when it comes to moving weights: the muscle fascia.

Fascia is essentially a thin wrap that surrounds the muscle, bones, and organs and that has the role of keeping them in place and supporting their movement. When you prepare a raw chicken, fascia is transparent the wrap that surrounds the meat before you cook it.

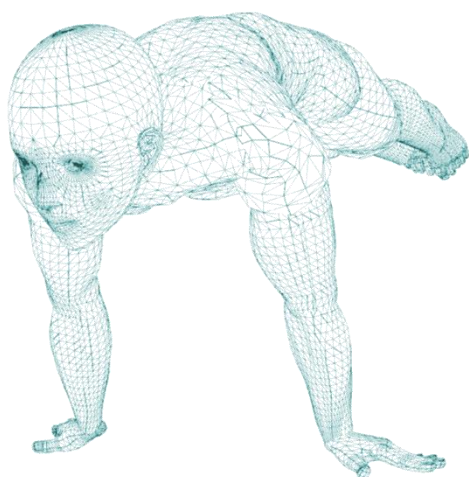
Fascia may also be extremely ancient, and it is thought that it may be an evolution of the membrane that once allowed prokaryote to navigate their environments without any limbs or body parts to speak of. This stuff was once dismissed as inert *muck* until researchers looked closer. Not only does it contain its own smooth muscle cells – allowing it to generate force ([reference](#)) – but it may also contain mechanoreceptors so that it could play a role in proprioception. There have been suggestions that its sensor array might even be denser than that of the human eye!

The muscle fascia has elastic properties, making it useful in providing energy return when using explosive depth-jumping style training. It may have its own logic circuits, allowing it to aid with reflexive movement. It is thought to be conductive, and thereby useful for the “amplification” of signals across the body. And it has even been suggested that muscle fascia might provide some scientific explanation for the concept of chakras and acupuncture. The jury is out on that one.



The danger here is that we make too many logical leaps. Our understanding of fascia is still limited, and so we cannot prescribe specific training methods to help develop it. But here are some things we know:

- Muscle fascia or myofascia is a *single* connective tissue that wraps from the bottom of your feet, right to the top of your head. This is one potential reason that massaging and flexing the bottom of your feet can be so therapeutic in dealing with mobility issues, and seemingly unrelated aches and pains.
 - That said, “structural integration expert” (whatever the heck that means) Tom Myers, claims that we can divide the fascia into five subcategories: the superficial back line, the superficial front line, the lateral line, the spiral line, and the deep front line.
- Myofascia is also called deep fascia. There are likewise two other types of fascia: superficial fascia (just beneath the skin in the subcutis surrounding most of the body), and the visceral fascia which suspends organs.
- Myofascial release is the practice of using foam rollers and tennis balls to try and remove “myofascial adhesions.” We can say with some certainty that this *does not work*. At least it does not in the way that many health experts have suggested. This is because the fascia is actually *extremely* strong – and far too rigid to be in any way changed by a little force applied by a tennis ball. That said, what *might* be going here, is that stimulation of the mechanoreceptors and muscle cells is helping to release tension in the fascia, thereby helping to improve limited mobility. Therefore, a little foam rolling could be useful – especially as an alternative to static stretching prior to training.
 - (It is also possible that the mobility gains seen with myofascial release are actually simply a result of relaxing the antagonistic muscle. Many therapists have now adopted the alternative term “myofascial unwinding.”)
- What most people can agree on, is that fascia benefits from a varied range of motion, which appears to help it remain hydrated, perhaps by emptying out the liquids trapped in the “microvacuoles.” ([Study](#).) Using explosive plyometric training might also help to encourage the elastic property of the fascia.
- The body is absolutely incredible.



file 4: energy

When you begin lifting a weight, running, or balancing on your hands, your muscles require energy. Likewise, when you find yourself faced with a problem, or sitting down at a computer with intent to work for the next 3 hours, your brain will increase its energy demand.

Energy in the body comes primarily in the form of a substance known as adenosine triphosphate (ATP), which is in turn made of three individual phosphates held together by powerful energy bonds. ATP is created from glucose within the mitochondria, and releases energy when its chemical bonds are broken (creating by-products ADP – adenosine diphosphate and one loose phosphate – a three becomes a two and a one). Mitochondria are the “energy factories” of our bodies and are responsible for producing the useable energy within our cells. Fascinatingly, they actually began life as an ancient form of protobacteria, and thus have completely separate DNA to their host humans! In all likelihood, they began as exogenous bacterium with a symbiotic relationship, and eventually became wholly integrated into our biology.



The human body, right?

We can actually increase the health and wellbeing of our mitochondria in numerous ways. They even have a sleep cycle, meaning that they go to bed when we do! When you are jetlagged or low on sleep, so too are your mitochondria. Certain forms of training can also *increase* the number of mitochondria in the body. One of the best for this, according to the science, is high intensity training.

But the mitochondria need energy to function. Where do we get this energy to start with? Food, of course!

Food from our diet is either stored in the muscles and liver as glycogen, or as adipose tissue (fat) around the body. Protein cannot be stored easily, but is used to rebuild muscle tissue and other important materials. Our cells are also able to utilize glucose that is freely circulating in the bloodstream.

How the body makes use of these energy sources is what is really interesting though, and is what we will be looking at in this section.

THE ENERGY SYSTEMS

There are three energy systems by which the body utilizes and creates this energy. These are the

- ATP Creatine or phosphocreatine system
- Glycogen lactic acid system (or just “lactic acid system”)
- Aerobic system

The body uses these in a descending order, with the phosphocreatine being most useful for sudden bursts of short, intense movement (such as powerlifting), and the aerobic system at the other end of the spectrum being useful for sustained periods of activity (such as running a marathon). The lactic acid system sits comfortably in-between, being useful for exercise lasting 30-40 seconds, such as high-rep weight lifting.

The ATP-Creatine System

To break this down a little bit more, first of all, your body will utilize the energy that is freely available in the muscle. This is the nearest energy source after all! There is usually enough ATP stored here to provide around 3 seconds of full-power exertion, but once that is depleted, the body is actually capable of recombining used ADP in order to recycle some of that ATP. It does this with another substance called creatine phosphate. We store enough creatine to provide roughly 8-10 seconds of additional exertion, meaning that we can maintain max output for 13 seconds before being forced to switch to a less “efficient” system, resulting in a slight drop in performance.

Note that this process does not require oxygen, and is therefore considered to be “anaerobic.” This also means that it relies on fast twitch muscle-fibre, which is used for more powerful and explosive movements.

This is why using creatine as a supplement can be so effective: it maximizes the amount of recycling the body is capable of, potentially allowing longer sustained “max output” before switching to the next system.

Lactic Acid System

At this point if exertion continues the body needs to get its ATP from somewhere else and this is when it looks to its stored carbohydrates in the form of glycogen. This represents the shift to what is known as the glycogen lactic acid system.

This system is a slightly slower and less efficient means of supplying energy, which requires the body to split the glycogen first into glucose and then again into ATP. This unfortunately creates a number of by-products called metabolites including lactic acid (from which the substance takes its name). This metabolic build-up creates the uncomfortable, mildly painful “burning” sensation we get in our muscles when we push ourselves in the gym. The body can sustain itself using the glycogen lactic acid system for a further one minute and thirty seconds until this build up becomes too much to tolerate. If we continue to try and push ourselves at MHR past this point, it can lead to nausea and even fainting.



It was long believed that lactic acid was actually responsible for this failure and for the burning sensation. However, more recent research has shown us that lactate is not harmful in itself but rather seems to correlate with other factors that fatigue the glycogen lactic acid system. Thus, high level athletes can still monitor their build-up of lactate in the blood in order to calculate a “lactate inflection point.” (More on this in an upcoming chapter.) With training, it is possible to improve tolerance and thus sustain maximum exertion for longer. This allows you to continue exerting yourself before being forced to switch to the slowest energy system of all.

Aerobic System

This is where the aerobic system comes in, relying on the oxidation of foodstuffs in our mitochondria. In other words, the body looks to our supplies of glycogen (and so ATP) stored in our cells as fat and then uses the oxygen in our blood to break them down and carry them to our muscles. This is then what leads to fat being burned directly. This forces us to breathe more heavily in order to supply the necessary amount of oxygen and it increase our heartrate further to transport the oxygen to the fat stores and then to bring the energy to our muscles and brain.



The aerobic energy system can actually be used indefinitely and will continue until you completely exhaust all supplies of energy located around the body. During a typical prolonged endurance test, you will find you also breakdown protein for energy and even muscle. This in contrast to high intensity exercises that will use 100% carbohydrates for fuel, purely because they provide the quickest and most accessible source of ATP.

Note that aerobic exercise uses the slow twitch muscle fibre, which means it isn't capable of the most explosive or powerful movement. If you were to begin sprinting again, this would force you to return to the glycogen-lactic acid system, until the build up of lactate and other substances forced you to slow down again. The body simply isn't able to utilize the aerobic system fast enough to keep up with your most rapid exertion. Thus, anything above 70% of your maximum heart rate (MHR) is going to include a switch to the anaerobic system.

This is the main concept behind high intensity interval training, which we will learn more about shortly.

VO2 MAX AND MORE

So far, we have seen a few ways that we can improve aerobic fitness through a better understanding of our biology. We can increase the amount of creatine for example, so that we can stay longer in the ATP-CP system. We can also boost our lactate threshold in order to last longer in the glycogen lactic-acid system.

But there are other less obvious options too. For example, increasing your lung capacity can potentially help you to last longer in the aerobic system. By allowing you to bring in more oxygen, this means that you can transport more useful energy around the body. Increasing the stroke volume of your heart (the amount of blood circulated around the body by every pump) also has a big effect.

With the popularity of High Intensity Interval Training (HIIT), many people have been all-too-eager to write off steady-state cardio or low intensity steady state (LISS) altogether. In fact, this form of training is particularly good for the heart, and is able to significantly strengthen and enlarge the left ventricle (the side responsible for delivering oxygenated blood to the muscle).

Hormones and the vascular system also play a big role. When we engage in physical exercise, the parasympathetic nervous system kicks in to deliver oxygen and blood where it is needed. It does this by expanding (dilating) and contracting (constricting) the blood vessels in order to create pressure differentials. Do a whole bunch of curls, and you'll notice that the blood vessels on your forearms begin to rise to the surface and increase in size. Meanwhile though, the blood vessels around your digestive system will be shrinking, thereby redirecting blood away from those peace-time processes. Bringing blood to the surface, while also increasing perspiration, and also methods that will help to keep the body cooler as you create lots of heat energy as a by-product of physical exertion.

Actually, temperature control is one of the lesser talked about aspects of endurance. This is why wearing cold wristbands can actually greatly enhance performance in these kinds of tasks. Training outdoors, using pump training, and other aspects of the SuperFunctional Program will develop this. I got you.

The lungs themselves can be trained, as can the intercostal muscles that live between the ribs and allow us to expand our rib cage. All of this will be discussed shortly.

File 5: advanced physical training

Now you have a far more complete and scientific picture of how the entire brain and body work together in unison. This gives you an advantage over the average gym goer, but you still need to actually put all of it into practice.

The problem is that so many people train only the *obvious* aspects of their strength and fitness – the things you read about all the time. We train our abs, our biceps, and maybe a little bit of flexibility and cardiovascular fitness.

And we act as though this can undo the damage caused by years of sitting fixed in one position, years spent feeling stressed and anxious, years of poor sleep, years of no learning...

In order to become SuperFunctional, we need to go beyond the bare minimum and train in a way that will take *all* these concepts into account. It is not enough to train strength in a few select muscles. We want to train our brain plasticity, we want to train our attention, we want to train fascia... We want grip strength, straight arm strength, and more.

Fortunately, I have spent the last 10+ years researching obscure training methods, warrior cultures, online subcultures, and the latest research. This stuff is very much out there, and because a lot of it *overlaps*, we can incorporate it all into a program without too much challenge.

Here are some of the techniques you'll be employing in the SuperFunctional training program, based on that broad understanding of biology.

MOBILITY

We need to train our mobility in order to restore much of the lost movement and limited range of motion that is a symptom of our modern lifestyles. The techniques we will be using are a combination of:

- Static stretching with proprioceptive neural facilitation (used as part of a separate mobility routine)
- Dynamic stretching and/or myofascial “unwinding” prior to exercise
- More varied movements during our training routines

PROPRIOCEPTION AND INTERMUSCULAR COORDINATION

We also need to train our proprioception. We will achieve this partly through active balancing and movement training. Other training methods in this section though will also have beneficial knock-on effects for our proprioception.

Common advice is to practice such things as balancing on one foot, then to listen to the lengthening and the shortening of the muscles.

That's good and well, but is more useful for rehabilitation and maintenance. It's not going to help you move like Spider-Man.

For that, I recommend trying more ambitious balancing movements such as sissy squats, one legged calf raises, and hand balancing. A handstand requires a lot of feedback from your arms and core, and few people actively train the upper body in this manner.

SENSORY DEPRIVATION

As you become more confident, I also recommend attempting some of these with your eyes closed. Doing this will allow you to remove some of the distracting data from other senses, thereby allowing you to focus exclusively on the information you are getting from your body. Try to picture yourself in space, and to feel the tension in every muscle and the position of every joint.

This can also help you to turn your training into a form of moving meditation. This will help you to train your focus, and to gain more control over your stress response.

CONTRALATERAL TRAINING

The bilateral deficit tells us that we are capable of producing slightly more strength from a single arm or leg when using it alone, than we can when using both sides together. The generally accepted reason for this is that it comes down to neural drive: focusing our attention on two limbs effectively reduces the amount of effort that goes to each. This means that, all other things being equal, you should be able to generate more power from each arm during concentration curls than you can during barbell curls.

This also has the added bonus of ensuring that both sides do equal work, thereby addressing strength imbalances and improving symmetry – ironically!

The downside of this of course, is that unilateral (single limbed) exercises take twice as long as bilateral exercises. The answer is therefore to use alternating exercises instead.

And there's another benefit to training this way too. That is, when we train either limb, it actually has some knock on effect in the untrained limb. That is to say, that if you perform curls with your left arm only, you'll actually get stronger in your *right arm* too. Specifically, your right arm will enjoy roughly 50% of the strength gains seen in the left.

This is known as the “contralateral strength training effect” or “cross education.” And it means that if you train using alternating sides, you may effectively increase the volume for each limb. At least in some ways. It also provides an interesting option to reduce loss of strength due to injury.

What if, instead of using your left and right limbs in an alternating manner, you had them doing entirely different things? This is what is sometimes referred to as contralateral training, and it's actually a fantastic way to improve your athleticism and your proprioception in particular.



The left and right limbs are linked in the brain due to the number of tasks we perform that involve coordinated movement between the two sides. And from an efficiency standpoint, it of course makes total sense for the body to “cheat” by controlling the limbs in tandem using largely reflexive strength and deeply in-grained movement patterns. If one limb mirrors or opposes the other, then you only need to send one set of instructions. Opposition is the word we use to refer to movements like walking or crawls where the limbs move in an alternating fashion.

And so, moving limbs completely out of sync is actually quite hard to coordinate without practice. If you ever tried patting your head with one hand and rubbing your tummy with the other, you’ll know what I mean.

This simply requires more conscious effort on your part, as you essentially split your awareness into four rather than into two (or one). The potential performance benefits of being able to concentrate on all four limbs and move them freely in space though is huge.

When we constantly use limbs in conjunction for certain movements, the neural maps become linked (remember: what fires together wires together). Eventually, they can become fused to the point that we *can’t* individually move one side. This is why some toes can’t be moved independently!

Training with each side separately will literally provide more independent networking for each side, helping you to gain more dexterity and freedom of movement.

This also tends to involve moving the limbs into unusual positions that lengthen the lever arm and remove some of the support structure provided by the torso. In short, this challenges your strength in unique and extremely difficult ways, helping make you more prepared for a range of situations.

You might also have heard that the right side of the brain controls the left limbs and vice versa. The nerve connections run in an X shape across the core, connecting these two sides. And that’s also why we swing the opposite arm when we walk.



This is why contralateral movements that “cross the midline” are potentially so good for us. It’s like ambidexterity training with weights!

Anatomically, the left shoulder is also linked to the right hip and vice versa. We see this when we run, walk, or throw a ball – just think about what the opposite limb is doing!

When we train with cross body exercises that move across this midline, we also strengthen the core in this manner. This type of training will introduce offset loads and thereby force us to use our obliques to resist torque and stabilize ourselves.

A lot of this stabilization occurs unconsciously in a reflexive manner. Lift something heavy on one side and the muscles on the other side will brace automatically. By developing this further, you can increase your balance, and stability – becoming impossible to knock over.

FOOT STRENGTH/CONTROL/BAREFOOT TRAINING

Right behind proprioception must necessarily come foot strength/control. Our feet are extremely important sources of proprioception, and so much more.

Were you to go for a run in the woods with bare feet, you would find that they would bend and contort over the shape of the ground underneath. Your toes would splay over rocks and branches. Your feet are mobile and flexible, and this would help to prevent falls and trips. Conversely, when running with a thick sole, your foot is essentially balanced on a thick platform-like wedge. Step on an uneven surface and the entire foot will tip.

What's more, is that shoes prevent you from realizing the ground isn't straight until too late. Our feet *should* be able to provide us with useful information about the ground, which in turn can help us to adjust our stance in real time – using those rapid monosynaptic connections.

It also provides that information *consciously*. When I first tried a pair of Vibram FiveFinger Shoes, I was absolutely blown away by how my feet could now *wrap* around railings and branches allowing me to effectively grip them and to feel precisely how centrally I was balanced.

I wear “minimal shoes” all the time now. This gives me more confidence – makes me *literally more sure-footed* at all times. It means that when I am carrying my baby down the stairs, I can feel precisely where each step ends so I *know* that I'm not going to fall.

It has been speculated that elderly people who fall a lot might do so *far less* if they spent more time bare footed. The problem is that when you spend all your time in shoes and slippers, you essentially “cut off” all this crucial information. It's almost like losing an entire sense. Walking around a bit at home in barefeet is not enough to restore all of that lost neural matter – it has atrophied from a lack of use. To get it back, you need to spend a *lot* more time barefooted, on *interesting* terrain, and while actively listening to that information from your feet.



In fact, it has even been suggested that this practice could help to *slow* some of the lost balance and even the cognitive decline seen in aging. An interesting theory is that one cause for dementia, Alzheimer's, and even normal age-related cognitive decline, is a reduction in sensory input. As the senses begin to fail, the brain has *less information* coming in. This in turn means that it has a lower cognitive load at all times... and if you don't use it, you lose it! It's just one factor (and my deaf Granddad is incredibly switched on in his 90s), but it's certainly an interesting theory – that as you become shut off from the outside world, so too does your plasticity and eventually your reason begin to fail you.

Listening to that information from your feet can *compensate* for the loss of other senses. And it might help to provide an opposite effect – providing MORE information, in order to offer you a massive cognitive boost.

And that's before I've touched on the benefits of being able to *use* your feet athletically. Barefoot, you have the ability to literally *grip* the ground with your toes, and to use them to absorb impact when landing.



That latter point has been used to explain why indigenous tribes such as the Tarahumara people, are able to run 10-30 miles daily without seeing damage to their knees. By running barefoot, or in very slim sandals, they are more likely to use proper running technique that involves landing on the ball of the foot so that the leg can compress like a spring. This is opposed to the heel-first running that most of us practice thanks to decades of wearing big shoes. This gait misaligns the centre of gravity away from the knee, resulting in zero shock absorption. Ironically, the more “supportive” a shoe, the more damage it will do in the long term.

Running barefoot *forces* you to use the correct technique, and it gives you the tools to do it.

Suggested Resource: *Born to Run* by Christopher McDougall

And did you know that your toe flexors – such as the flexor hallucis longus which connects to the big toe – respond to direct training and aid with plantar flexion (downward force into the ground)? That muscle in particular has been described as the “bridge” between the powerful muscles in the leg, and the ground. You’re only as strong as your weakest link as they say! And studies ([study](#)) show that *specifically* training this muscle can result in significant performance gains in jump height, running speed, balance, and more.

Meanwhile, it is the job of the flexor digitorum longus (connected to the four smaller toes) to help support the arch of the foot. This may help us to make better use of our glutes specifically during movement, resulting in bigger squats and springier athletic performance all-round.

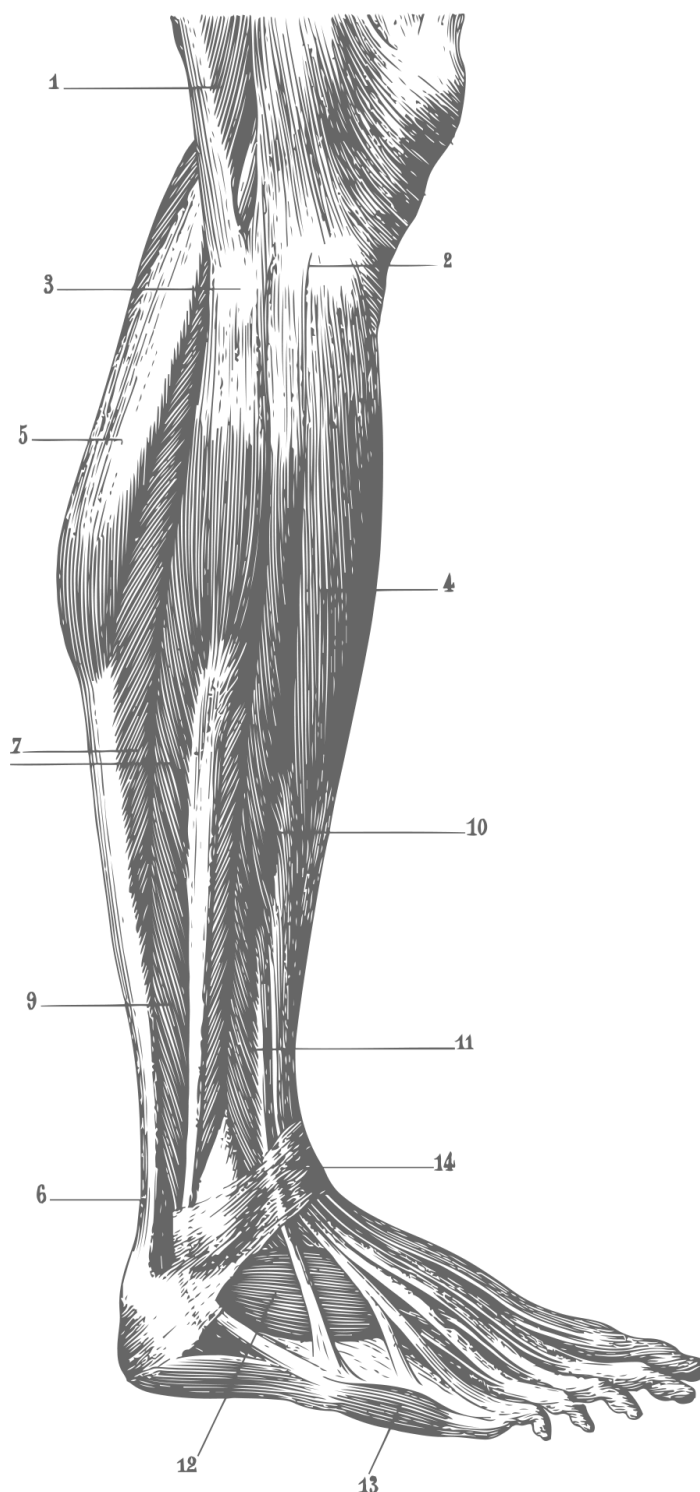
Training barefoot might EVEN provide some massage benefit for the fascia. Remember how your muscle fascia is connected from your feet all the way to your head? And how that fascia benefits from movement and potentially pressure in order to stimulate mechanoreceptors? It has been suggested that running barefoot could help to release a lot of tension that many of us carry around. There is a reason that a foot massage feels so good, and standing on the grass and feeling different pressure points around the sole of your foot is the next best thing.

Some people even suggest there is a “grounding benefit” to be had from going entirely barefoot. Again, the jury is out on that. But who knows? The point is that we evolved to move barefoot. And doing so is like coming home for our bodies and athletic performance.

The answer then? Train barefoot when you can. Invest in minimal footwear (that means something with a thin sole, wide toe box, and small or non-existent heel-to-toe drop), and be mindful when actively *listening* to your feet, or purposefully engaging specific foot muscles during training.

Be careful when introducing yourself to barefoot training. Go out sprinting on concrete immediately and you WILL injure yourself (I did). Instead, try being barefoot while playing in the garden. Invest in minimal every-day shoes, and gradually ease yourself into it. It will be a while before you’re running long distances with no footwear at all, but that is just fine.

Note: You also need to be realistic about the times we live in. We were not meant to run barefoot on concrete, and nor were we designed to survive shards of glass to the foot. That’s why minimal footwear > barefoot for urban environments. Be smart.



HAND STRENGTH AND GRIP STRENGTH

When it comes to unlocking maximum strength and physical performance, grip strength is one of the worst-kept secrets. Nearly everything you push, pull, or balance on is routed through your grip, and thus it often ends up being the “weak link” that lets you down if not properly trained. Grip training will improve everything from your ability to lift a heavy weight overhead, to your ability to stand on your hands for long periods of time.

This was well known by the old-time strongmen, who reportedly used grip training as one of the main strategies for wowing audiences. They would reportedly use wide bars for many of their stunts, knowing that if someone from the audience came up to attempt the feats they had seen, they likely wouldn’t be able to hold the weight properly to begin with!



And did you know that there is a positive correlation between grip strength and general health/life expectancy? This isn’t necessarily a causative relationship (meaning that both might – for example – be the result of heightened testosterone). However, it is still largely believed that increasing grip will improve your health overall.

Not to mention presenting amazing potential for climbing, grappling, and busting open jam jars. Check out the “Human Monkey”, Jyothi Raj, for an example of someone who defies gravity in seemingly superhuman ways, thanks to their insane grip strength.

So how can you train your grip? Rope climbing is one of the best methods there is. If you don’t have a rope to hand, then you can alternatively use towels by hanging them over a chin up bar and then gripping onto the material in your fists.

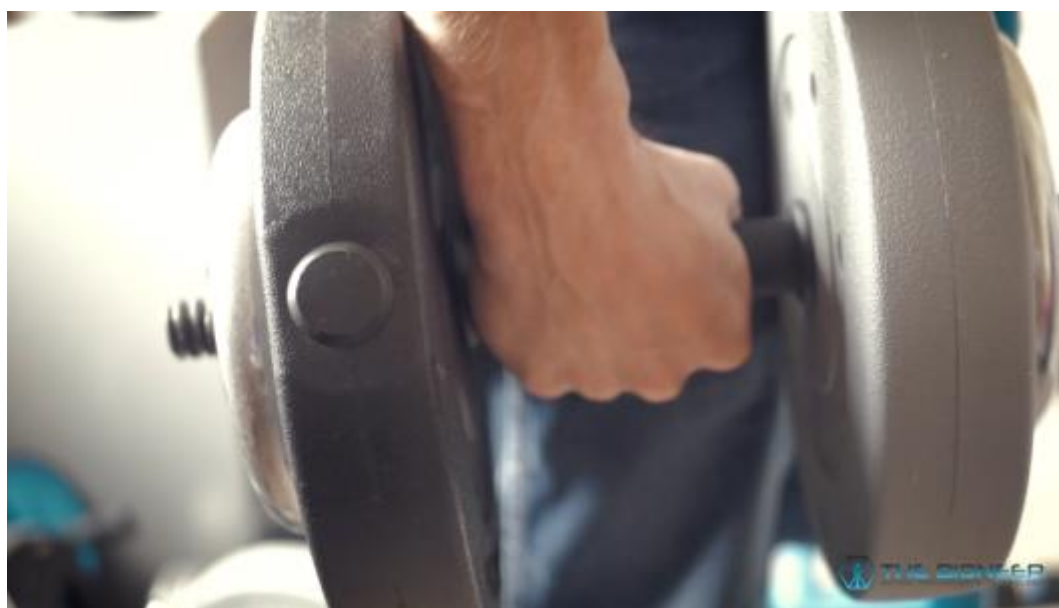
Using wider grip bars when curling weights is also a very good idea, as is hanging from your fingers when performing pull ups or dead hangs. Grip trainers also have a place, especially when used during “incidental training” (more on this soon). Simply gripping harder when holding weights or even a steering wheel can help too.

We can also train the fingers individually, by using finger push ups, or hang boards.

The Navy SEAL Physical Fitness Guide recommends finger press ups as a way to build hand and forearm strength, and suggests reducing a finger at a time as you get stronger. Eventually, you might be able to perform Bruce Lee’s two-finger push up!

Little Finger Strength

Did you know that the ulnar digits (two smaller fingers) are responsible for 34% to 67% of total grip strength?



This is something that was well known by samurai. Reportedly, if a samurai were defeated, their opponent might have cut off their little finger – knowing it would have the most detrimental effect to their ability to hold and fight with a sword.

Why is this? Well, the ulnar digits are controlled by a separate muscle called the flexor carpi ulnaris and the ulnar nerve.

This power is not available in isolation though. The way in which the little finger provides its power is by working in tandem with the other fingers, such as the ring finger, middle finger, and thumb. Think about it: the thumb is an “opposing thumb” because it is *opposite* the little finger. And when you clasp the thumb over your fist, you create a tidy closed loop.

Think about the position of your grip when training – meaning the way you use your thumb and fingers together. In particular, wrapping your thumb back around and over your fingers when lifting weights or hanging from rings or a bar, will help bring your wrist and pinky into a stronger position by closing the loop and acting in opposition to the thumb.

Likewise, simply changing the position of a single finger – moving the knuckle of the pinky finger on top of the bar during a pull up for example – can alter the muscles

primarily being worked. In this case, you'll increase lat activation. When you train farmer's walks, try bringing the pinky finger *under* the handle of the weight to increase flexion in the wrist. This will train grip more effectively than if you give no thought to the position of the fingers and wrists.

Training wrist flexion is extremely valuable in order to avoid injury when performing difficult movements such as the muscle up and rope climb. Also: try to make sure that you train with a pronated and supinated¹ grip equally, in order to avoid imbalances.

Finally, be very careful not to injure your little finger. And if you should bend it backward during sports, spend some time recovering before you lift anything too heavy over your head!

SINGLE LEG STRENGTH

Vertical jump height might be one of the main tests of athletic prowess, but how often do you actually use it in any kind of sport or competition? More often than not, we're taking running jumps. That in turn means that we launch off of *one leg*. Likewise when running, we spend very little time on two legs.

And sure, you'll improve both these things by squatting – but only to a point. Imbalances will inevitably appear meaning that you'll have greater thrust from one leg than the other (my right leg was recently actually significantly heavier than my left!). You might also find that it's harder to balance on one leg and therefore to exert maximum force without practice.



Not only that, but the neural drive that generates power from a single leg is actually different from the way it engages the legs bilaterally. Remember the bilateral deficit ([study](#)) – the observation that we can generate more than 50% of our max bilateral strength from each single leg. That means, for example, that you might be able to leg press 100KG with both legs and 60KG with either leg on its own.

¹ Supinated means under-hand. You can remember this as “how you would hold soup.” Supinated.. soupinated... you get it.

Suffice to say that taking the time to train your legs individually is an effective way to increase your explosive power, your running speed, your jump height, and your strength with either one or both of your legs. You'll improve your stability too, and significantly decrease your likelihood of subsequent injury (just make sure to ease yourself into the routine I'm about to share and listen to your body).

And what's handy is that when we train each leg individually, the challenge ramps up significantly. This makes it easier to create challenging leg workouts that we can perform at home without a power rack or heavy barbell. It also makes the training more fun and enjoyable that *just squats* all the time.

CORE TRAINING

There is a lot more to core training than sit-ups. In order to train the core properly, you need to recognize that it is in fact made up of many smaller muscles. These are the: rectus abdominis, transverse abdominis, obliques, and erector spinae. Let's dive into how to train each of these areas in a little more detail.

Rectus Abdominis: The muscle that most of us think of as the "six pack." Contrary to appearances, this is actually just a single sheet of muscles that is split into segments. It is split vertically down the middle by the linea alba however, so you can contract more on one side or the other with training.

The main role of the rectus abdominis however is to pull your body forward. This way, it acts antagonistically to the erector spinae (back muscles) to prevent you from snapping over backward. Every moment you aren't leaning back on something, your abs are working in tandem with the back to keep you upright, which means they have a lot of slow twitch muscle fibre ([study](#)).

What surprised me when I spent almost a day attempting to backflip though, was just how much my rectus abdominis burned afterward. And it's *obvious* really: when you backflip, you bring your knees up to your chest and curl. This is the most important part of the movement and should provide the momentum to spin you through the air. If you lack core strength, you won't be able to generate that spinning motion.



There are two problems with many people's approach to training their rectus abdominis. One is that they often aren't targeting the right muscles at all. Perform a hanging leg

raise and you might be tempting to fold your body at the waist. The same goes for sit-ups. Doing this won't actually train your abs at all, but will rather train the hip flexors. In order to train the abs, you need to crunch the stomach to thereby bring the legs up. One of my favourite ways to train the abs is to perform leg raises like this to failure, then to switch immediately to frog kicks (bringing up just the knees) making sure to really focus in on the crunch movement. Better yet is to try the myotatic crunch as described by Tim Ferriss in the *Four Hour Body*. This is a crunch performed over a bosu ball in a semi-arch position. That allows the rectus abdominis to work through its full range of motion, rather than just crunch halfway up. Also useful is the pike pulse, which helps to train more of the ROM that often gets missed.

Recommended resource: *The Four Hour Body* by Tim Ferriss

The other issue is that most ab training is high rep with low resistance. This is partly out of fear of injury, though as long as you build up slowly, it is perfectly safe to crunch against weight. Remember: your abs work *all day* holding you up. They're perfectly fine when it comes to endurance. If you want to increase agility and power, you need to add back in some fast twitch fibre. For this reason, holding weight between the knees during frog kicks is even better. The kneeling cable crunch is another great one. Again, make sure the fold is in the stomach, not the hips. I've been practicing performing leg raises in a more explosive manner, almost as if trying to backflip, and it has made a huge difference. Likewise, training with some explosiveness by bringing the knees up quickly is also a good way to get more rapid motion in your upper torso.

Transverse Abdominis: The transverse abdominis is often described as nature's weight belt. It lives underneath the rectus abdominis and wraps around the mid-section keeping it tight and flat. This provides stability and allows you to keep your trunk even more rigid when necessary – making movements like the front lever and the planche possible. It also helps to prevent injury AND it brings your stomach in nice and tight so that those abs look flat as well as defined.



Any exercise that keeps the body as a rigid plank will help to train the transverse abdominis. That includes the plank, the planche, and the front lever. Better yet is the hollow body hold. This is a movement from gymnastics that involves lying on your back

with your lower spine against the ground, bringing your belly button in toward your spine, tucking your chin, and depress the shoulders by pointing the hands forward. Eventually you can progress to having your toes pointed and arms pointing behind you, but always with your lower back in contact with the ground. This will develop the kind of rigid plank like body that will give you greater control in almost *any* movement.



Erector Spinae: The erector spinae are the muscles along your spine that allow for extension of the spinal column. In other words, they allow you to bend backward, while also keeping your back upright acting as a counterbalance to the rectus abdominis. They're crucial if you want to be able to perform a back handspring by whipping your hands back, and to avoid injury during a vast range of exercises. The erector spinae exercises everyone knows is the roman chair or superman. The deadlift will also work them, and particularly the straight legged deadlift. Christopher Sommers from Gymnastic Bodies is a huge advocate of the Jefferson curl – though you should approach this with caution and build up to heavier weights slowly.

Just make sure that if you're hitting the abs hard, you also do enough for the erector spinae.

Obliques: Finally, we have the obliques. These are divided into the internal and external obliques, and their job is to help keep the spine straight by bracing against resistance on one side, to bend sideways, as well as to power twisting movements. To turn left, you will contract the left internal and right external obliques. They are what provide the detailed striations on either side of the six pack when your abs get really ripped.

Obliques get ignored, which is absurd when you consider just HOW important they are. They are not only crucial for kicking, punching, throwing, and grappling, but also for anything that involves twisting in the air – b-twists, aerials, side flips.



So, perform these movements during your training. That means oblique twists (woodchopper), cable resistance punch-outs, side plank twists, hanging leg twists, bicycle crunches, the palloff press, and the bear crunch. Make sure to also train the external rotation of the shoulders if you are doing a lot of cross body movements though, as you otherwise risk rounding the upper back. Oh also, just punch and kick a *lot*. Martial arts training and heavy bag work will build explosive power and torque that translates extremely well in martial arts, gymnastics, and more.

You should also incorporate some off-set loading exercises and unilateral (one sided) exercises. That might mean loaded carries such as the suitcase carry with just a single weight in one hand, or it might mean one handed overhead presses. This will force the core to brace against the load to keep you stable. Old-time strongmen knew the importance of this kind of strength, and as an added bonus it will help make you *impossible* to push over. More on this in a moment.

STRAIGHT ARM STRENGTH

Calisthenics athletes spend a lot of time developing straight arm strength by building the scapula muscles and the rotator cuffs. This allows them to stabilize their shoulder joint, in turn transferring more energy to the ground or bar with a straight arm. That in turn enables moves like planche, iron cross, mana, front lever, and the maltese.

By training straight arm strength, you can become more efficient in all pulling and pushing movements. This is true to the extent that many people anecdotally report seeing huge cross over into their bench press and other lifts. So how do we incorporate this?



First, we need to build up tendon strength. As we saw earlier in this book, the tendons respond more slowly to training than does muscle and requires longer to recover, due to limited blood supply. Whereas muscle will begin responding to training in as little as eight days, tendon can take up to two months to show initial structural changes. The danger is that our muscles run too far ahead of our tendons, leading to a serious injury.

When you perform a straight arm move, you place a huge amount of strain on the biceps tendons and elbow joint, which is why gymnasts have such huge biceps. So, before you go attempting these more advanced moves, it is crucial to build up a foundation of tendon strength by using supinated support holds on the rings (balancing on gymnastics rings with hands turned out), and/or rings-turned-out push ups, or at least push up variations like the pseudo planch that will place the arms in a similar position under lighter load. In short, practice having your arms locked out and supinated with lighter loads for a while before you start progressing to more difficult moves.



Many of these movements are isometric holds, unless you add a pressing movement. Generally, the way to progress is to start with an easier variation – say tuck planche or tuck lever until you can hold that position for a whole minute with good form – elbows locked out and scapular protracted (meaning your shoulder blades are forward so that the top of your back looks rounded). Then you can move on to attempting the more difficult progressions. This book comes with a comprehensive guide to bodyweight exercises, which includes numerous progressions building up toward planche. You'll find positions of increasing difficulty that start simple and become extremely advanced. By the time you're performing these more elite movements, you'll have developed devastating control over your body and incredible stability and power.

There are other ways to progress in calisthenics too. Supramaximal training is training that helps you to perform movements that you couldn't normally, either with assistance or with momentum. An example of this might be a negative one armed pull up – jump into the position and then slowly lower yourself, an assisted pull up, or perhaps swinging your legs up into planche and holding it just for a second on the parallel bars.

These movements are incredibly taxing for your central nervous system, so they should be placed at the beginning of your workouts – treat them like you would compound movements when weightlifting.

That said, the isometric nature of many calisthenics progressions means they're likely to cause less muscle damage or inflammation, which means that you can occasionally practice some of the progressions throughout the day to help 'grease the groove'. There's nothing to stop you from trying a crow pose for 30 seconds while you wait for your computer to boot.

EXPLOSIVE TRAINING

Explosive training is training in order to become more explosive. This means training "starting strength," which refers to the amount of power you can quickly exert right at the start of a movement. Partly, this means increasing the number of type 2b fibres (super fast twitch fibres) by converting them from type 2a. At the same time, it also means improving technique AND increasing muscle fibre recruitment.

For many of us, normal weight lifting does not incorporate enough *explosiveness* to really challenge the type 2b fibres – type 2a will do just nicely (unless you do a lot of Olympic lifts). To really challenge the body to be explosively powerful, you need to train *in* that manner. One way to do this is with plyometric movements – exercises like box jumps and clapping push ups that challenge you to really *explode* into the motion.

Likewise, you can also perform other bodyweight moves with more explosive intent. When performing a pull up for example, you might choose to pull yourself up explosively as if trying to pull yourself past the bar and launch into the air.



Conversely, if we wanted to increase our endurance to create more Type 1 muscle fibre, then we would do so by using higher rep ranges. This would increase the number of mitochondria in the cell and surround it with more capillaries.

The other strategy for creating more 2b and better muscle fibre recruitment is to use '**speed lifting**'. This means performing a set of exercises as quickly as possible. This effectively means performing weight lifting with that same explosive intent. So instead of having a 2-1-3 cadence (two seconds on the concentric portion of the movement, one second pause at the top, three seconds down on the **eccentric** portion – the part where the muscle is being stretched and the weight is usually being lower), you now have a 0-0-0 cadence. Now you are training for force *and* velocity.

Note: Keep in mind that exercise that is too explosive and light will not lead to hypertrophy, though it might encourage type conversion. Why is that? Because the time spent where the filaments are in contact is too short, and there is not enough stress to cause any damage to the muscle. With heavy enough weight however, these issues are mitigated.



What is interesting here, is that although the movement is slow (against the resistance), because the *intent* is fast, this changes the firing and recruitment pattern – thus it trains explosiveness. You can use visualization to aid with this intent. For example, when pressing a weight, imagine that you are trying to launch it through the ceiling (while of course not actually letting go of the bar!).

This also develops something called the “rate of force development,” which refers to the speed at which you are able to generate large amounts of power.

Also interesting, is the notion of training explosive movement in the upper limbs and elsewhere. This is something we often don’t see, and instead the emphasis is on explosive jumping etc. Training this kind of upper body speed can be described as training **quickness**. Note that this works well for punching when using resistance bands (placed behind the arm and wrapped around the knuckles).

Another interesting consideration, is whether the resistance is constant or not. In most cases, it will not be – which is where using cable machines might be preferred.

Bruce Lee actually used this type of training and would perform a relatively standard “bodybuilding routine” but with an added element of speed and explosiveness. Bruce Lee quite likely had more fast twitch muscle fibre in his upper body than pretty much anyone – hence his alleged ability to steal a coin from your palm and swap it for *another coin* before you could close it. Which might be true, you never know!

The SAID principle is never broken (Specific Adaptations to Imposed Demands). Simply put: to jump higher, practice jumping high. To create more explosive strength in the upper body, use explosive movements like the snatch. Or take up bouldering and perform lots of dynos (hang from a good handhold and then propel yourself up the wall with just your arms).

Another personal favourite of mine are calf jumps, where you launch off of your tip-toes without bending your legs. Squat jumps will do something similar.

90% IRM TRAINING

But speed training isn’t the only way to become explosive.

Yes, explosive bodyweight movements work as long as you perform them in an explosive manner. This is because in terms of initial muscle fibre recruitment, the body will treat speed and resistance the same – it's all about rapidly applying force.

If you wish to do the same thing with weight, with the squat or the bench press for instance, then you need to use enough weight. We've already seen that you can use "speed training" to recruit more muscle fibres but the same thing can also be accomplished by using heavier weights – as far as the body is concerned the explosive force needed for lifting a heavy weight is no different from that used to launch you up into the air, or to curl very quickly. Force, is force, is force.



This is preferable to using speed lifting in some cases – such as when the movement is highly complex and requires more careful precision. Moreover, training with an extremely heavy weight can also train other aspects of performance, such as increasing the *max* strength.

But how heavy is heavy?

Specifically, you need to observe the rule of 90%, which is to say that you should challenge yourself with 90% of your one rep max in order to recruit the larger, more explosive type IIb muscle fibres.

BUT you also still need to lift the weight in an explosive way. Having the heaviest squat does not necessarily ensure the best vertical jump because you might not be able to call on that power as fast as is necessary to launch yourself off the ground. This is why 90% is preferable to 100% – because for most people the speed of the lift will decrease at this point significantly.

When lifting heavy weights, attempt to explode through the start of the movement, and lower more slowly to extend your time in the eccentric phase for building max strength.

This brings us nicely to the next technique...

ACCENTUATE THE NEGATIVE FOR EXPLOSIVENESS

But there is another more surprising way to train for explosiveness too.

Another way we can categorize strength is in terms of the portion of the movement:

- Concentric
- Isometric
- Eccentric

Concentric strength is the contractile strength: the positive strength or our ability to curl the weight up in the first place.

Isometric strength is static strength. This is the ability to hold a weight in place without moving through the range of motion.

Finally, **eccentric strength** deals with the negative portion of the movement. This is the part where we lower the weight and where the muscles lengthen again – it is our eccentric strength that allows us to handle this in a controlled manner. This is the force you are capable of exerting while muscle is elongated, which happens to play a critical role in our explosive power.

This is because our muscle essentially works like a spring, to store energy while it is stretched. That is why before we jump, we usually squat down slightly first. Likewise, before we throw, we normally pull our arms back first. The reverse punch in karate starts with the fist pulled back at the hip and twisted to face the ceiling. That stores potential energy.

And when you then launch yourself up in the air or throw that punch, the stronger the muscle is in the elongated position, the more energy it stores and the greater your power output.

There are other reasons to train eccentric strength too. For one, this kind of training allows you to lift much heavier loads – your eccentric strength is up to 1.75 times greater than your contractile strength. Eccentric training even appears to encourage recruitment of more muscle fibre.

Interestingly, eccentric training is also good for flexibility *and* can be used for injury correction.

Suffice to say, that eccentric training can increase explosive power. And I've heard testimony from many fitness coaches who have used this kind of training to help their athletes jump higher, hit harder and run faster.

To use this kind of training, you can try what are known in bodybuilding as negatives. More on this shortly. These exercises involve lifting a weight that is too heavy for you and then lowering it very slowly. You might do this by using a spotter, by using a free arm (for unilateral movements) or by using machines.

SHOCK TRAINING

Want to go even further beyond? Then how about incorporating depth jumps and '**shock training**' into your regime?

The idea is that you train in such a way that the body is required to absorb shock and then return that energy in an explosive manner. The best example of this kind of training is the depth jump. Here, you jump from a short height (around 42 inches for maximum benefit) and then you land and spring back up spending less than 0.2 seconds on the ground. Higher heights can also be used but not until the athlete is able to squat 1.5 times their own body weight – as shock absorption from a drop of >42" may be three or four times the athlete's bodyweight!



This move requires sudden eccentric strength in order to absorb the impact. This triggers the myotatic reflex, described in an earlier chapter, and allows the individual to rebound. That causes the individual to be able to jump much higher than they would be able to off the ground. But at the same time, they are also training their eccentric strength in an explosive manner in order to improve their regular jumping ability too. Not only that, but neurogenic effects occur due to the incredibly short time between the stretching and shortening phase. Eventually, the pre-motor cortex anticipates the shock and the firing rate of the myotatic reflex increases. In other words, the CNS *learns* to spring up from that position and thus the muscle fibres begin to activate faster and faster. Resulting in explosive strength!

Meanwhile the shock massively stimulates the CNS and this increases 'muscular excitation' for even more power over time. One study of volleyball players found that they gained 14% increases in jumping maximal strength by using a depth jumping program. In other words, eccentric training is fantastic for developing explosive power, so perhaps it should come as no surprise that eccentric training performed *explosively* should be possibly even better! Performing negatives is hard without a spotter, but remember: the body considers resistance and velocity to be the same. If you are slowing yourself from plunging fast, it is the equivalent of performing a negative with several times your bodyweight.

And if nothing else, the ability to shock absorb and to decelerate is incredibly useful in a range of situations – such as changing direction in sports, blocking punches, or catching heavy objects.

ISOMETRICS

Isometric training means training against resistance without movement. While this might sound like a fairly simple concept, it in fact can be performed in many different ways, yielding numerous different benefits.

The two primary types of isometric training are:

- Yielding
- Overcoming

Yielding is what many people imagine when they hear the term. This means holding a position or a weight for a set time, until they begin to weaken. An example might be holding a plank position until you give up, or holding a dumbbell for a minute until your arm starts to lower.

This type of training has some benefit as we will see in a moment. But the other kind – overcoming isometrics – is what has real potential for building massive strength. Overcoming isometrics means trying to push or pull against an immovable force. For example then, you might attempt to push down a wall, or to bend a piece of steel to no avail. You then continue to exert force for a short duration.



What makes this valuable, is that it creates conditions for you to train using your maximum capability.

The closest comparison is training with a one rep maximum, which means lifting the heaviest weight you possibly can in order to utilize 100% of your accessible strength. The problem with this, is that a one rep max invariably involves momentum, varying angles and gravity. In other words, you are only using a maximal contraction for a very brief moment; at a peak in the movement after which momentum or gravity manage the rest.

On the other hand, overcoming isometrics allow you to focus on that moment of maximum strength and to maintain that power for the entire exercise. This has the effect of improving said maximum strength and in particular, it can increase muscle fibre recruitment – perhaps more than any other form of exercise ([study](#)).

It's no coincidence that this is the training method used by Dennis Rogers, thought by some to be the strongest man alive pound for pound. Dennis was found to have greater control of his muscle fibre recruitment on the show *Stan Lee's Superhumans*. It appears that overcoming isometrics provide the perfect stimulus for increasing muscle fibre recruitment, thereby allowing you to use a larger percentage of your dormant strength.

As far as the body is concerned it has met a challenge it is not prepared for and it needs to adapt to get stronger. This is primarily achieved through neural adaptations, and there is evidence that a form of plasticity can occur at the neuromuscular junction – creating more acetylcholine receptors for example as already mentioned.

OVERCOMING ISOMETRICS: Pulling or pushing against an immovable object.

For this reason, adding overcoming isometrics to your current routine may be one of the most effective ways to rapidly increase your strength and power.

While it's true that overcoming isometrics can help you to build a particularly high amount of explosive power, it's also true that this strength increase is focussed on a single joint position as there is no range of movement. Studies suggest that there is some spillover to the rest of the ROM of about 15-30%. Whatever way you cut it though, you're going to need to train multiple angles in order to get the most from it. The usual recommendation is to pick a position at the start of the movement, the middle and towards the end. I would even suggest adding in a fourth position so that you are covering each quarter of the movement... but that is optional.

Isometric training can also be used as a way to deal with the failure points of a movement. If you find yourself often failing at the same point in a movement, then you can use isometrics to increase your max power output at that specific point.

In terms of how long to hold these contractions for, the generally agreed advice is to make each "repetition" 6 seconds long for strength benefits. This appears to be the most effective method for suppressive the protective mechanisms of the CNS. This form of training is very intensive for the nervous system and should be performed at the *start* of your workouts before your muscles are fatigued. If you train using reverse pyramid training (meaning you start with the heaviest weight), then you can consider this to be the set that comes before your max.

I haven't found any concrete advice on how many sets and reps to use for each of these exercises. But if we consider that we're performing a maximal contraction for longer than we regularly would during a 1RM exercise, I would recommend keeping this relatively low. Perhaps 3-6 repetitions at each joint angle. I personally like to use overcoming isometrics at the start of a heavy drop set, wherein the overcoming isometric effectively acts as the set that is "heavier than the one rep max."

There are actually other forms of isometrics we can apply though as well.

Ballistic Isometrics

Ballistic isometrics are sometimes also referred to as explosive isometrics. Either way, you might be forgiven for thinking that this sounds like a contradiction. But again, the concept is about "explosive intent."

The idea is that you are going to try to recruit max effort as quickly as possible against the immovable object – exploding into the effort and thereby potentially increasing your starting strength and ability to *quickly* reach top power for explosive movements.

You can of course rep these out, holding the contraction only very briefly, or combine these concepts so that you start the contraction as explosively as possible. But there is another way to incorporate ballistic isometrics too.



If you try to generate as much force as you can for 6 seconds – measuring it with a hand dynamometer say – you will inevitably find that it begins to taper off toward the end as your muscle fibres fatigue and give out. If you started at 60kg, you might finish at a lower 48kg.

But now try making a conscious effort to explosively contract again and you'll find you actually *do* have a little force left in the tank and you can bump it back up to 55kg say. In other words, by adding ballistic isometrics during a longer overcoming isometric, you can recruit more muscle fibre in total.

Why? Because the nervous system never allows you to recruit 100% of your muscle fibre, or even 100% of your larger, fast-twitch containing motor units. There are always some left in reserve to prevent injury and to conserve energy. So as you start to fatigue the motor units you are currently using, you can send a new neural drive to recruit even more large ones. In doing so, you dig deeper, recruit more strength, and force more neural adaptations!

Quasi Isometrics

At the other end of the spectrum, we have quasi isometrics, which have more in common with yielding isometrics.

The idea in this case is to move through a complete range of motion as slowly as possible, potentially taking minutes to complete a pull up or press up. This is much harder than it may at first sound.



This does numerous things. Firstly, it trains you to much more finely control the amount of force you are exerting during the movement. You need to recruit and/or release just the right amount of motor units to gradually raise or lower your body. Secondly, it forces you to maintain full concentration through the entire range of motion, and to feel the feedback from your muscles as you do – many people say this can help to fix technique issues.

Finally, it forces you to contract your muscle continuously during the stretch position, which is well known to elicit hypertrophy and strength gains.

In short: if overcoming and explosive isometrics build brute force and power, quasi isometrics can be used to develop finesse and precision. Combine both and you can begin to control your muscles in a way that even strength athletes rarely manage.

To get started, aim for around 30% of your 1RM or use bodyweight to avoid injury. Then aim for a 30 second concentric and same for eccentric. During the lowering phase you can choose to use 'active' or 'passive' contractions. Active means that you're engaging as much force and muscle control as possible, passive means you're attempting to relax and only use the necessary strength. The former is better for hypertrophy – effectively being similar to a negative rep – while the latter can improve strength and control. Proponents like Maxick tell us that muscle relaxation can similarly contribute to muscle control and strength and of course this can improve your overall efficiency and endurance – this would be an ideal exercise for a rock climber.

Avoid extremely complex movements that put you in a compromised position – this technique is not suitable for deadlifts for instance. A good way to use them is at the end of a workout as a kind of finisher, especially as they will use a large proportion of slow twitch fibre.

These aren't the only methods for improving muscle control and fibre recruitment. The aforementioned Maxick and Maxalding method is something I'd like to look into in future, as is electromyostimulation. If that sounds interesting... stay tuned!

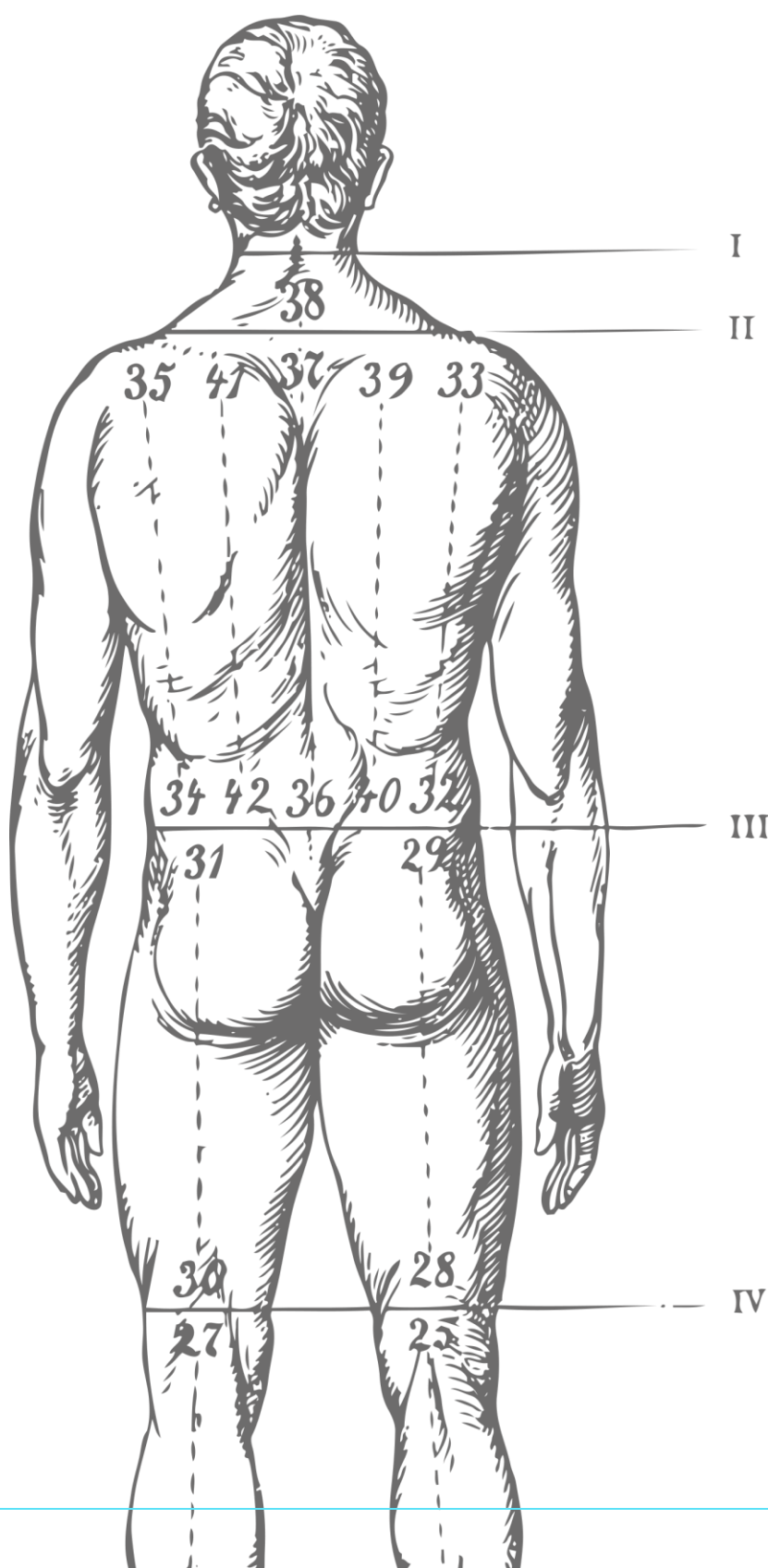
MUSCLE CONTROL

Muscle control is a closely related cousin of the mind muscle connection and refers to the practice of contracting specific muscles while letting others stay completely relaxed. So, for instance, if you were doing a bicep curl, it might mean *only* contracting the bicep while keeping the delts, lats, pecs and triceps completely soft. It can also mean contracting or moving muscles that you wouldn't be able to move without training. You might be able to pop up a muscle on your forearm for example, or move your ears (some say this is genetic, but I have trained myself and others to do it – it is actually just a great demonstration of muscle control in action). This is considerably harder than it sounds!

Maxick was a famous strongman who swore by muscle control and claimed it made him more powerful than any living man during his time. He was one of the first people to lift double his own bodyweight over his head and could easily perform a military press of 222lbs. Eugene Sandow (the father of bodybuilding) also used to practice this technique and would curl a dumbbell while reading the paper, being sure to keep the rest of his body relaxed.

How does muscle control make you stronger? Firstly, by helping you to better isolate and recruit the muscle fibres that you need to use. Try to contract your forearm without contracting your bicep and you might find you struggle unless you have previously done this kind of training. This is wasted energy and effort.

More importantly, muscle control and make you stronger by preventing the antagonist muscle groups from contracting, the idea is that you reduce the resistance presented by your *own* body. In other



words, if you unconsciously contract your triceps while curling a dumbbell, the tricep will now be working *against* you as you try and work. This was Maxick's hypothesis and we know there's some truth in the idea – which is why stretching the antagonistic muscle groups can increase your maximum strength on any lift or exercise.

How did Maxick recommend gaining his impressive powers? By practicing the wilful contraction and relaxation of specific muscle groups. Again, iso-contraction appears to be a useful way to improve the “mind-muscle connection.”

Specifically, Maxick recommended first relaxing every muscle in the body and doing a “body scan” (similar to the cognitive behavioural therapy technique) and making sure that each muscle from head to toe – even the facial muscles – are fully relaxed (likely you'll find some tension you weren't aware of even in the second or third check). Then you do the same thing in reverse, tensing the whole body and looking for areas you've “missed.” I also find that when I'm “fully contracted” I can normally actually contract *more* if I want to. You can practice this in bed, or during workouts.

You can also simply try to isolate and twitch each muscle in your body to see how much control you have over it and whether you can improve this. Sometimes a little mental “trick” makes this possible. I mentioned before that a lot of people reading would not be able to isolate and contract only their forearm muscles.

MUSCLE CONTROL: Using the mind-muscle connection to isolate, move, or relax individual muscles.

Try that again, but this time, imagine you are trying to squeeze a ball in that hand. Have the intent to do that but then *fight back* and don't let your hand close. You should find this makes it easier to see the muscles in your forearm flex. Practice this, and you might find in future it becomes easier to use only those muscles during a rope climb for example.

Try something similar by flexing your lat. If you can't do this right now (you might find you flex your pecs instead), try placing one hand on one lat gently and try again. This helps your brain to make that connection. You can eventually gain this kind of control over every muscle in your body – even your shins!

Finally, you can also try to be more mindful of your muscle as you use it. When curling weights, try to *feel* which muscles are working and try to let the others release tension as much as possible. When using isometric holds (yielding) such as a handstand, try to feel each little muscle contract and twitch to keep you balanced and stable. Balancing is a particularly good proprioceptive activity that is perfect for focussing on the slight movement of muscles, especially when used as a form of yielding isometric.

Speculation: I am generally what I would describe as a sceptic. However, as I have researched this book, I have found more and more that we can't write off *anything*. On that note, I take particular interest in the training of Shaolin Monks. Shaolin Monks originally developed their kung fu as a form of moving meditation and as a means to strengthen the body. They thereby developed the 18 Lohan Hands (which evolved to become Shaolin Kung Fu) and Sinew Metamorphosis (which became Chi Kung). This, combined with meditation, is what Shaolin monks refer to now as the “3 living treasures of Shaolin.”

Chi Kung involves controlling the movement of chi (lifeforce energy) around the body utilizing visualization. This might sound absurd to Western sensibilities, but the fact remains that these “warrior monks” manage to display skills such as smashing their heads through plates of cement, and throwing needles through plates of glass.

It is my belief, that chi kung is *actually* simply a way to control the muscle fascia, using visualization in order to improve the mind-muscle connection. In lieu of concepts like muscle fascia and the neuromuscular junction, “chi” was used as an abstract concept. And by focussing on your centre of gravity for example (which is called the “dan tien” in Shaolin), monks are better able to ground themselves and therefore balance.

I am not saying you can become a warrior monk, but by listening to your body and by focussing on controlling individual muscles, you may surprise yourself in how your body changes.

PUMP TRAINING

With all this functional-style training, you might assume that I have nothing but bad things to say about bodybuilding. You’d be wrong!

For those not in the know, bodybuilders train by lifting relatively light weights (around 75% 1RPM) and use higher rep ranges of around 10-15. They might then use a variety of “intensity techniques” in order to go “past failure.” That means that they will continue lifting the weight, even after it has become too heavy to lift, by employing the assistance of a spotter, by changing their technique, or by lightening the load and carrying on.

This increases the time under tension, it increases the amount of blood flow to the muscle, and it encourages occlusion ensuring more blood is trapped in the muscle body, allowing for the build up of metabolites and intracellular pressure. This form of training can improve work capacity, it can aid with blood flow to the muscles (and vascularity in general), and it is excellent for promoting hypertrophy (if not max strength or starting strength).

While pump training won’t provide the same explosive power as lifting 90% of your 1RM, it still does improve strength. That’s because as the muscle fibres fatigue, the body will be forced to recruit larger ones. This is why the arm begins to shake when you reach those lighter weights – because you have lost the fine control provided by the smaller muscle fibres.

Pump training is fantastic for encouraging a better mind-muscle connection because you can really *feel* the muscle working. It also builds determination and focus, enhances muscle endurance, and more. That said, this type of training is only really suitable for single joint/isolation training. You cannot train squats past failure for example, not only because this would be dangerous (you’d get crushed) but also because there are too many muscles working together. Your failure during a squat is due to the failure of multiple muscle groups working together.

That said, you can employ some of these methods to an extent when using something such as leg press or bench press. This is safer, and while you might not fatigue a single muscle to the same extent as you could do with curls, you’ll still feel it!

INTENSITY TECHNIQUES

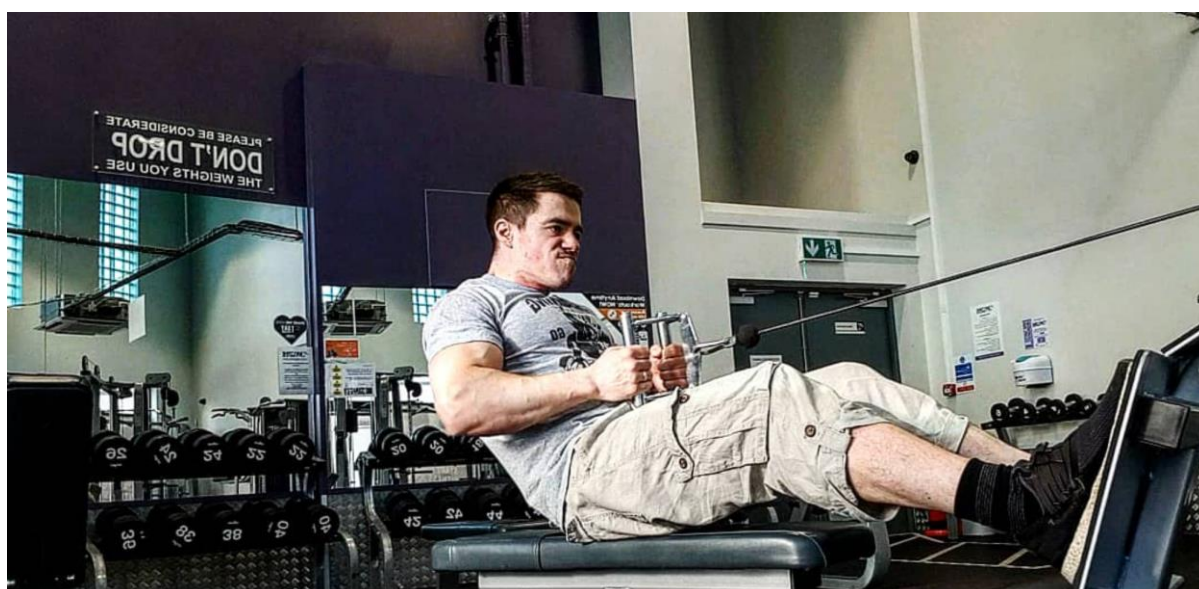
So, what is the best way to use pump training?

During the “golden age of bodybuilding” (generally considered the 60s-80s), Joe Weider reigned supreme as the preeminent media mogul in the fitness industry. He owned numerous muscle building supplement ranges and magazines and was also responsible for discovering some of the biggest athletes of the era – including Arnold Schwarzenegger!

Recommended resource: *Ultimate Bodybuilding* by Joe Weider

While Joe wasn't in huge shape himself, he was clearly a very well-informed fan of the sport. And this is how he was able to catalogue all of the advanced training methods that he managed to identify the top lifters as using. Through observations and interviews, he set out to keep a log of all the strategies that the biggest bodybuilders of the day were using so that others could borrow them.

A lot of these techniques have become common parlance among gym bros today: such as the superset – which simply means performing two exercises back-to-back to eliminate rest time. Often this would also mean training two antagonistic muscle groups.



While supersets are common knowledge, some of his other techniques are not so commonly known. Here are some of the best ones explained for your convenience:

Rest Pause: Our first advanced bodybuilding technique, the rest pause, is not about going past failure but rather about stopping the weight mid movement and then starting again. For example, you might be performing bench presses but instead of bouncing the weight straight up and down, you instead stop the weight and rest it on your chest for one second before moving it again. What this does is to prevent the muscles from utilizing their natural elasticity and it removes any momentum that might have helped you through the movement. Now each repetition is coming from ‘cold’ and that means you’ll need to put in a lot more effort each time.

Partial Rep: A partial rep has a similar purpose to a rest pause, in that it challenges you to remove the element of momentum and to start the weight from cold each time. At the same time, it allows you to focus on just one portion of the ROM (range of motion) by not going from fully contracted to fully extended.

A partial rep then simply means curling through the top, bottom or middle third of a bicep curl, or pressing a barbell so that your arms aren't *quite* straight.

Burns: A ‘burn’ is an example of an exercise that will let you push past failure and to increase time under tension to a *huge* degree. Essentially, this is like an “involuntary” partial rep.

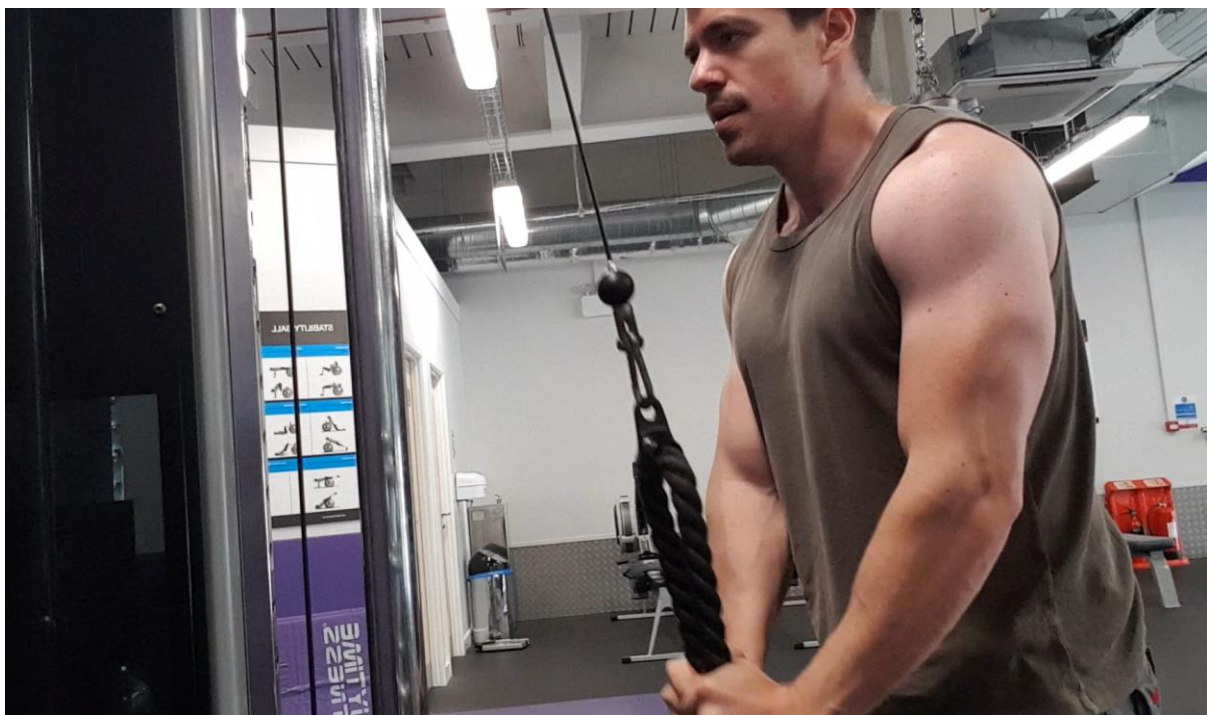
What does that mean? It means that you’re performing only a small portion of the movement because that’s all you *can* do at that point. For example, you might do as many press ups as you possibly can and then once you reach failure, you simply bob up and down on the spot – pushing yourself as far as you can get. You keep going and going until eventually you literally can’t lift yourself even an inch off of the floor.

Can you guess why they’re called burns?

Drop Sets: Drop sets are a form of forced rep that I absolutely rely on for my training. What these involve is performing as many reps as you can with a given weight, then lowering that weight only to carry on with a slightly lighter one (with no break in between).

Recommended resource: *The New Encyclopaedia of Modern Bodybuilding* by Arnold Schwarzenegger

From an anatomical standpoint, what’s happening here is that you are lifting as much weight as you can for as many repetitions as you can until the muscle is too flooded with metabolites and too much fast twitch muscle fibre has fatigued so you can’t go on any more.



But when you drop the weight, you are able to recruit all those *other* muscle fibres that weren’t yet being trained in order to trigger even more muscle damage. What’s more, is that you are extending the time under tension even more, thereby allowing yourself to keep flooding the muscles with more and more metabolites to the point where they’re practically fit to burst!

The best thing about this, is that you can actually combine pump training with heavy power training this way. For example, you might use weight that is 90% of your 1RM for the first three repetitions, then immediately drop that down to something much lighter in

order to keep going. This is one way we'll be incorporating different types of training into a single elaborate program.

Assisted Reps: This is exactly what it sounds like – getting a spotter to assist you through the last few reps. It's again a great way to go just beyond what you should normally be capable of.

Cheats: Another way to push past failure is with cheats. These are essentially like assisting yourself by “cheating” – often using momentum to swing the weight through the movement for example. The point is that you use these at the end of a good set with proper form.

Negatives: Negatives are a way to train with a heavier weight than you normally can. To do this, you are simply going to get help *lifting* the weight and then only use your own controlled movement during the eccentric phase. This works because the muscle is actually strongest at this point during the movement, remember?

Flush Sets: A flush set is an extremely large set (i.e. lots of repetitions) using a light weight. For instance, you might do 50 lat pull downs set to 10kg. This is used as a finisher, often at the end of a series of exercises focussing on one body part. It fatigues every last bit of muscle fibre and hugely builds metabolites and pump.

MECHANICAL DROP SETS

Mechanical drop sets are a brilliant extension of the idea of drop sets and my favourite advanced bodybuilding method that can absolutely revolutionise the way you train. They are also going to be a HUGE part of the SuperFunctional Program. If you're taking notes, now would be a good time to get that pad of paper out!

So now you know what a drop set is, a mechanical drop set is essentially the same thing – consistently making the exercise easier and easier as you fatigue, so that you can keep going.

Only the big difference here is that you are now going to make the exercises easier by changing the *way* in which you perform those exercises as opposed to changing the weight. In some cases, you might even switch to a different exercise, except that the exercise is going to still target the precise same muscles.

So an example of this would be to go from performing clapping press ups, to press ups, to press ups on your knees. These are all press ups, they all target the very same muscle groups but the difference is that they get increasingly easier meaning you can carry on going as you get increasingly more tired.

I have coined another phrase too: that being **Dynamic Drop Sets**. A dynamic drop set doesn't change the weight or the type of exercise, but rather the cadence or intent. For example, a dynamic drop set might involve an overcoming isometric, followed by slow eccentric reps, followed by explosive reps. Or it might involve switching from curls to cheat curls!

These kinds of routines are perfect because they're really brutal and *more* than capable of stimulating a lot of growth, while at the same time allowing you to train in a way that is very convenient: going from one exercise to the next without even putting the weights down in between to change the amount you're lifting! If you're creative, you can create huge giant sets like this all at one station in the gym.

Plus, by challenging you in lots of ways, they are more likely to be effective for more people.



"BANG FOR YOUR BUCK" EXERCISES

"Bang for your buck" exercises in this context, are those miscellaneous exercises that will provide many of the benefits we are training for in a single move or set of moves. You'll find some of these below.

CARTWHEELS

One of the more unusual types of exercise I will be including in this program is cartwheels. Why perform cartwheels?

Firstly, cartwheels are a movement that require great core strength, and a surprising amount of agility and coordination. Add these to a workout, and you'll be practicing using your body in a way that you likely haven't since you were a kid.

Moreover, cartwheels are a great gateway movement into other tricks like aerials, b-twists, and handsprings (all of which are also options when it comes to your training). This will help to make you lighter, quicker, and more agile. Make sure to practice moving in both directions.

JUGGLING

With cartwheels and juggling, we're off to an odd start here. Sounds more like a circus training regime! But juggling is one of the most fantastic tools for training your brain AND body together. This will increase your hand-eye coordination, your focus, your ability to track objects with your eyes, your ambidexterity, your reflexes, and more!

BAG WORK

Bag work makes this list as another excellent example of a specific exercise that provides "bang for your buck." Bag work can be used as a HIIT finisher (more on that in a moment), but will do much more than providing a cardio benefit.



Bag work will:

- Develop shoulder, pec, and tricep strength
- Improve coordination
- Develop torque and obliques
- Increase flexibility (when practicing kicks)
- Harden knuckles

FINGER/KNUCKLE PUSH UPS

Likewise, finger push-ups are excellent for strengthening the fingers, and therefore the grip. At the same time, they will train the pecs, triceps, and shoulders, and because you normally use a position with the hands shifted backwards, they can be combined with pseudo-planche for straight arm strength.

Again, same thing for knuckle push ups, except that these won't develop finger strength. Instead, they will toughen the knuckles. If you have *any* interest in training for fighting, then conditioning the knuckles should be considered an absolute must.

It is possible to condition the knuckles in this way, seeing as bone can be remodelled just like muscle. In fact, it is incorrect to think of bone as inert – it has even been described as being more like a “bank” for minerals such as calcium and magnesium. When you break down bone, osteoblasts will enter the area and lay down new bone matrix at the site of the “bone turnover.” In short, microdamage allows bone to grow back stronger.

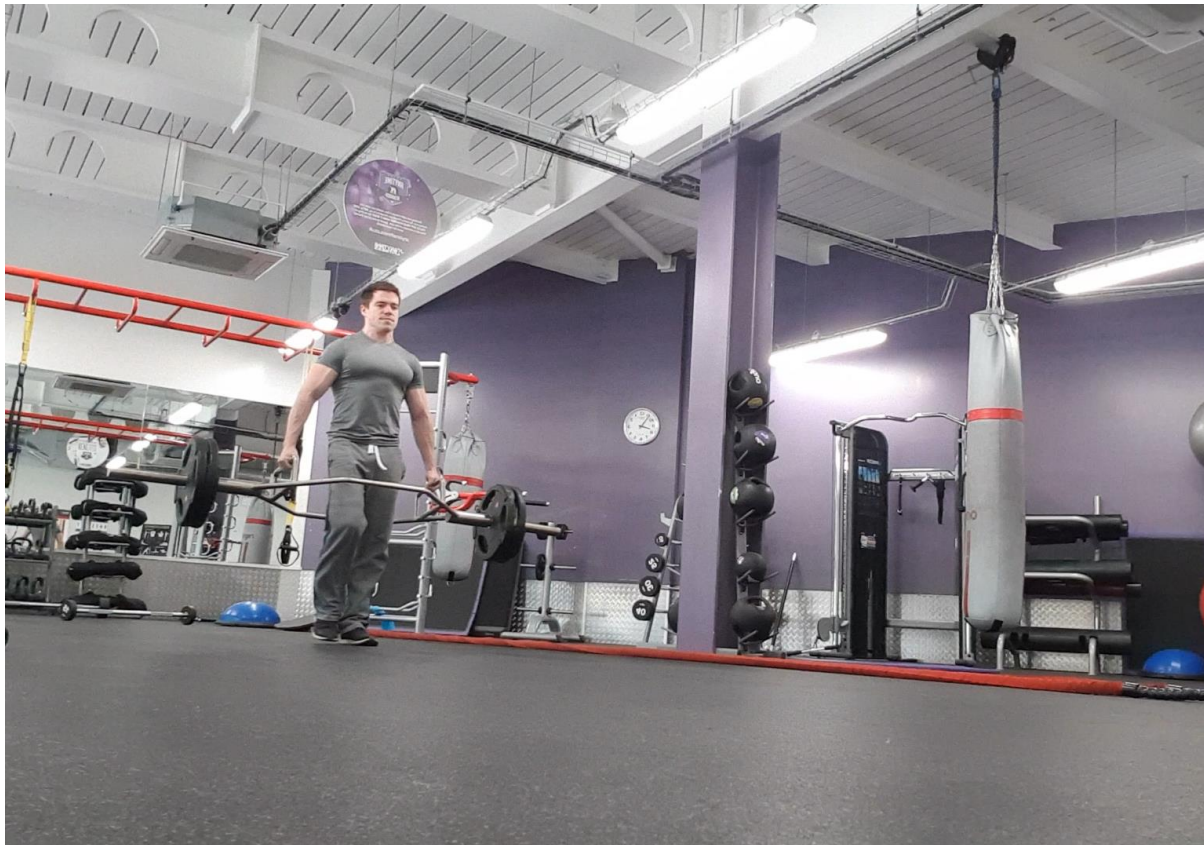
As well as small impacts, load bearing also triggers the development of stronger and thicker bones. This is why lifting heavy weights results in higher bone mass, and it has been incorporated into this program in various ways along with tendon training.

SPIDER-MAN CRAWLS

Spider-man crawls (or bear crawls etc.) are sometimes referred to as cross crawls. Crawl low to the ground to train that contralateral movement, and build on your reflexive strength and core power. This is a fantastic way to train your coordination and movement, but it also works as a brilliant pec, shoulder, tricep, and ab workout in its own right. Staying low to the ground creates an isometric hold, while the locomotive aspect makes it a lot of fun and certainly a change from the norm.

LOADED CARRIES

Loaded carries are considered by some to be the “most functional” exercise. Of course, this is nonsense... but it’s certainly true that loaded carries have a lot of crossover with a lot of real-world tasks. The aim is simply to carry something heavy from point A to point B. This builds the traps to a large degree (maintain a slight shoulder shrug – avoid fully depressing the spine), trains the erector spinae and core to keep you upright, improves your gait (and makes you harder to push over), offers a form of contralateral exercise for enhanced coordination, develops the grip and forearms, improves hip strength, and may enhance jump height, balance, and stability. Of course, this is also a great form of resistance cardio as you will use a lot more energy to move. It can increase bone density too simply due to your body being under a heavy load for longer.



Boxer Kostya Tszyu would reportedly train by picking up a kettlebell and carrying it for a full hour!

There are lots of different versions of weighted carries, from overhead carries, to Zercher carries... I recommend sticking with a trap bar. Squat to pick it up, then walk standing in the middle. If you don’t have one, then use a front-loaded carry with a kettlebell, or hold dumbbells or a barbell across your shoulder.

You can increase difficulty either by aiming for more distance, more speed, or more weight! Weighted lung walks also offer a variation that will additionally train the legs.

FACE PULLS

Anyone who has watched Athlean-X (which should be everyone by the way), will understand the importance of face pulls. These provide some training for the external rotation of the shoulder, which offer the necessary counterbalance to a push-heavy workout. Face pulls are usually trained using the cable machines, but you can also perform the movement using a pull up bar. The key is to focus on the rotation. This will

help you to avoid injury, will prevent rounded shoulders, and will generally improve your performance.

BENT PRESS/SQUATTING PRESS

The bent press is an old-time strongman move that involves holding a single weight such as a kettlebell against your shoulder on one side, and then bending down to the opposite side to rest on your knee. As you do this, the arm *stays* where it is until it is held straight above you as close to the centre of gravity as possible. This involves moving *away* from the weight, which is an entirely different concept to *pushing* the weight – involving entirely novel forms of coordination, and a HUGE amount of core stability (this is excellent for the obliques). There's obviously also an isometric hold element here, and because you're under the weight for a long time, it can further help to strengthen the bones.



The squatting press is similar and once again involves moving away from the weight. Here, you hold a barbell as though you were about to do a front squat, and then you squat downward, keeping the bar in the exact same place until the arms are outstretched holding the bar above you. Again, the bar stays still and *you* move away from it. This also develops/requires shoulder mobility.



The key takeaway from old-time strongman lifts in general, should be that they involve lifting weights in unusual ways. They would also train using moves like **barbell turns** which involve rotating a barbell in front of you with both hands, and the **anyhow lift** which involved lifting as much as weight possible using *any technique*. They also trained often with unusually weighted items, like the Indian Club and kettlebell.

These movements all train the body at extremely awkward angles, developing insane strength in the core, grip, and smaller supporting muscles. They include movements that we might think of as dangerous, but as long as you start very light, you can develop strength at nearly any angle – and then become far *less* prone to injury as a result.



Figure 1 Bar Rotations

NECK TRAINING

Building neck strength is another overlooked training focus. Developing neck strength will help you to absorb stronger impacts without injury/concussion, and to massively increase the *appearance* of size and strength. What's more, is that some evidence now suggests that training the neck can help to improve the transmission of nerve impulses between the brain and the rest of the body AND even aid with respiration (makes sense given that the neck muscles help to keep the airways open – and what's more is that the anterior, medial, and posterior scalene muscles among others help to provide extra pumping to bring air in and out during exercise).

You can train the neck using gentle self-resistance using your hands. You should be wary however of compressing the vertebrae in the neck, which can lead to the creation of new neck bone that ends up irritating the nerves and leading to long-term problems (again: see Athlean X!).

Neck training such as self-resistance is ideal for incidental training and can be used on the bus, or in the queue. See the section on “using CBT to become socially bulletproof” if you find this embarrassing!

Another option is to use plating, which involves lying a weight plate on your head (with a towel between) and moving your neck through the natural ranges of movement (flexion, extension, side bending). You'll need to use your hand for rotation however.

HEAVY PARTIALS

A heavy partial involves moving a weight that is *heavier* than your 1RM but in a shorter distance so as to avoid injury. The most famous example perhaps is the rack pull, which is a deadlift performed from a higher starting point (the bar rests across the rack, often about shin or even waist height). This allows you to use much heavier weight in order to strengthen and toughen the tendons, without risking injury.

There are many adaptations that occur simply as a result of being under or over extremely heavy weights. Stronger tendons is one, but it can also help to train the stabilizer muscles and the sheer *confidence* necessary for moving those large loads. There's even a small chance it may help to override feedback from the golgi tendon organ that normally inhibits strength in response to extreme muscle tension. In other words, this type of training may help you to switch off the “safety latch.” There is no hard evidence for this effect, but seeing as there are plenty of other great reasons to use heavy partials, it is another “added bonus.”

Of course, it is also extremely useful for developing amazing grip strength.

There are other ways to perform heavy partials. For instance, **accommodating resistance** is a similar concept performed with chains or bands positioned so that the amount of weight *increases* as you get to the strongest range of motion.

WEIGHTED STRETCHING

Weighted stretching means lifting weights and going beyond the usual range of motion in order to place the body under a slight stretch. This can be achieved for instance using the pec flyes, or by performing press ups on dip bars and going lower than parallel to the ground.

Training in this way may help to encourage more hypertrophy and possibly even hyperplasia. More evidence is needed, but this is why the hen study might have proven effective at triggering the effect: the wings were stretched. Anecdotally, stretching the

muscle seems to illicit impressive hypertrophy, and it may also strengthen the tendons and improve range of motion.



As with heavy partials, old-time lifts, and many other concepts on this list, you must approach weighted stretching with caution.

PIKE PULSES

Have you ever wondered why you can't touch your toes, even though you can swing your leg up high? The answer might not be to do with flexibility, but rather strength. Specifically, I'm talking about compressive strength, or compression strength. This allows you to compress the hips, and requires a great amount of core strength. Again, this has plenty of crossover with a range of other activities crucial for overall performance. The solution? Pike pulses!

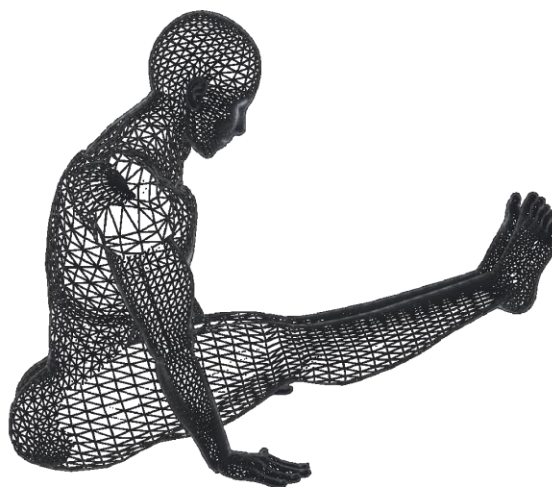


Figure 2 The Pike Pulse - lift and lower the legs from this position

Sit on the ground with your fingers touching the floor on either side of your knees, slightly in front of the rest of your body, and your legs out straight in front of you. Now raise the toes as far as you can, keeping your legs straight – you might not be able to go particularly high. The aim is to “pulse” up and down like this, to improve range of motion

and that compression strength. You can alternatively pulse a single leg at a time. Given time, this can help you to pull off more impressive v-sits through stronger active compression.

MORE

- Pistol squats – Balance, core, mobility, leg strength
- Weighted monkey bars/pull ups – Lats, grip, endurance
- Good mornings – Strength + flexibility
- Hangs – Mobility, grip, injury prevention
- One-arm/one-leg push up – This is one of the best tests of your core strength and works wonders for building up the core and your overall stability



- Planche – Core strength, straight arm strength
- Loaded carries – Core strength, grip, balance
- Jefferson curl – Develops the erector spinae and mobility
- Kettlebell swings – Posterior chain, cardio, shoulders
- Weighted vest pull ups – Because this trains the same precise joint-angle, you can use a weighted vest to improve form and technique on almost any movement.
- Battle ropes – Shoulders, cardio
- Overhead lunges – Hold a barbell overhead and perform lunges/lunge walks. Develops core strength, shoulder mobility, straight arm strength, leg strength, and more.
- Weighted step ups – Legs, balance, core
- Pistol squat jumps – An explosive form of the already-challenging pistol squat
- Deadlift – The deadlift itself is among THE most powerful exercises in terms of developing posterior chain, traps, grip, core etc. I recommend using trap bars however in order to avoid potential injury.
- Muscle ups – Weight-strength ratio, technique, pull and push muscles
- Rope climb – Grip, elbow/tendon strength, biceps, endurance
- Old time squat press – Control, core stability, shoulder strength
- High resistance stationary bike – Cardio, leg strength
- V-Sits – Excellent for abs, triceps, and mobility. Also trains the external shoulder rotation.
- Mindful jogging with ab tensing – Core strength, mindfulness, cardio
- Skipping – Cardio, dexterity/footwork
- Straight Legged Deadlift – Posterior chain, mobility
- Cable punches – Shoulder/triceps/pecs, core, punching technique
- HIIT – Cardio endurance, fast twitch muscle fibre/explosiveness
- Depth jumps – Explosiveness, strength
- Handstand push ups – Balance, shoulder/pecs, strength-weight ratio
- Rock climbing – Grip, endurance, focus, balance, strength-weight ratio

TRAINING OUTDOORS

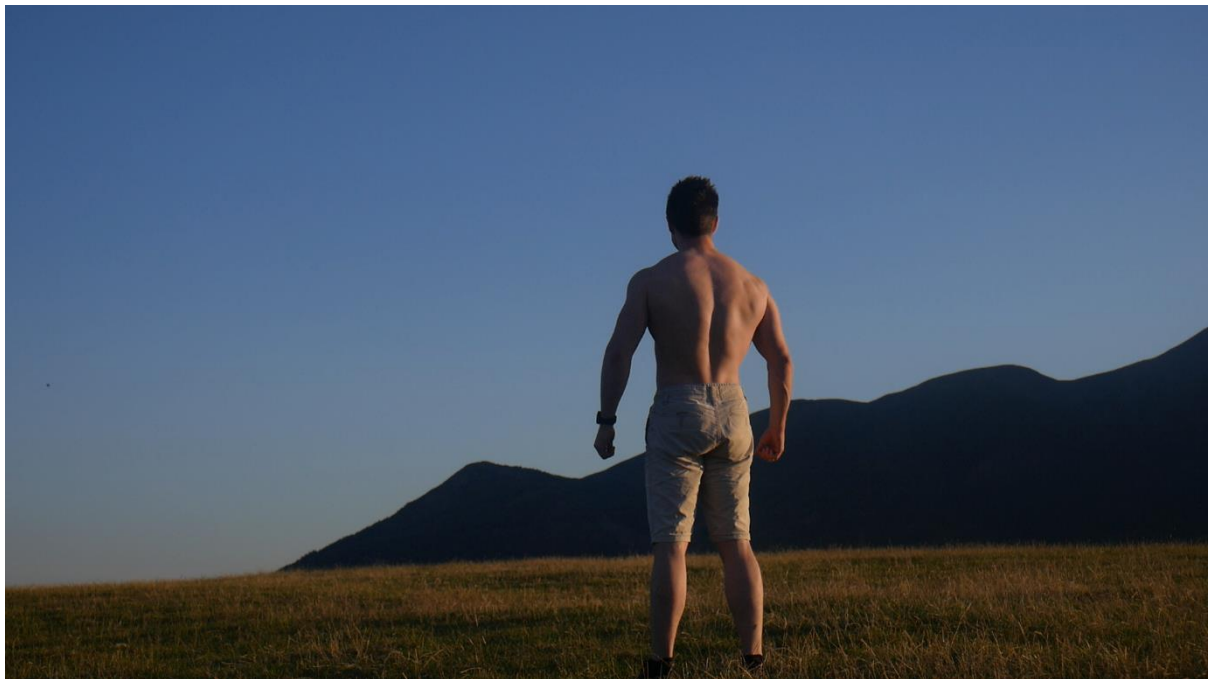
At the start of this book, I mentioned that modern humans are not maladapted. That we are simply perfectly suited to the lifestyles that we lead – often very sedentary and unchanging ones.

Perhaps this doesn't sound like such a bad thing?

So allow me to put it another way: we have become domesticated. By spending all our time indoors, and by being so “coddled” by creature comforts, we have grown weak. Author Yuval Noah Harari suggests that we were domesticated by wheat – that wheat actually benefited more from us planting ourselves in one place and becoming farmers rather than hunter gatherers. Slowly, we lost agency, strength, and adaptability.

Recommended Resource: *Sapiens* by Yuval Noah Harari

If we want to be SuperFunctional, then we want to be ready for things that haven't happened yet. That means that in a sense, *any kind* of adaptation can be considered a bad thing. As soon as we become too used to one type of training, one set of movements, we start to lose functionality and power in other areas. You become comfortable.



In a sense then, we are trying to adapt *to* adaptation. To keep our brains plastic, and our bodies endlessly malleable.

Take a look at your pet dog and compare their health and vigour to that of a wild wolf. Who seems healthier, more powerful, and more at peace with their nature?

Most pet dogs are somewhat overweight, they quickly develop issues like diabetes and arthritis, and their teeth all fall out. Sound familiar? They become infirm as they age, and they lose their eyesight and their energy.

The issue is adaptation and stagnation. The very adaptability that is designed to help us to be our most effective is what ultimately is our undoing. As we age, the same movements, thoughts, and routines carried out billions of times begin to wear us down. We get set in our ways, and issues come to fore.

Compare this with elderly members of native tribes. These older individuals are still able to live and perform in just the same way that they did when they were younger. Many of them are able to challenge their much younger counterparts in terms of athleticism and physical prowess!

And long before the deleterious signs of aging begin to show, you will begin to deteriorate from performing the same tasks over and over.

It is when we *lose* our plasticity that we lose the ability to adapt, to react, and to remain limber and healthy. And how do we lose that plasticity? By becoming *too adapted*.

How do we prevent this happening? We inject chaos into our lives and our routines.

Training outdoors is one of *the* best ways to do that.

To illustrate why that's the case, consider trying to perform a chin up in the gym, versus on a tree branch. In the gym, you will jump off of a perfectly flat floor in order to catch a perfectly round bar that is perpendicular to the ground. When you come back and do that pull up tomorrow, it will be the exact same.



When you perform this movement from a tree however, you will start by jumping off from an uneven terrain, to catch a branch that could be at any height. The diameter of the branch in your left hand will likely be wider or narrower than it is in your right hand. Your fingers might not even be able to reach around at some points, and one hand might be higher than the other. When you perform the chin up, the tree might bend slightly, forcing you to engage your core more to keep it straight. And when you do the same movement tomorrow, it will be slightly different. This is true, even if you pull up from the exact same branch!

You'll also get similar benefits when trail running, during which your foot will hit the floor at numerous different angles and you'll be required to engage a wide focus to avoid everything coming at you. Running through water, on grass, on sand, and on stone all provide different amounts of resistance, as does running up and down hill.

Every exercise is therefore made more challenging and unique when conducted outdoors. And that's before we take into account the other benefits that you will be getting simultaneously.

One is cold exposure. Cold exposure is enjoying a lot of attention at the moment for its myriad health effects. Being cold can train the immune system (as a form of stressor), it can increase sharpness and alertness, it helps to develop better thermoregulation, and it raises testosterone – to name just a few things. It can also help to develop mental willpower, and better control over the nervous system.



Sunlight also does absolute wonders for us. That's because sunlight stimulates the production of vitamin D. Though it's called a vitamin, vitamin D is really more akin to a master hormone regulator. That's why low vitamin D is linked with a drop in testosterone and therefore muscle building. Vitamin D is also crucial for strong bones, being used as it is to aid with the absorption of calcium and magnesium.

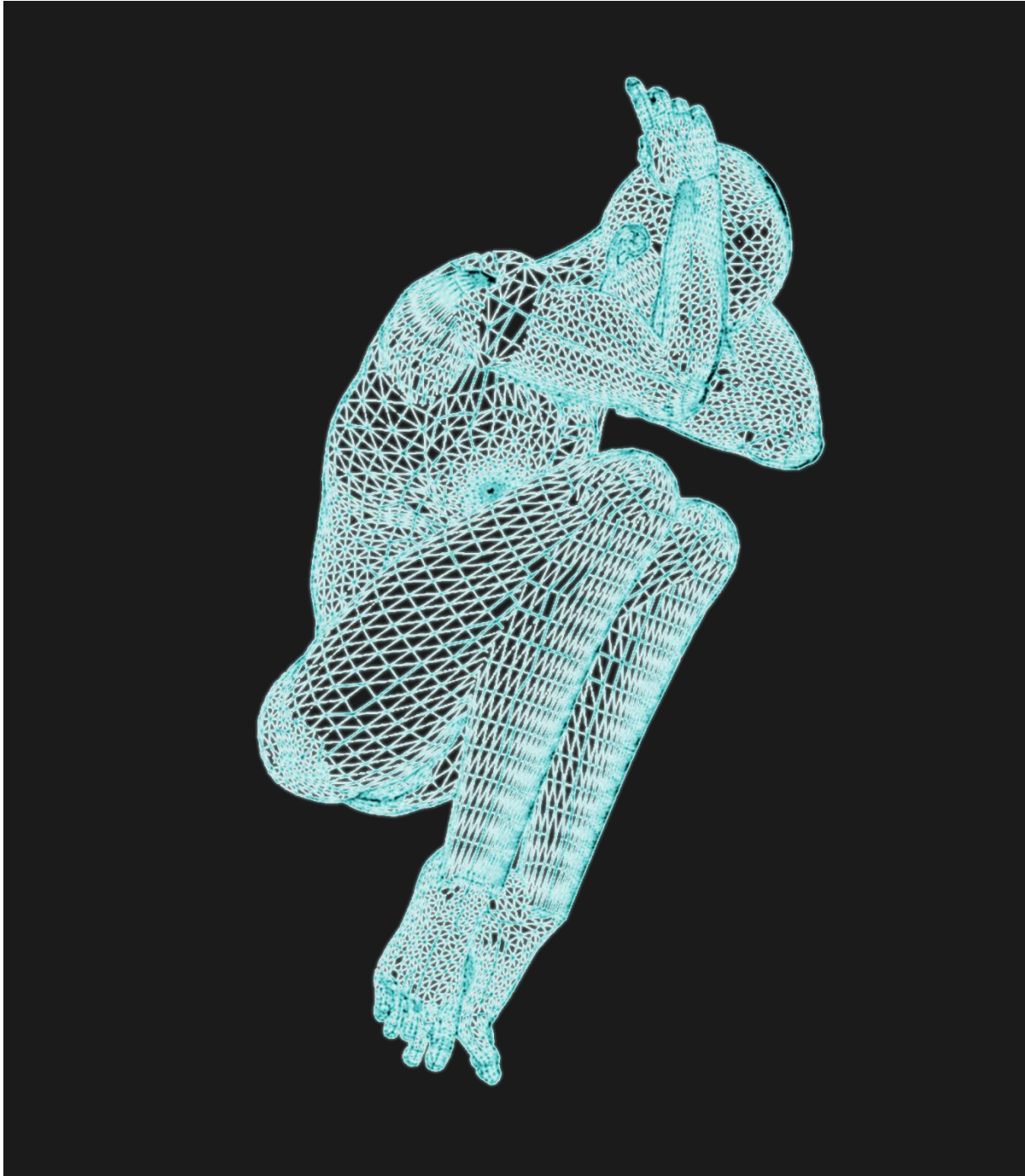
Finally, vitamin D and sunlight are “external zeitgebers.” This is the scientific term meaning “external light givers” – the stimuli that our body uses in order to regulate its circadian rhythms (body clock). In short, cues from the outside world are required to help aid the sleep/wake cycle through the production of hormones like melatonin (sleep) and cortisol (wake).

Vitamin D is also crucial for the immune system and it seems *considerably* more effective than even vitamin C at combating the common cold/flu. This makes a lot of intuitive sense to me. It seems as though my “outdoorsy friends” and surfer friends *never* get sick, and are always full of energy.

Even the lush environment helps to stimulate us in very positive ways, and has been linked with an increase in creativity and reduction in stress. Recent research demonstrates that people who spend just two hours a week in a natural environment report being happier, less stressed, and more content.

There is much more too, from the cold water (discussed above) to the potential benefits of the ground itself.

My recommendation is that you train outdoors wherever possible. You won't be able to perform every one of the routines in this book in a forest, but if you use trail running rather than road running for example, this can be a great start. Likewise, creating an outdoor gym using equipment kept in your garden can be a great strategy to get all those useful cues from the environment.



File 6: advanced energy training

LISS CARDIO

LISS is Low Intensity Steady State cardio. This is your traditional cardio, such as running for 40 minutes, or swimming. LISS has fallen out of favour recently owing to the significant popularity of high intensity interval training (coming up). However, LISS does have significant advantages that HIIT doesn't offer. For one, LISS is far less taxing on the nervous system. Pairing HIIT with a very intense powerlifting training program will likely lead to burnout and injury. HIIT is also an unsafe choice for individuals that are very out of shape, or that have a history of heart problems.

Moreover, there are some positive adaptations that only occur in response to LISS and NOT HIIT. An example is the increased size of the left ventricle, which in turn is able to increase the stroke volume of the heart, allowing more blood to be circulated with each beat. This not only improves your long-distance running performance (which has a lot of potential real-world application) but is also a general marker of health. A lower heart rate will signal the vagus nerve to remain calmer, helping you to achieve a general sense of zen and calm.



Running at 70% of your MHR is particularly effective for immediate fat burn, as it ensures that you will be in the “fat burning zone,” which is the upper limit of your aerobic system. You’re burning fat as quickly as you can, but without switching to other energy systems. Running or swimming for an hour remains one of the best ways to burn a large amount of calories in a short amount of time, though a lot of people find the activity time-consuming and perhaps boring. That said, it has the potential to be meditative if you focus intently on each stride, which can allow you to train mind and body simultaneously.

LISS of any kind is a particularly safe option for those that have weak hearts or are very out of shape, thanks to the relative low-intensity. It is also a good option for those that are engaging in particularly intensive forms of additional training. That said, there are better options for long-term fat loss, once you build up the base level of fitness.

Just don't completely forget LISS – it definitely still has a place.

HIIT

HIIT is the new kid on the block when it comes to cardio, or at least it was a decade ago. It's STILL getting a lot of love right now though, and for good reason.

HIIT is High Intensity Interval Training, with the idea being that you will swap between high intensity anaerobic activity, and then lower intensity recovery phases. For example, you might sprint as fast as you possibly can for 1 minute, and then take 1 minute to recover by walking. Then repeat. The precise amounts can vary, but the aim is to gradually reduce the amount of time you spend recovering.

The reason this works, is that you're going to be switching between energy systems. You will use the aerobic system for a set period of time giving your body enough time to clear the build-up of metabolites in your bloodstream and then you would switch *back* to maximum exertion to further deplete the glucose stores. This would mean you were taking a small break from burning fat and blood sugar thus reducing the negative impact on your mood and muscle mass. Moreover, it would mean you could almost entirely empty your glycogen stores and thereby force your body to use blood sugar and fat stores for even the simplest movements for a long period afterward while it creates more glycogen!



This results in an increased metabolism *following* that HIIT workout. This is known as the “after burn” effect, and it is why greater weight loss is observed over time for HIIT versus LISS.

HIIT is able to burn more calories (per given minute) than steady state cardio then and because you're exerting yourself more at certain points throughout your training, this means you should be finished in a much shorter space of time.

Typically, a HIIT session can last between 10-20 minutes and be just as effective in terms of calories burned as a 40-minute run. For those who have a busy and hectic work schedule then, HIIT training is the ideal solution and allows them to squeeze in a few short minutes of highly effective training to get amazing results.

There are more reasons to get excited about HIIT too.

When looking at any type of training program, what's always useful to keep in mind is the SAID principle. As briefly touched upon, "Specific Adaptations to Imposed Demands" means that your body changes to adapt to the demands placed on it. If you train at altitude, you become better at training at altitude. If you jog, you become better at jogging.

Thus, HIIT makes you better at high intensity activities – which include sprinting, running, rowing, boxing, wrestling, fighting, sports, moving furniture and more. These are things we are much more likely to utilize in our daily lives and that makes this a more adaptive and useful form of training. Whereas steady state cardio makes you more effective at "long slogs," HIIT makes you explosive and athletic.

VO2 MAX: The amount of oxygen your body is capable of using.

Ever wondered why little kids seem to run in circles all day without getting tired while older generations get exhausted from getting up to turn the TV on? One of the big reasons for this discrepancy is the difference in the number and efficiency of mitochondria. This also improves your "VO2 max."

But perhaps best of all is that the kind of explosive movement used in HIIT will invariably engage your fast twitch muscle fibre.

If you engage in steady state cardio, then you can risk converting your fast twitch muscle fibre into slow twitch fibre. Why? Because you are placing high energy demands on your body over a long duration – and thus your body will want to move the ratio toward the most efficient form of muscle fibre. What's more, is that you create a highly catabolic environment that in short starves your body of fuel and forces it to break down both fat *and* muscle.

This is why most long-distance runners also happen to be stick thin.

But when you engage your fast twitch muscle fibres, you show your body that you need explosiveness and you shorten the length of the catabolic period. This in turn means that you don't risk breaking down muscle tissue in the same way, allowing you to create a physique that is hard, ripped and powerful.

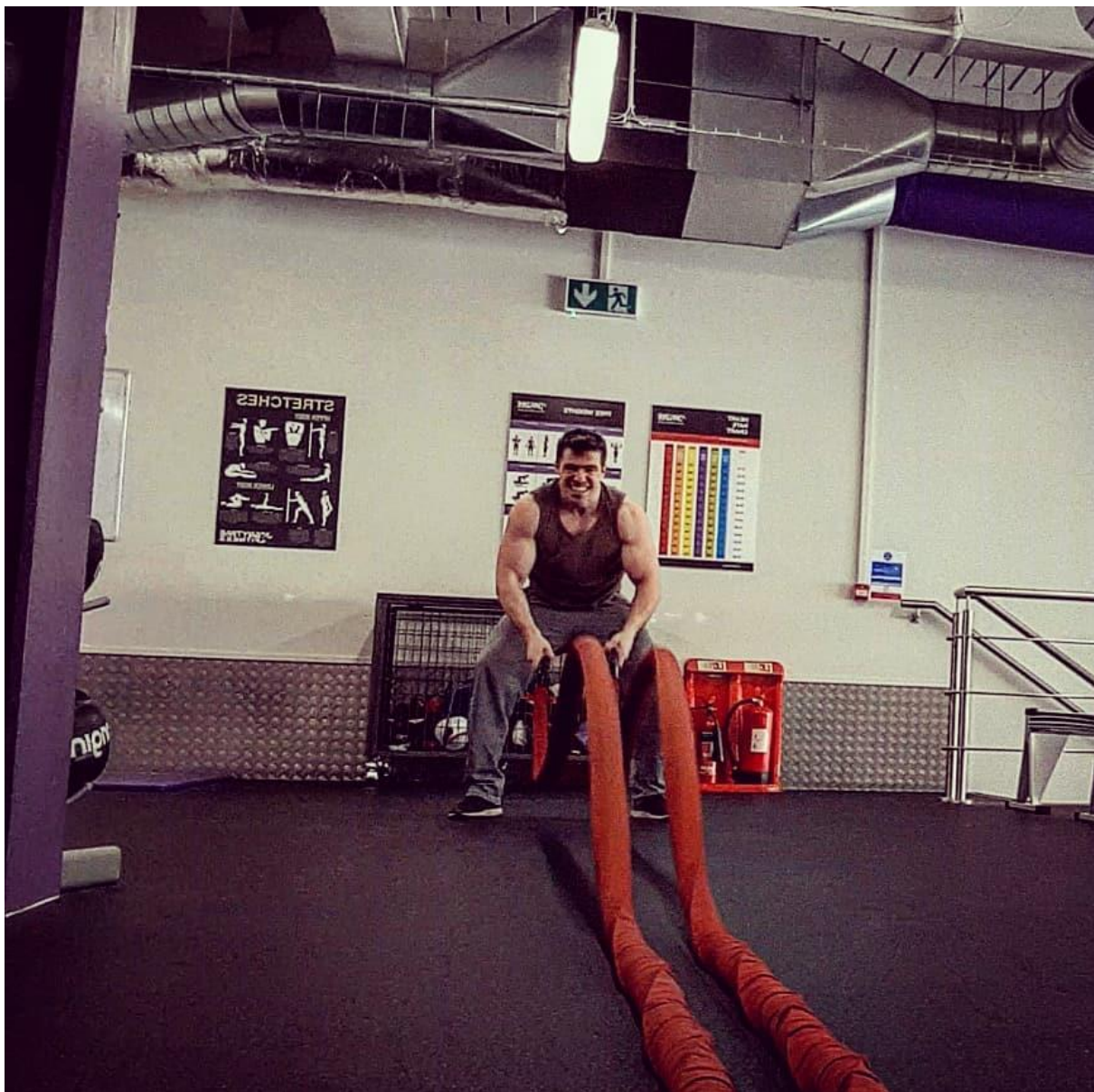
THRESHOLD RUNS

Remember the lactate threshold? This can actually be trained through "threshold runs" which involve running the fastest you can for long periods. To try a threshold run, try to cover as much distance as you possibly can in 30 minutes (take breaks where necessary but keep them short as you possibly can). Now calculate your average speed and this will be your "max speed at lactate threshold." Running at this speed will help to train your threshold, and thus greatly increase your endurance output.

RESISTANCE CARDIO FINISHERS

Resistance cardio is any form of cardio that introduces some light resistance too, meaning that it almost straddles the line between cardio and resistance training. A good example of this would be battle ropes: beating heavy ropes requires muscular power but doing it for long periods of times will work your cardiovascular system, so it's also cardio. Other examples include the rope climbing machine, kettlebell swings, or cycling up a hill.

Resistance cardio is one of *the* best ways to burn calories, improve your cardio fitness and still maintain muscle mass. Resistance cardio burns more fat because using more force requires more energy. At the same time, using the muscles more will build up metabolites and protect them from degradation. You'll be building muscular endurance, and this can help you gain size. You may even benefit from some occlusion and blood flow restriction.



In many ways, it makes little sense to think of cardiovascular exercise and resistance training as being binary options. In reality, all forms of exercise are at once resistance *and* cardio and the question is simply where they land on the spectrum.

And note that performing any movement explosively will have a similar effect to resistance training. That's because the body is still exerting force, just as it would be to lift a heavy weight.

Add a resistance cardio finisher at the end of a workout and pick one that targets a similar area as the workout you have just completed. This will then allow you to send even more blood and metabolites to that area. Perform a shoulder workout and follow up with bag work or battle ropes and you will hardly believe the amount of pump you have at the end of that routine!

Metabolic Resistance Training

And so, my favourite form of cardio: metabolic resistance training.

This simply means that you are performing a regular resistance training session but with "incomplete recovery." The typical way to achieve this is by training with a circuit of different compound moves and calisthenics but not to rest between them. However, using massive drop sets can *also* have a similar effect. This is one of the ways we'll be sneaking endurance training into the SuperFunctional Program.

As mentioned, all resistance training is also CV: it still requires energy. The problem is that you can't continue long enough under normal circumstances to utilize the aerobic energy system. If you do hundreds of biceps curls for 40 minutes straight every day, you'll likely get tendon damage.

BUT if you perform curls, chin ups, squats, sit ups, press ups, burpees and tricep kick-backs all without a rest in between, then you are increasing the work capacity enough to start burning fat *while* building muscle.

For added credit, design the circuit to bounce from upper body work like shoulder presses to lower body work like squats. This way, the heart has to work even harder to send blood first to the top of the body and then the bottom. Another tip is to keep the weights you use relatively light to avoid injury.

LUNG TRAINING

One less obvious method for training your VO2 max, is to train your lungs themselves. Or more specifically, to train the intercostal muscles and diaphragm that help to expand and contract your lungs. This can increase the amount of air you're able to breathe in with each attempt, thereby filling your blood with more oxygen.

One way to do this is with something called Inspiratory Muscle Training (IMT). This involves using an apparatus or other method to add resistance to your usual breathing. The result is that your lungs need to work harder to achieve the same level of oxygen saturation. Something similar can be achieved with the altitude masks that you see people wearing in the gym. These products came under fire due to false advertising – they don't actually simulate a high altitude environment in all respects. What they *do* do however, is to help strengthen your lungs and improve oxygen delivery during intense exercise.

With time, this will allow you to take in more oxygen on every single breath. You can easily purchase devices called breath trainers online, and these will help you to conveniently engage in this type of training anywhere. Or wear the masks during training – just keep in mind that you won't be able to work as hard, meaning that you'll leave some gains on the table during those workouts. This is something to use "as and when."



Or you could just put a straw in your mouth and breathe through that, that works too!

IMT is often recommended for patients suffering with breathing difficulties such as asthma, but studies have also shown benefit for athletes, and the general public. has been heralded as a “five minute” exercise that can lower blood pressure, boost cognitive performance, and enhance cardio fitness ([reference](#)).

In one study, this was shown to improve rowing performance ([study](#)). Another demonstrated potential benefit for distance runners, although this one failed to produce significant results ([study](#)).

BREATH HOLDING

Want to take this a step further?

Practicing breath holding might be an exercise that can offer benefits on a par with the Wim Hof technique or even meditation. In fact, breath holding was traditionally practiced by yogis.

Breath holding can further strengthen the intercostal muscles and the diaphragm. It also helps to teach the body to become more efficient in its use of oxygen, increases carbon dioxide tolerance, boosts mitochondrial density, and raises EPO levels. In short, it teaches you to be able to perform with a lower oxygen content in your blood, which makes you more efficient at using it. This is why some athletes now practice running and engaging in other physical activities *while holding their breath*.



Another huge advantage is that it teaches you to become more resistant to high levels of CO₂ in your blood. This is important, seeing as CO₂ is actually a very useful substance that helps us to extract oxygen from blood cells.

Moreover, it teaches you to control your own response to physiological stress, and improves your overall mind-body connection. If you're going to reach impressive breath-hold times, then you *need* to learn to relax your body and mind in the face of stress.

Over time, these changes can drastically improve your athletic performance, lower your resting heartrate, and significantly reduce anxiety. And you'll start seeing notable benefits within one month.

There are two primary ways to train breath holding. One is by gradually increasing the amount of time you hold your breath in one go, which is known as O₂ training. This uses a fixed recovery period – usually around 2 minutes - to expel all CO₂, and the aim is to improve the body's efficiency when working with low O₂. Over time, you'll increase the challenge.

The other is to train by reducing the amount of time *between* breath holds, known as CO₂ training. Here, you will keep the breath *hold* consistent at around 1-2 minutes (this should be about 50% of your static PB), but will gradually decrease the rest in between from 2 minutes, to about 15 seconds. This results in a build-up of CO₂, which teaches the body to improve CO₂ tolerance, and thereby overcome the “burning desire to breath.”

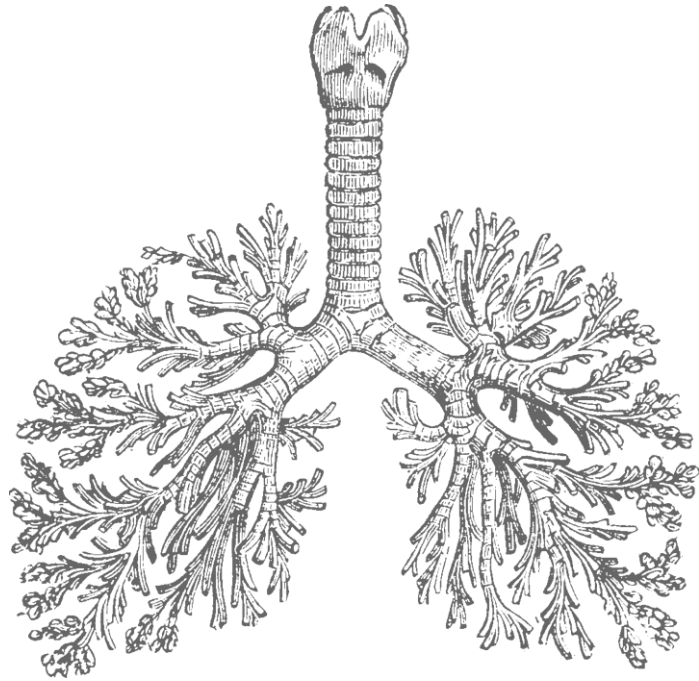
Typically, you'll follow CO₂ and O₂ “tables” respectively, which will provide you with a guided structure for gradually building up each practice. But at the same time, you should base this on your own current ability level and not push yourself too far.

CO₂:

REST	HOLD
2.00	2.00
1.45	2.00
1.30	2.00
1.15	2.00
1.00	2.00
0.45	2.00
0.30	2.00
0.15	2.00

O₂:

REST	HOLD
2.00	1.30
2.00	1.45
2.00	2.00
2.00	2.15
2.00	2.30
2.00	2.45
2.00	3.00
2.00	3.15



The great thing is that this is also highly meditative and is fantastic for building tremendous will-power and focus. Listen to your own physiological responses to the drop in blood oxygen, and use this opportunity to practice taking calm control over those reflexes.

Make sure you are somewhere safe when practicing breath holds. Interestingly, you can actually improve your performance further when diving thanks to something called the mammalian diving reflex, which kicks in in response to cold water on the face (where we have special receptors). This reflex lowers the heart rate by 10-25%, increases blood flow to the vital organs, contracts the spleen to release more blood, and alters internal pressure. It's quite amazing, and shows that we all have an untapped genetic heritage, and shows once again that training in nature can yield incredible, unexpected benefits.

It also means that Wim Hof was right about combining cold showers with breath training.

For our purposes though, "dry training" as it is known, is safer and more practical for the most part.

BREATH HOLDING WHILE RUNNING

Advanced level coaches are now introducing this kind of training for their sprinters, cyclists, and more.

Recommended Resource:

by Patrick Mckeown

But in the interests of SAID – Specific Adaptations to Imposed Demands – they also train breath holding *during* their workouts. As reported in *The Oxygen Advantage*, runners are tasked with such challenges as holding their breath during the last 30 meters of a 400 and 800 meter sprint. Author Patrick Mckeown recommends athletes to hold their breath after exhalation, rather than after inhalation as with the methods just described. This significantly decreases the blood oxygen saturation and ups carbon dioxide concentration. This is ideal for stimulating the production of red blood cells, and it can also reportedly improve the lactate threshold.

Mckeown recommends sprinters to practice jogging 80-100 paces while breath holding with six repetitions and a minute rest in between. He suggests doing this daily.

I'd love to tell you to try doing this while performing deadlifts, but the chances of breaking your spine are just too high. That said, with careful exercise selection, this could be cautiously integrated into a training program. My recommendation is to use it at the end of a large set of push ups, battle ropes, or perhaps resistance machines on a lower setting where there is no risk of getting crushed.

You can learn breath control from other less expected places too. In his autobiography, footballer Johan Cruyff described how his team received coaching from a professional opera singer to help them “gain the optimal return from each breath.”

OXYGEN PACKING

Want to go even further beyond?

If improving your ability to hold your breath has cognitive and athletic benefits, then surely we should be looking to the people who are able to hold their breaths longer than *anyone else*?

And who would that be?

Free divers! Free divers who regularly hold their breath for over ten minutes. The world record is an amazing 24 minutes and 3 seconds! Keep in mind this is achieved using pure oxygen and minimal movement, but it is still incredible. Magician David Blaine achieved a similarly impressive feat when he trained himself to hold his breath for 17 minutes and 4 seconds during a televised stunt.

OXYGEN PAKING: Inhaling increasing amounts of oxygen once your lungs are already seemingly at capacity.

We have come a *long* way since Houdini's then-amazing breath hold of 3 minutes, 30 seconds!

What strategies do they use to achieve these superhuman feats?

One answer is something called oxygen packing. This involves breathing in to take in as much oxygen as you possibly can... and then breathing in *more* on top of that. The logic is

that you are physically *stretching* your lungs and increasing lung capacity that way. Usually, we actually leave a large amount of space in our oxygens untapped when we inhale.

When attempting your personal best, incorporate this method in order to see how it might facilitate greater results. Over time, it may have long term advantages.

Keep in mind that this can be a dangerous activity. I recommend easing into it, and seeking further information on this if you wish to incorporate it into your routine – it will not be part of the SuperFunctional training program.

BREATHING EXERCISES AND OVERCOMING ANXIETY

As mentioned, breath control is also extremely beneficial when it comes to controlling your autonomic nervous system. We see this most clearly with the Wim Hof method and Tummo Meditation.

This is all possible because the way we breath is able to stimulate the vagus nerve. That nerve returns physiological information about our physiological state to the brain, in order to provide a two-way communication. In short, when we breathe quickly, it likely means we're either training or in danger. This information is relayed to the brain via the vagus nerve, which leads to an increase in hormones like adrenaline and cortisol. That means greater strength and performance, but it also means you breathe even quicker and you place a strain on your body. When left unchecked, this can eventually lead to a panic attack.



This is why it's so destructive to spend all day in a state of chronic stress. And it's why it's so unfortunate that most of us also exacerbate this problem by using shallow breathing due to poor posture.

Belly Breathing

Throughout the day, it's important to learn to use "belly breathing." This type of breathing involves relaxing the abdominal wall in order to allow the diaphragm and lungs to expand into that space *before* being filled up at the top as well. In short, it increases

the amount of useable oxygen space you have and helps to reduce stress throughout the day.

The Fourfold Breath/Box Breathing

Other breathing techniques allow you to control your breath and your mental state while also enhancing your CO₂ tolerance and oxygen efficiency. One example involves using something called fourfold breath, or box breathing – a method used both by yogis and by military personnel to attain a sense of calm.

If you check out my article/video on flow states, you'll see that using these kinds of strategies to maintain a sense of calm might even be linked with achieving flow states during intense moments.

To breathe this way, empty the lungs for the count of four seconds, inhale while counting to four, hold while counting to four, and then exhale while counting to four. This can feel a little uncomfortable, but it not only regulates your breathing to thereby help prevent hyperventilation and fight or flight, but also forces you to fully inhale and exhale, thereby achieving a better balance of O₂ and CO₂. Over time, you can try increasing the number so that the two breath holds are slightly longer – 5, 6, or 7 seconds.

Breathe in through the nose to clean the air and increase nitric oxide, and breathe out through the mouth.

The Dead Breath

The dead breath is similar and involves simply breathing out gently until all oxygen has been expelled, and then letting the lungs “hang” empty. As soon as you feel any oxygen hunger, breathe back in. You can repeat this a few times to gain a sense of calm.

Minding the Gate

Minding the gate is another very interesting option. Here, the aim is to breathe very shallow, light, and gentle. You do this by only letting the oxygen move as far as the nostrils before breathing out, to massively increase your CO₂ levels. Your breath should be almost imperceptible to outside observers.

This maintains high levels of CO₂, and the truly die-hard yogis will even go as far as to maintain this practice for entire days at a time – which also has the added bonus of improving your awareness of your own breath.

You can attempt to follow suit, or you can use it as a form of quiet meditation that will have added benefits.

WHM

Of course, the Wim Hof Method uses an entirely different strategy. This more rapid shallow breathing is designed to intentionally trigger a fight-or-flight response by starving the body of CO₂. This can result in short-term benefits such as increased strength and resistance to cold.

To use the Wim Hof Method, you take 30 quick, deep breaths (in through the nose, out through the mouth), and then take a final deep breath, exhale and hold until you feel a breath hunger. Inhale again as fully as you can and hold for 10 seconds. Repeat as you like.

File 1: advanced mental training

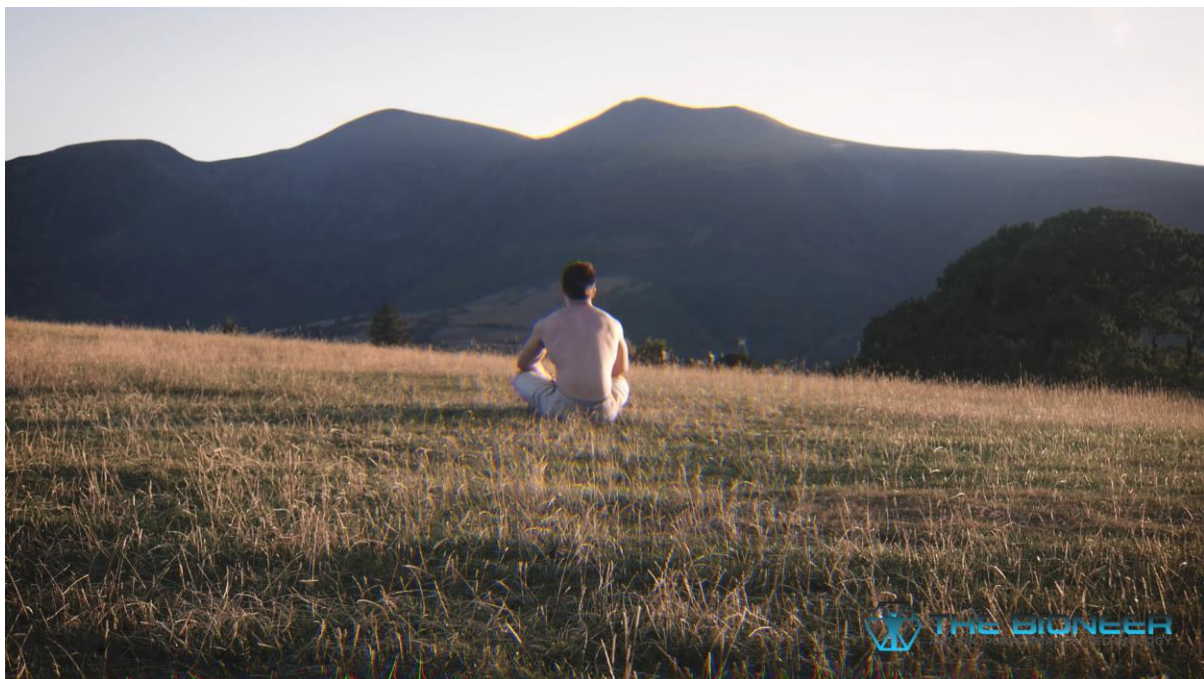
This section will continue the process of listing advanced and lesser-known forms of training that will be incorporated into the SuperFunctional Program on the basis of all we have learned about the brain and body.

MEDITATION

Meditation is a huge topic, with countless different types and near-endless benefits. Studies show that people who meditate regularly have more grey matter and greater connectivity in their prefrontal regions. They are more focussed, have improved working memories, and are less stressed. Meditation might just be the perfect tonic for modern life.

But meditation also seems daunting for many. It still has an air of mysticism about it, even though it is a very straightforward and scientifically sound practice.

For all its different forms and connection with yoga, psychology, and religion, meditation really just comes down to one thing: focus. It's very practical, and very straightforward. Regardless of which type of meditation you pick, you will ultimately be spending 10-60 minutes quietly focussing.



When you use transcendental meditation for instance, you will pick a mantra (a word that you repeat) and focus on that. When you use mindfulness meditation, you will focus on rising above your thoughts. And when you pick religious meditation, you will focus on a prayer, or a passage of religious text.

And whichever option you pick, this has amazing benefits for your brain power. With so many things constantly vying for our attention (your phone being one of the prime suspects), it is increasingly difficult to remain on-task. We have even lost the ability to

read dense passages of text! By practicing this skill, and by being more in-the-moment (though not at the cost of other mental states, if you recall from an earlier chapter!), we can increase our alertness, vigilance, and more. It also appears to boost working memory, which is likely because working memory depends on our ability to focus on something that we are visualizing or holding in our mind's eye.

Meditation of course can also help to combat stress and anxiety, and a good friend of mine describes it as somewhere you can “always go.” Meditation causes brainwaves to slow to gamma and alpha.

When you focus intently enough, this can actually result in other brain areas shutting down. In extreme cases, this can include those that are responsible for our sense of self and understanding of the world around us. This can cause an ego death, which is likely what some proponents are describing when they talk about “reaching enlightenment.”

If you've been paying attention, then you'll also realize that this is similar to what happens in the brain during a flow state – suggesting that meditation could help us to reach that state more easily (especially Hakalu meditation, which will be discussed below).

The confusing part is that there is not a single type of meditation. Indeed, we can consider Image Streaming (explained in a moment) to be a form of meditation. This practice involves turning your attention inward and concentrating intently on that stimulus, therefore it can be likened to a form of meditation and will have very similar benefits!

Here are some of the most common and/or useful forms of meditation that we will be adopting to varying degrees into the program.

Transcendental Meditation

One of the most popular and well-known forms of meditation by far, is transcendental meditation – or TM. This type of meditation original comes from India during the 1950s, and is practiced by many high profile celebrities.

The general concept however is very simple, and is actually one of the most tested. Simply, practitioners are tasked with completely emptying their minds of all thoughts and all distractions. They do this by focussing on something – which will very often be a mantra. A mantra is just a word or phrase that you repeat over and over, and this could be as simple as the word ‘Om’ (so *that's* where that comes from!). The mantra should have no meaning, because the aim is not to ‘reflect’ on meaning and thereby trap yourself at the “surface level.”

The aim though is to focus just on this mantra, and then to allow all other distractions to sink away. If you notice yourself thinking about something else, just calmly bring your mind back to the point of focus and calm.

Transcendental meditation is a regulated form of meditation that is led by instructors. However, it is also very similar in aim and method to other forms such as vedic meditation. We can use TM as a broad term to describe almost any form of meditation where the objective is to empty the mind by focussing on a singular qualia (stimulus).

Body Scan/Progressive Relaxation

Body scan meditation is often used in conjunction with mindfulness meditation, and is what we can think of as a form of ‘kinaesthetic meditation’ (meaning that the focus is on the body and the way you feel).

KINAESTHETIC MEDITATION:- MEDITATION FOCUSSED ON THE BODY AND PROPRIOCEPTORS

The aim of this kind of meditation is to gradually move your focus across your body, while relaxing each muscle during the process. Throughout the day, we all carry a lot of tension in our muscles. Some of this is caused by stress, some by knots in the fascia that surround your muscle, and some by normal, healthy tension known as ‘tonus’ (this is what helps to keep a little tautness in the muscles and prevents our body from completely relaxing in a limp heap!).

When you use progressive relaxation, your aim is to release as much of this tension as possible – calming the mind as a by-product. So, you might start by focussing on your forehead. Is there any tension in your brow? How about your ears?

Contract each muscle, then make a conscious effort to release it – breathing out slowly as you do in order to ensure that the area is fully relaxed. This form of meditation not only distracts you from your troubles and helps you to get “out of your own head,” but it also gives you the ability to fully relax on cue. This can be a very useful method for getting to sleep for example, if you are someone who struggles with insomnia perhaps.

What’s really interesting about this form of meditation though, is that it practices muscle control. As you improve your abilities with muscle control, you can use a body scan meditation to even more fully relax your whole body and release tension. It’s a great “2-for-1 exercise” that will let you develop focus AND greater control over your body. It’s also a useful option before beginning a workout. This is something I recommend for the SuperFunctional training plan.

Breath Awareness Meditation

Breath awareness meditation is exactly what it sounds like: a form of meditation that involves focussing your full attention on the breath. This can mean that you count your breaths, that you breathe in a specific manner (earlier in this book, we talked about different breathing strategies that we can use as meditation), or simply that you focus on your breath. Whatever the case, this once again provides you with a single focal point, and the idea is to release all other thoughts so that your mind becomes quiet and calm.

Gazing Meditation

Gazing meditation is a yogic tradition that is “externally focussed.” All that basically means is that you’re going to be focusing on something outside of your own body – which might mean that you’re focussing on the movement of a flame, a running river, or something else entirely.

If your eyes become tired or you need to blink, close them and try to focus on the after image of what you were gazing at. Then, when ready, open them slowly again.

This can again be used in the same way as TM – the idea being to calm the mind and remove distracting and unhelpful thoughts.

Many people find this to be one of the easier methods to get started with, as there is a useful outside distraction. Try to think back to the last time that you found yourself gazing off into the distance having completely lost yourself – that is the state of mind you’re trying to get to. Knowing that this is your goal, it can make it easier to return to again.

Using a candle, a water tank, or the leaves rustling in the wind can all provide useful points of interest.

Hakalau Meditation

Hakalau meditation is a form of meditation that involves engaging the peripheral vision. We spend a lot of time focussing our attention narrowly on one thing, especially when using a smartphone or computer. This is a state that the nervous system associates with stress and focus – it suggests that there is a point of interest we must get away from, or must get too. As such, hakalau meditation tells our autonomic nervous system that there is no immediate threat and thus helps to put us in a calm state – it's another way to hack the nervous system by changing the input.

(For the record, changing the inputs is how you hack any system – and the body is no different.)

What's more, is that practicing the use of peripheral vision actually has a lot of application. Survivalists use a similar practice (sometimes referred to as “owl eyes”) in order to improve their ability to spot predators and sources of food when walking through the woods. Likewise, intelligence officers in the MI5 and CIA will use a technique called “scatter vision” to quickly scan a crowd for a target.

Even cooler, is that your brain and body are actually faster to react to stimulus found in the peripheral vision. This way, when sparring against a partner, you can actually significantly improve your performance by relaxing your eyes and spreading out your vision, rather than focussing on any one single point.

Like many other forms of meditation on this list, hakalau can be used in conjunction with other techniques and activities – ranging from nature walks (which help to relax the body on their own), to movement practice.

Kundalini Yoga Meditation

Kundalini yoga meditation is a form of mediation that incorporates specific movements, diet, and more. The aim is that you're going to be looking to improve your flexibility, muscle tone, and strength, while at the same time calming the mind and improving your breathing – getting a whole lot of bang for your buck.

In the SuperFunctional training program, we need to focus on exercises and techniques that provide more than one benefit – it's the only way to fit in everything that we need into one workout. Thus, we will be borrowing some ideas heavily from kundalini meditation!

Nada Meditation

Nada meditation is another yogic method that involves using an outside stimulus. This time though, you will be focussing on your other sense: hearing.

Nada meditation means focussing on one sound, which can mean listening to the sound of a babbling brook for instance, the wind, the traffic... You can alternatively open yourself up to all the sounds around you and take a moment to stop and listen to as many sounds as possible. It might surprise you to learn just how many sounds you miss out on normally – and how much you can hear when you broaden your scope.

Nada meditation can also be achieved using music, which many people find is an easy way to get themselves lost without thought. This is also an excellent way to develop your hearing and your awareness.

By combining nada meditation, gazing meditation, and hakalau meditation in public spaces, and adding a type of mindfulness, you can effectively train your ability to be aware of your surroundings. You can do this while walking. This can improve your **situational awareness** which is another technique used by intelligence officers and the special forces to ensure they are the first to identify a potential threat.

You can also develop night vision, by practicing “sensory” meditation in dark places. This will also heighten the acuity of your hearing.

Chi Kung

From Shaolin Kung Fu, Chi Kung is a form of meditation that really means ‘energy work’. Its objective is to help practitioners visualize the flow of ‘chi’ (qi) around the body, in order to enhance health and strength. Of course, your belief in chi may vary – but whatever your interpretation, the visualisation can help you to better focus the mind and even develop a better connection to your own body.

Chi Kung involves holding a number of positions, which place a light amount of strain on the body. This further helps to route the mind in the body, as does gently moving occasionally from one to the other. You will practice controlled breathing, and at the same time bring the mind to the centre – or the “dan tien” – which is located a couple of centimetres below the navel and also happens to be the centre of gravity.

Tai Chi

Tai Chi is a form of meditation that has close links to Chi Kung. Here, the movement is far more continuous, with practitioners gently progressing through a series of stances and movements.

Again, the idea is to use this as a form of kinaesthetic meditation, wherein the focus on the body helps to clear the mind. At the same time though, this can also be a good way to develop a greater control over the body and greater strength. Each of these movements in fact has a martial application, and when delivered with speed and power can be deadly.

We have already talked about using hand balancing and similar methods to practice proprioception and balance. By combining this with a form of focus, you can essentially train your mind at the same time. This works even better with eyes closed, as discussed earlier.

Self-Enquiry Meditation

For those who want their meditation to be a bit more spiritual but who perhaps don’t want to adhere to any particular religion, self-enquiry is an ideal form of meditation. Here, you focus on yourself, your beliefs, and your goals.

Where do you see yourself heading in life? What is the meaning of your existence? Are you happy? This is another form of yogic meditation, and of course has a lot of potentially profound benefits. It can also be used as a form of metacognition (more on this in a moment) in order to explore aspects of your own thought and thereby enhance them.

Productive Meditation

Productive meditation is distinctly *not* spiritual, and seems almost to be an anathema to the idea of meditation in a way. That’s not the case however, as once again, this type of meditation simply involves committing yourself to a particular line of thought and then focussing the mind on only that thing.

You see, productive meditation – first suggested by Cal Newport in the book *Deep Work* – is a type of meditation where the focus is on a problem that you are having in your work or personal life. Or perhaps you’re trying to think of something creative? Maybe you’re trying to come up with a new idea?

Mindfulness Meditation

Mindfulness meditation is the last item on this list, not because it is obscure – in fact it is perhaps the most popular option right now – but because we’re about to dive into it in much more detail. This has recently become popular thanks to the prevalence of CBT (cognitive behavioural therapy) in psychotherapeutic schools, and involves detaching yourself from your thoughts. You do this by deciding to sit back and “watch” your thoughts go by. Often the analogy is given that you are “watching clouds move across the sky.” So, you don’t tell yourself off for thinking something, and nor do you force a thought. You just let them pass, and you make a conscious effort to be aware of them as they do.

The aim of this is partly to allow yourself to detach from your thoughts, and thereby to gain a sense of peace and calmness that might otherwise elude you if your thoughts are constantly racing and troubled. At the same time, it is also useful as a means to gain better insight into your own thought process. This in turn can be useful as a way to better understand what might be *making* you stressed or otherwise.

METACOGNITION

Many athletes and coaches agree that the next breakthroughs in human performance will involve training the human brain. An athlete’s ability to perform at their best is dependent not only on their energy, speed, and strength, but also on their confidence, focus, and awareness. Many of those same coaches and athletes believe that mindfulness and cognitive behavioural therapy are some of the key tools that we can use to get there.

Why is it that you choke when you are under pressure? Why is it that you can’t find the motivation to train when you’re tired? Why can’t you summon maximum strength at will?

The key thing to understand here, is that it is our thoughts that shape our experiences, which in turn shape our emotional response and thus our performance.

For an example of this, consider a situation where you are lost in the woods and there is a wolf hiding in the bushes stalking you. In one situation, you know about the wolf, thus your heart rate is high, your adrenaline is flowing, and you are in the throes of fight or flight. But in the *exact* same situation, you might not know about the wolf and thus be completely calm.

Or what if you know about the wolf and you have a phobia of wolves? Or you know about the wolf but are so confident in your physical capability (rightly or wrongly), that you are not even slightly concerned?

It isn’t the wolf that causes your emotional response, but your internal representation of the situation.

Thus, if you can control your internal representation of a situation, then you can control your mental state and therefore your ability to perform.

This is essentially what cognitive behavioural therapy is all about. It means controlling your thoughts and changing your beliefs in order to reprogram yourself. And this in turn is a form of metacognition: which means “thinking about thinking.”

METACOGNITION: Thinking about thinking

CBT is generally used by therapists to treat mental health disorders, such as phobias, anxieties, obsessive compulsive disorder, or limiting beliefs.

To approach this, a therapists will typically use mindfulness meditation in conjunction with two techniques: thought challenging and hypothesis testing. This can also be used along with tools such as calm breathing (which we are also learning all about in this book). To demonstrate, let's imagine that a client approaches a therapist with a crippling fear of heights.

Mindfulness is first used in order to address and identify the types of thoughts that might be causing this fear. For example, you might realize you are thinking things such as:

"I might lose my balance."

"What if I jump?"

"I might slip."

"What if it collapses?"

Or even just picturing yourself falling to the ground and breaking limbs. Something to keep in mind is that cognitive behavioural therapy *should* also include visualization as well as "spoken" thoughts.



Our job then, is to remove these thoughts. First, we would use thought challenging in order to assess how likely those thoughts are, and even whether they are even valid.

How likely is it that you would slip? And then fall off?

When was the last time you slipped for no reason? If you hold the hand rail, isn't that even less likely? And wouldn't the area here be *extra* safe?

If you were to slip, would you really fall *through* the railings? Wouldn't someone help you?

And wouldn't the floor here be extra grippy anyway?

Even if you did fall, would you know anything about it? Or would it be a relatively quick and painless way to go out? (Sounds scary, helps some people!)

(This is similar to a technique that Tim Ferriss uses called "fear setting.")

Recommended Resource: *The Four Hour Workweek* by Tim Ferriss

Hypothesis testing is similar, and involves *proving* to yourself that your beliefs are unfounded. Worried people will laugh at you if you stutter? Then try *intentionally* stuttering in front of people to prove once and for all that people are calm, and you can be yourself.

In this situation, you might attempt to climb over a railing somewhere. You'll find that not only is it unlikely you'd fall off, but that it's actually difficult to do *even intentionally*. Of course this must be done in a safe manner.



This can then be combined with positive mantras:

"This has been built with safety in mind. I am in control of my own movements. My feet are planted firmly on the ground."

At the same time, you can combine all this with a greater awareness of your own physiological reaction – in order to calm your mind and your body. For example, you might use the fourfold breathing technique to help get your heartrate under control. You can also visualize and sense your feet as being powerfully gripping to the floor (easier if you are also in minimal footwear).

This is the basis for CBT, but it can actually be used in many other ways to improve your focus and confidence, helping you to tap into flow states, and accessing greater motivation and drive when you need it.

BECOME SOCIALLY BULLETPROOF

One of the best demonstrations of the power of CBT is how it can transform your ability to interact in social settings. If you are someone who is very shy or socially anxious, this can be life changing. But all of us are sometimes held back by insecurity, or a fear of looking stupid.

This is actually a bigger limitation than you might realize. Negotiations and disputes are won very often because one person can't stand the social pressure to be agreeable or to make the other person happy. We often fail to speak up in situations where we stand to gain, and the bystander effects suggests that social pressure might even prevent us from taking action when someone needs our help (though the evidence surrounding this is a little uncertain).

So how do you become socially bulletproof?

Taking the CBT approach and applying thought challenging and hypothesis testing, you would first ask yourself *why* you are afraid to be awkward or uncomfortable in a group setting. If you're never going to see the people again and you aren't causing them any harm... then for what possible reason does it matter what strangers think of you?

The only real way to make this realization sink in though, is to actually practice being as awkward and strange as possible during social interactions. The best time and place to do this is in a shop far from where you live (so that you are unlikely to ever encounter the store keeper again).

Practice going into shops like this and ordering your items in a funny accent, or while saying strange facts. It feels immensely uncomfortable, but over time you will decondition your own stress response to social pressure, and you will prove to yourself that there are no negative outcomes to embarrassing yourself.

The result is a liberating ability to behave however you think is most appropriate in the situations that matter. You can approach and speak to anyone, and stand up for yourself as necessary.

SLEEP WELL EVERY NIGHT

One of the most powerful examples of CBT I've used in my personal life is to get to sleep. I lost my Dad at a young age (9 years) and for a while after this, I had trouble getting to sleep. I saw a few therapists, all of whom failed to provide any useful answers. It was my Mum who eventually fixed the problem for me, with a throwaway line: one that actually embodied the lessons of CBT long before either of us had heard of it.

She said that I shouldn't worry if I couldn't get to sleep, because simply *relaxing* in bed was a good way to recharge my batteries.

This realization was profound because I immediately felt all pressure to get to sleep being removed. Now I could drift off to sleep as slowly or quickly as I liked with no pressure. Thus, I was no longer in an aroused stressful state. And what do you know? I got to sleep really quickly!

With this new belief, I now looked forward to time in bed as an opportunity to lie and daydream/have ideas/make plans – all with no time limit or pressure. Of course, the moment I started enjoying lying in bed – and wishing it would last longer – I started falling to sleep in minutes.

METACOGNITION AND PERFORMANCE

Another area where CBT and mindfulness can be useful, is in achieving a calm mental state in high stress situations, or for digging deep to find motivation to train. Here though, the focus is very much on the ability of thoughts to guide and influence emotions, which in turn alter brain state and performance.

One way to increase motivation and adherence for training, is to look at what is *really* holding you back. This can require some real soul-searching and reflection. Often, I find myself too tired to train. What I learned by using some self-reflective meditation, was that the real reason for this was that I was looking for sympathy, from both myself and others.

In other words, I would assume the identity of being tired or stressed. I would mope around the house on purpose, hoping my wife would tell me to take it easy, or using it as proof for myself that I deserve a quiet night. I felt as though any training would somehow exempt me from being looked after.



Understanding this, I now remind myself that moping doesn't achieve anything, and that people are **more** impressed when I demonstrate my ability to train *through* nearly anything.

Similarly, when tired, I have identified that often the reason I don't want to train is that I don't want to *wake myself back up* and on some level, I feel that this will make me sleep less well when I am getting there. I now remind myself that I am someone who never has trouble sleeping, and who can sleep again easily. I might also use different strategies – such as starting with my mobility routine which is gentle and not prone to raising the heart rate.

I am not presuming that you are necessarily the same in these regards (though it is a deep suspicion of mine). What I am suggesting, is that by understanding the unconscious reasoning and thoughts that motivate your emotions and energy levels, you can work with them and around them.

It is true that the evolutionary purpose for sadness is currently thought to be a means for getting sympathy – so this does track.

Likewise, I read a very interesting study recently that the deleterious effects of stress were largely due to our understanding that stress *makes* us experience those things. People who recognize they are stressed but don't think of that stress as harmful, actually experience very few of the same negative symptoms stress can cause (and in fact they appear to have longer lifespans!).

EMOTIONAL INTELLIGENCE

CBT is closely linked with another form of “metacognition.” That is “emotional intelligence.” Emotional intelligence (EQ), refers to our understanding of our and other people's emotions. This is a key skill to develop that is largely overlooked. Understanding the thoughts of others, is a crucial skill in many different walks of life. Far more than increasing focus, or testosterone... if you want to succeed in the workplace then *emotional intelligence* will get you there. EQ can likewise improve your relationships, make you a better salesperson, and more.

But when we turn emotional intelligence inwards, that's when it becomes even more powerful. The ability to recognize your own emotions and how they affect/are affected by your thoughts, is hugely influential on the rest of your life.

In some cases, your thoughts can influence your emotions. We have seen this to be true when considering CBT: changing your thoughts about a situation can cause a different emotional response.



But likewise, your emotions can also influence your thoughts. Our thoughts are repeatedly darker when our mood is worse – which can create a vicious cycle.

And where do emotions come from? When it's not thoughts, it is either experiences, or physiology. Experiences are harder to control and predict, but physiology is easier to do both.

For example, you will find that when you are very hungry, this increases cortisol and adrenaline. These are fight or flight hormones, and thus your thoughts become more negative, and you become more focussed and alert.

If you are hungry, then you are more likely to be angry or upset. Thus, you might say something in the heat of the moment that you regret. Likewise, the world can seem like a very dark place at times, as our emotions take hold of our perception of our lives.

Learning to recognize that your emotions can affect your thoughts this way can have profound impacts on your motivation, your happiness, and your efficiency. Feel bad now? Then wait it out and come back to the problem when you are well-slept and fed.

It's incredibly difficult to be highly motivated or productive when you are feeling low. Using CBT will help you to overcome this to an extent, but recognizing the *physiological* stimuli that can lead to emotions is similarly important.

Learn to recognize your own emotions and your own triggers. How do light/food/time of day/recent interactions you've had all impact on your emotional state? And with that in mind, when is the best time to engage in X or Y? How can you best control your surroundings to ensure you are more productive?

Here's a simple one: don't have dinner and sit down until you have finished all the productive things you want to that evening. You'll find that the sudden release of serotonin after eating a big meal, and the feeling of relaxing, all make it very hard to get back up and be productive again.

Likewise: learn your chronotype so that you know what time of day you will function best. Avoid responding to an email while you're angry – wait a day and then respond.

Moreover, how can you influence those emotions, such that you will be effective again? I call these "inspiration hacks."

INSPIRATION HACKS: TECHNIQUES DESIGNED TO CONTROL YOUR EMOTIONAL STATE TO PRODUCTIVE ENDS

For example, you might find that watching a certain video always gets you psyched up ready for a workout. Why not keep this on your phone and then watch the best part when you are feeling a lack of motivation to train?

The same thing can help to motivate you to work: I'll often watch clips from *Limitless* or *Iron Man* to have this effect. I have actually edited together a few montages that I used this way to "prime" my mood.

Likewise, design your gym and your office to be *as* encouraging as possible to enhance your work. This should be a space filled with things that inspire you, and designed in such a way that you can't wait to be there. My personal office/gym (my "Biolab") uses futuristic lighting, combined with artwork of superheroes, scores of books on self-development, and renaissance-era inspired sculptures of globes, thinking men, and the human brain.

In his book *Deep Work*, Cal Newport describes a hypothetical space – a thought experiment in architecture – designed specifically to encourage a productive headspace.

Recommended Resource: *Deep Work* by Cal Newport

I also find that spending time thinking about my goals and the subjects that fascinate me, result in my being constantly more inspired (note that inspiration and motivation are

extremely closely linked). I am FAR more productive as a result if I am listening to audiobooks about training, the brain, or productivity – versus using my spare time listening to YouTube videos about inane subject matters. I highly recommend doing the same, particularly as this is also a great form of “incidental training” that will allow you to learn while partaking in other tasks. (and this book has given you some great titles to choose from!).

Studies have suggested that people with greater self-awareness and willpower are better at controlling the cognitive effects of alcohol intoxication. This makes a lot of sense if you consider your own experiences. If you have ever been drinking on a night out only for something bad to happen (perhaps you or a friend gets hurt, or someone loses their wallet), you will find you often become instantly more sober.

How? Simple: an increase in cortisol, adrenaline, dopamine and other arousal-producing neurotransmitters and hormones will combat the effects of the GABA (an inhibitory neurotransmitter) that was produced by the alcohol. The fight or flight response is so strong, it can break you out of your drunken stupor. Likewise, some people with greater control over their own emotions can fight the effects of alcohol.

Happiness Will Help You Train

Keep in mind that for all these reasons, being a happier and more optimistic person will allow you to work out harder, and to be more productive. When you are depressed and stressed, your energy is spent. When you see nothing but opportunities and have had a great day, you will find it much easier to dig deep and do a workout.

This is something you can cultivate to a degree (practice thinking about the positive in any situation). But it's also why it's so important to build up every pillar of your life. You will be able to follow this program more effectively if you invest time and effort into the most important relationships in your life.

WAKE UP ON TIME EVERY MORNING

The following will explain how to wake up quickly to your alarm every morning, and therefore decide precisely when you wish to start your day. It is also a great demonstration of using EQ and metacognition to take control over your focus and productivity.

The key is to recognize that there are two profoundly true laws for your motivation:

- Motivation is ruled by emotion primarily and logic second. We think we are logical beings, but we procrastinate when we don't emotionally feel engaged with what we are doing. And any salesperson will tell you that the majority of your purchases are based on emotion and NOT logic.
- The most powerful motivating emotions are those that are IMMEDIATELY relevant. Focussing on the long-term reward most often will NOT trump the option to feel good now.

Keeping these things in mind, why do you stay in bed when you should get up? Why do you hit snooze? Your emotions are governed by physiology, and right now your motivation is rock bottom because you are in a state of *sleep inertia* with your thoughts still muddled.



You can remind yourself that you will have a less stressful week if you get up and be productive right now. But because that reality is so far removed from the present moment, it's rare that this will be motivating enough to actually help you to get out of bed.

So we can fix both these issues with a two-pronged attack. First, we use a daylight alarm – a clock that will gradually get brighter and mimic the rising of the sun. This will create a physiological response and help us to produce more wakefulness chemicals (cortisol, nitric oxide, adrenaline) and it will reduce the effects of sleep inertia by bringing us around gently.

This is the difference between being started awake in a dark room, versus being gently nudged into wakefulness by a slowly increasing light.

The other trick is to have something to hand that you can do immediately, that you really look forward to doing. My recommendation is to grab a phone! Because while many self-help books tell you *not* to look at a phone first thing in the morning (it puts us in a responsive and perhaps stressed mood), the fact is that this is something many of us want to do. The social reward, and the dopamine hit is strong enough to be a powerful motivator.

If all you need to do is to prop yourself up slightly to get the stimulation from the phone, then you will often find you can manage that. And when you start flicking through that phone (which further elevates cortisol thanks to the blue light from the screen and the interactivity), you will find that this wakes you up thoroughly.

The emotion is what drives the action, and you now have one that is strong enough and *immediate* enough to override the urge to roll back over to sleep.

Some other examples:

- Make yourself more likely to be productive by finding ways to make that thing more interesting.
- Focus on the *emotional* benefit of what you are doing. This is why priming your mood with montage videos works so well, it forces you to remember how it will

FEEL when you accomplish your goals. Because it's right there, right now, it will put you in that headspace.

- Find yourself snacking? Visualize the last time you ate when you shouldn't: how it made you feel slightly sickly, how it made you feel guilty. This can then help you find the motivation and willpower *not* to eat that thing.

Use CBT and meta cognition in order to better understand your own emotions. Be more aware of how you feel and why – as well as how to change that feeling. This will also help you to better understand the thoughts and emotions of others.

COGNITIVE SIMULATION TRAINING

Cognitive simulation training is a concept I came up with while researching this book. The idea is simple: that you are going to use visualization in order to face puzzles and challenges that you normally would not.

There is plenty of evidence to suggest that visualising these skills can allow us to develop them just as we would do were we to practice them for real. We already know by now that visualisation is tantamount to working memory, which in turn requires us to light up similar brain regions to those used during *actual* activity ([study](#)). We also know that embodied cognition suggests this might serve as the basis for our abstract thinking.

What's more, is that we can use “cognitive simulation” to simulate challenges and mental puzzles that we would face in real life.

For example, you can use visualization in order to practice routes around your local area, or to rotate objects in your head. You can practice memory recall, and you can attempt math problems. Does this really result in the same improvements as the real thing? One amazing case study is that of Anatoly Sharansky. Sharansky was a human rights activist who spent nine years in prison based on a false accusation of spying in 1977 – and he spent much of his time in isolation.

To avoid letting the isolation drive him insane, Sharansky practiced mental chess – imagining playing chess against himself and storing the positions of each piece in memory. Amazingly, Sharansky would go on to beat the world champion – Garry Kasparov – upon his release!

Similarly, purely through rehearsal of mental maths, Rudiger Gamm was able to develop his skills in this domain to the point of being considered a “human calculator.” These cases and many others are described in *The Brain That Changes Itself*.

Recommended Reading: *The Brain That Changes Itself* by Norman Doidge

There are other ways to use cognitive simulation too. One is to prepare and plan for events. When I was doing the practical exam for my personal training diploma, I would utilize mental rehearsal to run through the whole thing over and over again, to ensure it was perfect.

Likewise, when leaving the house for an important event, I use mental simulation to check I have everything I need: I imagine myself going through the rest of the day and make a note of each item I need as I “use” it. This also works when making sure you have all the ingredients for a recipe you're cooking while going around the supermarket.

And finally, cognitive simulation like this can also be useful for practicing physical skills – especially martial arts kata, dance, or technique-heavy movements like the deadlift or clean and jerk. Again, there is plenty of evidence to show that this kind of mental

rehearsal is *almost* as effective as the real-deal for improving the speed and efficiency of many types of movement.

The following are examples of “cognitive simulation” that I use regularly in order to train my brain even while doing other things.

BIG IDEA THINKING

Big idea thinking is similar to productive meditation and simply “ups the ante.” This means engaging with a much larger problem than the kind you would normally face in your real life, which in turn makes you better at thinking on a grand scale, not to mention being more creative and getting out of your usual comfort zone.

Recommended Resource: *Make Your Brain Smarter* by Sandra Bond Chapman

Our brains love this kind of thinking, and it is incredibly good for plasticity and brain health.

An example might be to imagine being prime minister/president and to run through the changes you’d realistically make. What implications would those changes have? How would you afford them?

You might also challenge yourself to create inventions that solve common issues you struggle with. Or maybe to answer big questions – like the nature of consciousness or the origin of the universe.

One of my favourites is to imagine that I have been tasked with writing the next James Bond/Terminator/Transformers movie, or the next run of Iron Man comics. Then I ask myself how I would continue the story in an exciting and logic way. It’s a fun way to pass the time, and it practices your imagination, creativity, and visualization.

EMOTIONAL RESPONSE AND EXPLORATION

A method that is closely linked with CBT and mindfulness involves simply exploring your emotional responses to particular memories or events. You might spend some time thinking about something that makes you very stressed, or angry, or sad. Then you reflect on why you are having those emotional responses, and try to bring yourself back to a sense of calm.

NAVIGATION

Many of us struggle with sub-par navigation skills, which is due to the small amount of navigating most of us actually have to do. This is a big loss, given that our ability to navigate would once have been among the most important mental skills (when we were hunter gatherers). Learning lots of routes is great for plasticity, and it is an oft-quoted anecdote that taxi drivers have among the heaviest brains of any profession.



To practice your own navigation skills then, you can simply try guiding yourself around a place you haven't visited for a long time, or taking yourself to a particular destination on foot or in the car. Just picture yourself leaving the house and then turning in each direction as necessary to find your end point. Along the way, what do you see? What landmarks and points of interest?

This can eventually be developed in the system of loci, or a **memory palace**, whereby you use each point on that route to trigger a specific memory. This way, it is possible to memorize huge, long speeches, or reams of useful facts.

MENTAL ARITHMETIC

A very simple way to train your working memory when you don't have a dual N-back test to hand, is to try doing some long multiplication or division entirely in your head. Likewise, you could progress to playing mental chess!

PHYSICAL PRACTICE

To improve kata, dance moves, or anything else, you can practice rehearsing those things even when there is not the physical space to do so.

OLD MEMORY RETRIEVAL

Spend some time trying to retrieve very old memories in all their multi-sensory glory. For example, you might try to picture an old class room, or an old friend's house. It's amazing what you keep locked away.

You can also try retrieving shorter term memories, such as what you ate for dinner three days ago – it's surprisingly hard!



And you can train your factual memory by playing games like the alphabet game – naming songs beginning with each letter of the alphabet, or listing as many items in a certain category as possible as quickly as you can.

While there's not research to back this up, it could hypothetically help to improve your ability to retrieve memories quickly as needed – making you wittier and quicker on your feet.

Practicing dream recall is a related exercise, which certainly *does* improve your ability to remember dreams with time.

MENTAL ROTATION

To enhance spatial awareness and visualization skills, practicing picturing a 3D object and then viewing it from different angles.

LEARNING NEW SKILLS TO INCREASE PLASTICITY

When looking for examples of amazing plasticity, we are often keen to point to young children. As children, we were able to learn languages without even trying, to acquire skills like walking and writing, and to come to recognize countless objects in our environments. The believe of many psychologists is that young children have a kind of “critical period” in their development, during which this is possible. This is then theoretically lost to us in adulthood.



Except there could be another way to look at this. Perhaps a child's brain is so plastic *because* the child spends so much time learning. We know that learning new skills increases markers of plasticity such as dopamine, BDNF, and nerve growth factor. And with that in mind, it follows that children's brains would be *awash* with these chemicals. After all, as a young baby, *everything* you see around you is new and novel. You need to learn everything from how to stand, to what colours are, to the faces of your parents. This state of constant learning continues into childhood and starts to diminish as we become teenagers and adults. As teenagers we are still taking in plenty of new experiences: work, relationships, driving. As young adults we likely try out a few different jobs, become parents, etc.

But eventually, you normally "settle down" and fall into a routine, where the amount of new skills and experiences you are exposed to slows right down. If you do the same job every day, and have the same evening routine, your brain has no need to be highly plastic.

In short: the more you learn, the better your brain becomes **at learning**.

While we can't quite emulate the experience of being very young children again, we *can* continue to challenge ourselves and expose ourselves to new things. By challenging yourself to learn new abilities, skills, and facts, you can keep your brain plastic and youthful – you can remain adaptable.



Spend some time learning other languages, learning to program, becoming an electronic engineer, learning ancient Greek history... whatever it is that interests you. I recommend that you set aside time for this development, which will *also* have the added bonus of providing you with greater knowledge and more skills.

Best of all though, is to acquire new *physical* skills. This is again why training the brain and body together make so much sense. The simple act of learning to walk on your hands can trigger huge plastic change in the brain as it learns to coordinate all those tiny muscles, and even to view the world from upside down.

Recommended Resource: *Animal Moves* by Darryl Edwards

Ideally, supplement the novel movements in this plan with others that you research yourself. I highly recommend looking into Animal Moves and Ido Portal for more on that topic. Likewise, taking a martial arts or dance class as a supplement to this program is **highly** advised.

AMBIDEXTERITY

Ambidexterity is another example of a mental and physical skill that I believe everyone should be practicing – and that I almost can't believe is still so niche.

Here are a few reasons I believe it is so useful and important to train for ambidexterity:

- Ambidexterity provides you with two limbs rather than one that you can use to execute tasks. This is a huge advantage in a fight, where you can fight both southpaw and orthodox. It is a massive advantage in most sports. And it can be hugely useful when multitasking in your kitchen!
- Ambidexterity can lead to a more balanced physique, as you are able to train equally with limbs on both sides, avoiding asymmetry.
- Many careers, from artist to surgeon, can benefit from ambidexterity
- Improve your typing speed
- Keep a steadier hand when manipulating an object with both
- Ambidexterity may help to improve creativity and problem solving. That's because it thickens the corpus callosum – the thick bundle of nerves that connects the left and right hemispheres. This structural feature has been witnessed in the brain of

Albert Einstein and may go some way to explaining his extraordinary insightfulness.

- Many other highly creative individuals such as Ben Franklin, Da Vinci, and Tesla are thought to have been ambidextrous (there is some uncertainty surrounding Da Vinci, though recent evidence suggests he in fact was).
- This is an excellent opportunity to practice developing the mind-muscle connection, increasing strength on the left side of the body. This may enhance the “physical intelligence” that embodied cognition describes.
- It’s a brilliant way to kick start further plasticity.

In the early 20th century, John Jackson established an Ambidextral Culture Society believing that ambidexterity and “two-brainness” could lead to the betterment of mankind.

Jackson wrote:

“Each hand shall be absolutely independent of the other in the production of any kind of work whatever... if required, one hand shall be writing an original letter, and the other shall be playing the piano, with no diminution of the power of concentration.”

This is not the reigning perspective today.

There is some concern that training ambidexterity may lead to neurological disorders. However, this concern is based on poor reading of studies. These studies show there to be a correlation between ambidexterity and issues such as stuttering and reading disability.

What’s key to understand here though, is that these show a correlation and not causation. In other words: one does not necessarily cause the other. In fact, what is most likely is that ambidexterity arose as a result of the conditions that *also* happened to lead to those disabilities. For example: should one brain region fail to develop fully, this might leave “space” for ambidextrous abilities to form.

There is evidence to support this hypothesis. As one study reports:

“Systematic investigations of the second group of subjects always revealed perinatal cerebral disturbances. This paper discusses the thesis that insufficient oxygen supply to the brain in the perinatal period of life mainly affects the function of the dominant cerebral hemisphere that is responsible for the congenital handedness.”

In other words, cerebral disturbances here *led* to innate ambidexterity, not the other way around.

At the very least, training in adulthood is highly unlikely to *cause* damage.

Others report that the “benefits of ambidexterity training failed to emerge.” This is likely due to incorrect expectations. Ambidexterity offers immediate and powerful physical benefits, but the changes to your thinking will be more subtle.

HOW TO TRAIN FOR AMBIDEXTERITY

Note that ambidexterity is not binary for most people. Unless you are ambidextrous from birth, you will likely be able to train to improve your ambidexterity to varying degrees – rather than “becoming ambidextrous.”

Consider for a moment that most of us already find some things come more naturally when using our non-dominant hands. For example, if you play a guitar, you'll find that manipulating the fret board with your right hand feels awkward and slow! That's because the neural maps are simply not there for the right hand.

Practicing any activity like this then will help to improve control over your non-dominant side (also keep in mind that cross dominance does not *only* apply to your hands!). Activities such as playing piano and other instruments, practicing martial arts, or even working out using some of the techniques already described in this book (Spider-Man crawls, single leg training, unilateral curls), will help to develop greater strength and control of both limbs.



We can also use visualization as already discussed. Did you know that if you try and visualize yourself writing your name with your dominant hand, the act of that visualization is *quicker* than if you try to do the same thing with your non-dominant hand? This is demonstration that visualization training could be enough to help develop the necessary neural maps to improve dexterity on that side.

But additionally, we can also train ourselves by practicing skills we would normally use one hand for on the other side. This could be especially beneficial if those skills also happen to utilize very fine motor control, or a broad range of movements – because this would then help us to develop greater skill and movement control overall. There could be more crossover to other, unexpected activities.

The most obvious example is handwriting. Practicing writing or drawing with your left hand and you will be able to feel the amount of concentration this requires at first. In a moment, we'll see that there are benefits to handwriting with *either* hand also.

Likewise, this is the perfect fit for “incidental training” as discussed in a moment. Practice performing everyday tasks such as brushing your teeth, using cutlery, or washing up – but switch sides!

FINE MOTOR CONTROL

There was a time when most of us would practice fine motor control in the form of cursive (hand writing). Some of us still write by hand regularly, and others will practice other things such as painting, sculpting, and the like.

But *most* of us no longer exercise any form of fine motor control. And that might be a mistake.

To demonstrate what a loss this may be for your brain, consider the role of the pre-motor cortex in speech and the case of a young boy described in *The Brain That Changes Itself*.

This boy suffered from jerky writing, poor reading comprehension, and muddled speech (he would often stumble over his own words). To fix his writing, he was tasked by the Arrowsmith School, with tracing complicated lines in order to stimulate his pre-motor cortex. The Arrowsmith School being an organisation set up by Barbara Arrowsmith Young to help children with learning disabilities.

Remarkably, this exercise not only improved his writing however, but also his speech and reading. He was able to speak in much longer sentences and without getting ahead of himself. The same exercise has been used to improve the verbal fluency of many others, helping them to become more eloquent, witty, and persuasive in conversation.



So what's going on? During speech, the brain has to convert symbols (words and letters) into movement of the mouth and tongue. This requires rapid processing and planning, which is handled by the pre-motor cortex - The pre-motor cortex is generally responsible for planning movement and preparing the body for it. Thus, with the premotor cortex sufficiently trained, it should come as no surprise to see these improvements.

How about the reading? Well this comes down to the role of the premotor cortex in moving the eyes across the page and from one word to the next. By using this training, the patient's reading comprehension exceeded the average level for his age.

This is just one case study of course, but it makes a lot of sense given that we know there is a link between the premotor cortex and verbal fluency ([study](#)), and that writing and

similar tasks can strengthen this area ([study](#)). The premotor cortex even plays a role in speech perception, perhaps because we better understand the words by unconsciously sounding them out ourselves ([study](#)) – which would seem to support the theory of embodied cognition (a favourite of mine).

So what can we take from this? Well seeing as plasticity continues into adulthood, the answer is simple: we need to practice fine motor control. You may already have a useful practice in your routine, but if not then consider cursive. Try writing a diary or journal and you'll get extra benefit from it. Or, like me, you could always try practicing your ambidexterity and thickening that corpus callous as a result! How about some non-dominant colouring in on iPad?

Alternatively, consider taking up a hobby that doubles as a form of dexterity training. This will be especially beneficial if that hobby is also one that involves learning, and that encourages focus.

DUAL N-BACK TRAINING

The Dual N-Back test is an exercise that requires you to concentrate on a sequence of numbers or letters that are also changing color (or the sequence can be changing in other ways). Your job is to press a button when you notice a match or a repetition. So, in the sequence:

1, 2, 4, 7, 9, 10, 10

You would press the button because there were two tens. Likewise, you would press the button during this sequence. It's a 'dual' N back because you are looking for two things at once:

1, 2, 4, 7, 9, 10, 3

Because the colors match. Here, 'N=1' so you are looking for matches that go back one. But as the game progresses, the value of N increases. So if N = 2, then you press the button when this happens:

1, 2, 4, 4 1, 7, 9, 10, 4, 3

And you ignored the two black numbers that were only spaced one apart. This is hard work and it is effective because it requires you to hold information in your mind and then compare it with new information – tasking the working memory. Playing chess also requires you to test your working memory because you need to remember the positions of all the pieces on the board and you need to think about possible positions several moves ahead.

As we have already seen, the working memory is the part of the memory that you use to hold onto temporary information that you are currently working with. This allows you to manipulate that information and it is highly important for a vast range of different tasks and different activities. Moreover, working memory is the seat of our visualization, and is largely responsible for helping us to juggle plan, visualize, etc.

Dual N-Back is also extremely effective for training attention, and has a lot in common with meditation in this regard.

IMAGE STREAMING

Image streaming is a little-known tool that you can use to drastically improve your ability to visualize. The great news is that it is incredibly simple to get started with. Just close your eyes and then start describing what you see.

The idea is to allow visual imagery to come to you. Close your eyes long enough and this will happen for most people. Faces, animals, places or ideas will begin to form. Some you'll see vividly, others you'll just get an impression of.

You'll set a recorder and then you'll just explain what you're seeing as it goes. Don't judge or try to influence the pictures, just speak out loud about what they are – so that if someone were listening to you, they too would be able to picture those same images.

Do this for 5-10 minutes and then stop. Repeat this ten times over the course of a few weeks and that should be enough to start seeing the benefits – though many people will experience them much faster.

What is Happening?

Obviously this image streaming technique is simply practicing your ability to visualize, which in turn should be able to trigger physical changes in the brain through brain plasticity. Moreover, it should also help to improve our ability to utilize visualization training. But while there's not a specific "visualization" area of the brain, it stands to reason that the necessary networks within the relevant areas could be strengthened.

There's also a big element of creativity and likely memory involved here, which could aid with abstract thinking, memory retrieval and the general ability to think visually. Because you're 'saying what you see', it essentially becomes an exercise in association.

I was hoping that it might also benefit lucid dreaming, though I've had no progress in that area so far (I've never been able to crack it!).

I did wonder for a while whether it was really necessary to speak aloud during the process. What I've since discovered though is that explaining what you're seeing *might* actually be beneficial for thickening the corpus callosum – the thick bundle of neurons that bridges the left and right hemispheres of the brain. That's because our language centers and visual centers are largely located in opposite hemispheres and this exercises forces you to use *both* in a cohesive manner.

File 8: diet

Here is what you need to know about your diet as it relates to muscle building, brain function, weight loss, and general health and performance.

First: you gain and lose weight as a result of an energy balance. That balance is the difference between the number of calories coming in, versus the number of calories going out. We reach this number by first calculating an RMR (resting metabolic rate) and then an AMR (active metabolic rate).

If you have excess calories in your system too long, then those will be stored as fat. On the other hand, if you burn more energy than you consume, then you will have burned more fat than ultimately gets replenished. Maintain a caloric “surplus” or “deficit” for long enough, and your body shape will transform accordingly.

To use this information, you calculate first how many calories your body burns at rest. In other words, if you just lie there doing nothing, how many calories do you burn? If you’re surprised that you burn any calories at all, then keep in mind that your body is constantly working to help you breathe, blink, digest, and operate your immune system. On average, this number should be between 1,500 and 2,500 calories per day for most people.

Your AMR meanwhile is that number but with the addition of your average activity on top. Thus, your AMR should be a representation of the number of calories burned on a typical day.

To work these numbers out, simply follow these guidelines:

Men:

$$\text{BMR} = 66 + (6.23 \times \text{weight in pounds}) + (12.7 \times \text{height in inches}) - (6.8 \times \text{age in years})$$

Women:

$$\text{BMR} = 655 + (4.35 \times \text{weight in pounds}) + (4.7 \times \text{height in inches}) - (4.7 \times \text{age in years})$$

To turn this into your AMR, you then multiply that amount by:

- 1.2 if you’re sedentary (little or no exercise)
- 1.375 if you’re lightly active (you exercise 1-3 times a week)
- 1.55 if you’re moderately active (you exercise or work about average)
- 1.725 if you’re very active (you train hard for 6-7 days a week)
- 1.9 if you’re highly active (you’re a physical labourer or a professional athlete)

Losing weight then is simple: you just need to calculate those numbers, then count every single calorie that you consume, and then make sure that the amount going out is higher.

Right?

Right guys?

MACRONUTRIENTS

Even the most ardent “calories in” proponent will agree that there is at least one other important factor to consider when designing a diet for body composition and

performance: macros. Macros are macronutrients, a phrase that refers to the major food groups/sources of calories. These are: protein, carbohydrates, and fats.

For building muscle, the overwhelming majority of evidence suggests that the optimum supply of protein is 1 gram of protein for every single pound of overall bodyweight. So someone who weighs 170lbs would need to consume 170 grams of protein. As long as that person was also in a caloric surplus and was training hard at the gym to provide the correct stimulus, they would then gain muscle.

If you are aiming to gain or maintain muscle while losing weight, then the amount of protein needs to be slightly higher.

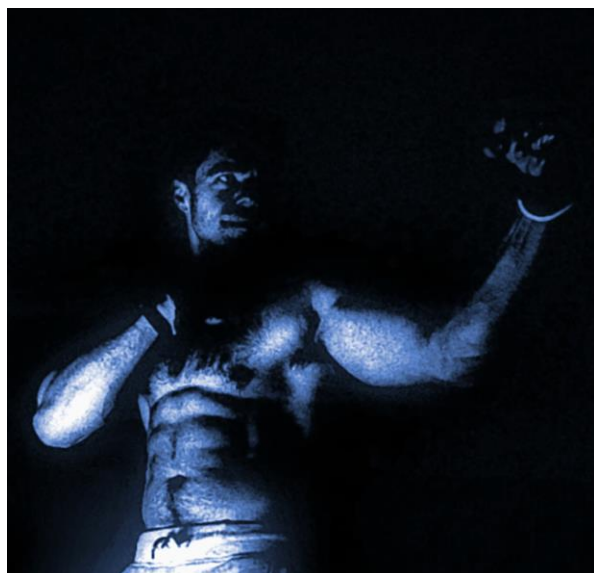
This then gives us a starting point for calculating how much we need to eat of everything. There are four calories in a gram of protein, and therefore we can calculate that we would be eating 680 calories in protein. If our calorie target for bulking is 2,000 for example, then that leaves us with an additional 1320 calories to get from carbs and fats. You might split this 60/40 or 70/30 depending on what your body personally responds best too.

Quick point to make here: eating all THREE of these macronutrients is extremely important. While some diets like the keto diet and carnivore diet focus on just one at the exclusion of the others (and do have some merit under specific circumstances), each of these macros actually plays important roles in the body. We should be getting the vast majority of our energy from carbohydrates, and failure to do so results in lowered performance in the gym. Fats meanwhile are important for the synthesis of hormones, aid the absorption of nutrients and more. Failure to get enough carbs OR fats results in a significant dip in testosterone.

WHY YOU AREN'T LOSING WEIGHT

Some people are extremely serious about the “calories in vs calories out” concept, to the point that they have made themselves deaf to all other options. A rallying cry on bodybuilding forums has become: IIFYM – standing for “If It Fits Your Macros.”

This was in response to an endless bombardment of questions like “can I eat donuts and still lose weight” or “can I eat chocolate and build muscle?” The answer was always the same: if you make sure you still get the required amount of protein, and you meet your calorie requirements, then yes you can lose/gain weight. If all you eat is one donut a day, then yes, you can lose weight by eating donuts!



Unfortunately, this became an actual “diet” for some people. Others simply refused to listen to any other advice. This played out on those same forums, where people who weren’t losing weight were accused of cheating, or not properly counting their calories. This significant lack of sensitivity no doubt led to many people giving up entirely.

“I’m counting my macros but I’m not losing weight!”

“This is the law of thermodynamics. It is irrefutable. If you consume fewer calories than you burn, then you WILL lose weight.

You probably aren’t counting correctly. Are you counting your drinks?”

Not helpful!

The truth is that weight loss is much more complex. And strategies like intermittent fasting, or the Mediterranean diet do have their place.

It is true that burning more calories than you consume will lead to weight loss. But what is unfortunately overlooked here, is that there is no way to *accurately* calculate this number. That’s because an AMR is an educated guess *at best*.

Hormones, metabolism, and even food timings play a big role here. Those that say hormones don’t make a difference should consider the case of someone using steroids. Use anabolic steroids and you will burn MUCH more fat and build much more muscle, simply by being in a more anabolic state more of the time. That person will experience different results on the exact same diet, and yet their AMR might be the exact same.

Likewise, consider someone with hypothyroidism, whose lack of the T4 thyroid hormone leaves them with a slowed metabolism prone to increased body fat. Consider too how women who start the oral contraceptive pill will often experience weight loss or weight gain.

I am not saying that you are using steroids or that you have an underlying health condition. What I AM saying, is that you might do. Or you might be on a spectrum that hasn’t been diagnosed but that alters your metabolism nonetheless. You could have a slow, hypothyroidism-like metabolism for example. Or you might have poor insulin sensitivity. Or you might have a poor balance of gut fauna (which you will learn more about in a moment), this can have a potentially *huge* impact on weight loss.

Other factors like sleep, and mood can even impact on metabolism!

The point is that all of us are extremely different and an AMR is an extremely poor representation of that. It’s about as useful as body mass index (BMI) – which doesn’t take into account a person’s muscle mass.

Then there’s the issue of trying to accurately monitor calories *in* which is fraught with similar problems: the information on packaging is often wrong for instance. Even packaged products vary drastically. Certain foods have a “thermogenic effect” meaning that the very act of consuming them will burn calories.

WHAT'S THE ANSWER?

So, what's the answer?

The strategy is still to calculate your AMR and macros initially. This is a useful starting point and it is the most effective for the most people. But you must be open to the potential for confounding variables. As such, you need to carefully monitor your weight gain and weight loss over time, and adjust your calories accordingly.

We unfortunately lack the tools just yet to track blood sugar and hormone balance conveniently throughout the day. But DO track as much as you can without going mad. (I.e. keep in mind how you feel, don't necessarily do lots of gruelling math.)

Also important is to do whatever you can to support your metabolism and to ramp that up as much as possible. The best way to do that is by exercising, and building muscle in particular. Muscle is metabolically active, which means that the more you build, the higher your RMR will be. Likewise, using HIIT can help to burn more calories thanks to the after-burn effect.

This is also why I highly recommend using incidental training (which we'll get to in the next chapter), in order to spend far more time being active throughout the day – placing a much greater demand on those energy reserves.

Moreover, consuming the right *micronutrients* will also play a big role.

EATING FOR PERFORMANCE: MICRONUTRIENTS

Micronutrients are vitamins, minerals, amino acids, and essential fatty acids that come from our food. Each of these plays a different, vital role in our body, and it is together that they are able to enhance our performance significantly. Moreover, when we *don't* get sufficient micronutrients, this is what leads to a loss of performance and health – which is something the vast majority of us are living with right now.

This is one of the biggest mistakes of focussing purely on calories. In doing this, you forget that food is much more than fuel: it is actually a resource that the body draws upon to build itself. This is never more true than in the case of amino acids, which are the carbon building blocks of proteins. So when you eat chicken, your body literally breaks down that meat and then reassembles the parts to make NEW meat that will be your muscle and your flesh. This is why it's important that we consume high quality, bioavailable protein that contains as many amino acids as possible.

Amino acids also have a wide range of other important jobs, ranging from making neurotransmitters (tryptophan is a precursor to serotonin for example), to ferrying fats around the body.

Vitamins are organic compounds found in large quantities in vegetables and fruits, but also in extremely large quantities in organ meats. Vitamins play many important roles:

- Vitamin C supports the immune system, is used to synthesize serotonin, increases nitric oxide production, increases testosterone production, and much more. Vitamin C is also an antioxidant.
- Lutein is a carotenoid vitamin related to beta-carotene and vitamin A. Lutein has long been known for its impressive benefits relating to eye health, where it is able to prevent macular degeneration. However, it has more recently been shown to improve mitochondrial function and thereby to increase fat burning and energy

([study](#)). This appears to work via the activation of AMPK. Lutein might also aid with cognitive development, particularly in young children.

- Vitamin D is largely created in the body, stimulated through sun exposure. However, it is also possible to get it from foods: such as mushrooms and fish. As mentioned elsewhere in this book, vitamin D is a powerful controller for other hormones and can elevate testosterone. It is also significantly more potent than vitamin C for preventing colds and flus.
- Vitamin B6 is also responsible for forming red blood cells, and it helps the body to extract energy from food.
- Vitamin B12 is crucial for your metabolism, your central nervous system, and your red blood cell count.

Minerals are non-organic compounds that include metals, stone, and more. These likewise play a number of important roles, being especially important for our body's structure.

- Iron is crucial for creating red blood cells and helping to carry more oxygen around the body, improving energy and athletic performance.
- Calcium is used to form bone and connective tissue. It also plays a role in cell signalling, contraction strength, and more.
- Magnesium is also important for bone strength aiding with the use of calcium. It also helps relax muscle, encourages neuroplasticity, and aids in testosterone production when paired with zinc and vitamin B6. It also supports healthy sleep.
- Potassium helps to prevent muscle cramps, among other things.
- Zinc meanwhile is implicated in neuroplasticity – the brain's adaptive capabilities. More zinc makes it easier to learn new skills and can encourage testosterone production to provide more drive and masculine aggression. Zinc is also crucial to the function of the central nervous system ([study](#)) and supplementation has been proven to improve cognitive performance ([study](#)). Zinc also helps to support an acute sense of smell!

More nutrients that serve amazing roles in the human body:

- We often associate creatine with supplements, but you can actually get it from red meat – especially organ meat! Creatine is not only useful for increasing energy production for athletic performance, but also has the same effect in the brain where it is able to increase IQ test performance in studies. Creatine also increases water retention in the muscles, and can potentially add nearly an inch to your biceps all on its own!
- CoEnzyme Q10 is another substance that people spend a lot of money on as a supplement, but which can be acquired from the diet via red meat. It increases energy efficiency to a huge extent and may even be effective for life extension.
- L-theanine is found in green tea and works as a counterbalance to caffeine – helping to provide a smoother and longer-lasting feeling of focus and attention. The presence of l-theanine in yerba mate green tea is what led Darwin to describe the beverage as “the world's most perfect stimulant.”
- Curcumin is anti-inflammatory, which can combat brain fog among other things, seeing as brain fog is partly thought to be the result of mild, chronic brain inflammation (hence why we feel groggy when we have a cold). It is also effective for enhancing brain derived neurotrophic factor, making it highly effective as a brain plasticity enhancer. It also helps to support blood sugar levels and more. Curcumin also helps to improve insulin sensitivity, so much so that it is highly recommended for anyone with diabetes or pre-diabetes.

IMMUNONUTRITION: Nutrition with the aim of supporting the healing process.

- Omega 3 fatty acid is one of the single most important nutrients you possibly aren't getting enough of. As well as reducing inflammation, it also raises DHEA (leading to heightened testosterone and a calmer mood), improves cell membrane permeability to enhance the communication of neurons, encourages myelination (the insulation of axons, which helps to encourage long term potentiation – i.e. plasticity), it is neuroprotective, and it encourages weight loss.
- Inositol may be able to increase the number of receptors in the brain for all neurotransmitters, allowing greater emotional control. Inositol also improves the transportation of lipids (fats) to be used as energy, and it strengthens cell walls. Inositol releases calcium to aid with the communication between nerves. Bruce Lee took inositol regularly!
- Citrulline is a non-essential amino acid that the body can convert to arginine. This is a vasodilator used by some as an ingredient in pre-workouts. What makes it even more interesting, is that it may help to increase healing by encouraging blood flow to wounded areas, and even helping to encourage the collection of collagen around the area ([study](#)). This is a crucial step in the healing process.

Recommended resource: *Bruce Lee: The Art of Expressing the Human Body*

- Choline is used to create the most abundant excitatory neurotransmitter: acetylcholine. It supports memory formation, wakefulness, and general intelligence. The popular nootropic Piracetam works by reducing acetylcholine-esterase which reduces choline. You can get choline from eggs, among other places.
- Forskolin is able to increase thyroid production to help enhance fat loss and energy metabolism. It raises testosterone, and may be instrumental in boosting neuroplasticity by adjusting the metabolism of cAMP.
- L-carnitine is an amino acid that is often described as a “ferry” due to its ability to transport fatty acids from the blood to the mitochondria. This could improve stamina, which is why it is often found in pre-workouts. Of course it also improves weight loss, making it a popular “fat burner.”

Specific foods provide a ton of incredible benefits:

- Dark chocolate contains the powerful vasodilator (vein widener) epicatechin. This works by elevating nitric oxide, which might also increase the abundance of satellite cells to improve hypertrophy. Consuming 30g of dark chocolate daily could raise NO by up to 54% in 15 days according to one study. Cacao and chocolate may actually be neuroprotective due to a high content of flavonoids with antioxidant properties. Dark chocolate, like red wine, is actually a source of resveratrol – also a flavonoid and one of the most sought-after antioxidants and mitochondrial-boosters usually associated with red wine. Dark chocolate is also rich in beneficial “good” bacteria (see the next section).
- Beetroot juice is another vasodilator that is particularly useful for athletic pursuits. So true is this, that it is sometimes described as a “performance enhancing drug” and is used by many athletes.
- Chia seeds are seeds that are capable of absorbing large amounts of water. This means that they can then release that water back into your system over time as they sit in the stomach. The amazing Tarahumara tribe may gain some of their

amazing athletic endurance from this effect as they are known to eat the seeds in large amounts.

- Coconut oil is something you've likely heard of. Coconut oil is rich in MCT oil, or "medium chain triglycerides." MCT oil provides you with immediate short-term energy because it much more rapidly enters the blood stream and provides the brain with "ketones" which are a secondary source of energy that the brain prefers for certain tasks. Better yet, is that this form of energy is not readily converted to fat.
- Garlic is a "natural antibiotic" meaning that it can kill off unwanted bacteria in the stomach. It is also great for supporting digestion, and is another powerful vasodilator, especially when combined with vitamin C.
- Bacopa monnieri is a creeping herb found in southern India, Europe, Africa, Asia and some other locations. It is considered by some to be the 'best natural nootropic' and the closest thing out there to natural Piracetam (which it is often stacked with). The active ingredient here is bacosides which has been shown to improve synaptic transmission and nerve pulse transmission. It does this by improving the electrical conductivity between some neurons which is a completely unique mechanism of action. Its effects are felt most strongly in the hippocampus, which is the area of the brain most involved in long-term memory formation and recall. It appears to have a particularly strong impact on working and special memory. And like some racetams (namely aniracetam), bacopa is also an anxiolytic meaning it can suppress stress and improve sleep. This is the main downside of its use however too – it also acts as a sedative. Gotu kola is a similar herb with anxiolytic and memory boosting effects but is lesser known compared with bacopa.
- Another natural nootropic that has racetam-like effects is Huperzine A. This one comes from the Chinese plant club moss and is a cholinesterase inhibitor. Cholinesterase is an enzyme that breaks down acetylcholine, which is the primary neurotransmitter effected by racetams (anything with 'ase' on the end is normally an enzyme that breaks down the compound that the first part of the word sounds like – lactase for instance is an enzyme that breaks down lactose). Huperzine A is commonly recommended to those suffering from Parkinson's disease and dementia owing to its positive effects on memory.

I could go on and on listing the crucial effects of amino acids, vitamins, minerals, fats, and more. But the point is not for you to take a reductionist approach and to try and seek out every single one of these things in your diet or through supplements. This would be time consuming, extremely expensive, and ultimately a wild goose-chase. There are countless nutrients in a salad, many of which we likely don't even fully understand the benefits of!

Rather then, the key is to try and consume as wide a range of healthy fruits, vegetables, meats, and more as you can. This will pack your body with as many of these powerful and beneficial nutrients as possible. Get as many colours and textures from *natural* foods on your plate as you possibly can.

Don't underestimate the role of nutrients in your diet. In fact, think of them like power ups in a computer game.

Someone left some blueberries that you can snaffle? Consider that a HUGE win – they're actually PACKED with DNA-protecting antioxidants in particular.

SUPERORGANISM: UNDERSTANDING YOUR MICROBIOME

You are a superorganism. While that sounds incredibly awesome and science-fiction, what it actually means is simply that you are a single organism that is made up of billions of *other* organisms. And of course, those organisms are bacteria. These are not all bad – in fact a huge number of the 500-1,000 species found in the human body are incredibly important for our health, performance, and even brain function.

In fact, it is an often quoted fact that the human body contains more bacterial cells than human cells, and the same goes for DNA. You contain roughly 100 trillion bacteria. Which is a lot. You are more bacteria than human!



And those bacteria aren't just free loaders – they play crucial symbiotic roles in the body, which are so important as to be a crucial part of *who we are*. In fact, our own cells are partly made up from ancient bacteria in a sense. Our mitochondria – the energy factories of our bodies – are actually *evolved* from ancient alphaproteobacteria more than 3.5 billion years ago. This explains why our mitochondria contain an entirely different set of DNA.

But what's most exciting from a performance point of view, is that the microbiome located in your gut specifically has a huge impact on your mood, your metabolism, your cardiovascular performance, your intelligence and more. This has led to the gut sometimes being referred to as the "second brain."

The potential impact of the microbiome on weight loss is particularly potent. In one case study, a woman received a faecal transplant (a transplant of faecal matter from one person to another) from her overweight relative to treat a serious health condition. While the transplant was a success and the illness was halted in its tracks, she soon began to notice that her body was different. The now-healthy recipient of the foreign faeces and thus foreign bacteria, began to gain weight! And nothing she could do could help her to control it.

More exciting still, is that bacteria could directly influence muscle mass formation. In one study, researchers transplanted the gut bacteria from wild mice into mice that had been raised to entirely lack a gut microbiota, which led to a marked increase in muscle mass and a reduction in muscular atrophy! ([Study](#))

In fact, a person's microbiome (which is far more unique from one person to another than DNA) can potentially be used as one of the *best* indicators of body composition.

Meanwhile, a whole field of psychobiotics is concerned with exploring the use of beneficial bacteria in improving mood and focus ([study](#)).

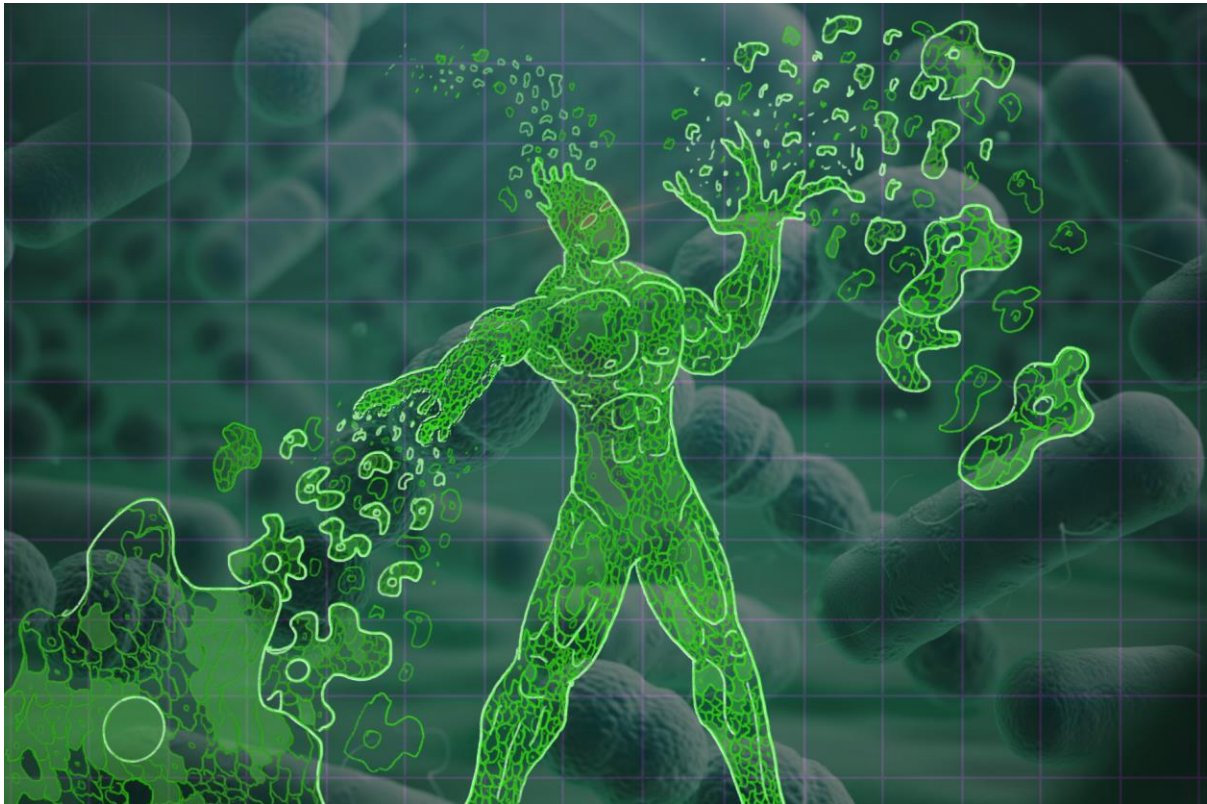
If you're struggling to lose weight, build muscle, or focus, it might be because your microbiome is negatively affecting your metabolism.

Recommended Resource: *Missing Microbes* by Martin J. Blaser

Bacteria are able to affect many processes in the body in fact. They do this through a number of processes:

- They produce digestive enzymes to help break down foods and aid digestion
- They produce neurotransmitters affecting the network of neurons lining the gut. The gut is so high in neurons in fact, that it is sometimes referred to as the "second brain."
- They boost the immune system by "fighting" bad bacteria in your gut.
- Your microbiome is even able to "talk" to your mitochondria via cellular signalling, owing to that common ancestry. This can improve energy production as bacteria produce short chain fatty acids (SCFAs) called butyrate that can be burned by the mitochondria to create ATP – providing more energy. Butyrate also affects gene expression in muscle and brown fat and encourages fatty acid oxidation via AMPK.
 - SCFA propionate is likewise a substance that helps to increase the integrity of the gut wall, helps to modulate the production of nitric oxide, and down-regulates pro-inflammatory TNF-alpha in colon cells.

It is believed by many that gut bacteria might hold the solution to health issues such as irritable bowel syndrome (IBS) and Chronic Fatigue Syndrome (CFS). Even depression and brain fog could be somewhat alleviated by controlling the gut microbiome.



WHAT DOES A HEALTHY GUT LOOK LIKE?

While this is all very interesting, it's not terribly actionable. What can we do to *improve* our gut microbiome and thus our body composition, brain function, and athletic performance?

Recommended Resource: *Peak* by Dr. Marc Bubbs

In the book *Peak*, author Dr. Marc Bubbs collects a large amount of relevant data on this point, as well as useful tips and advice. He reports on work conducted by Nic West from Griffith University, looking at the microbiomes of the world's top performers.

He discovered that there are actually several bacteria strains that are particularly common in the guts of elite athletes. These are:

- *Bifidobacterium longum* – A bacterium found in the GI tracts and are also observed to be particularly high in breast-fed infants. It is particularly prevalent in dairy, and those with lactose intolerance may benefit from supplementation.
- *Bacteroides* – This is a genus of anaerobic and bile-resistant bacteria observed in high quantities in correlation with high fat and high protein diets. Interestingly, bacteroides are passed from mother to child during vaginal birth – the child actually ingests them while passing through! Hence some hospitals have adopted the practice of transferring bacteria using a swab when children are delivered via C-section.
- *Akkermansia* – This is found in high levels in both elite and recreational athletes. It is supported by foods rich in a fibre called oligofructose, which is found in garlic, onions, and bananas.
- *F. fermentum* – Known to have antimicrobial effects against gut pathogens.
- *Prevotella* – A species known to aid the breakdown of carbohydrates.
- *F. prausnitzii* – A species of the firmicutes phylum (meaning category don't you know). This stays located close to the gut lining, where it is able to aid with the

interface between the body and the rest of the gut microbiota – think of it like the translator.

Other beneficial microbes include:

- *Bacillus* – A strain of anaerobic bacteria that is known to digest foods, extracting energy from indigestible fibres and resistant starches and producing SCFAs. You can get this one from consuming resistant starches, as well as fermented foods like sauerkraut.
- *Prevotella* – A bacteria that seems to correlate with the amount of intense anaerobic training a person does.

“Psychobiotics” is a new term used to describe the potential nootropic effect of some probiotics and specific bacterial strains. The following have been implicated in boosting brain health and function.

- *Lactobacillus brevis* – Found in pickles and sauerkraut, this one will not only boost immune function but also raise levels of brain derived neurotrophic factor for potentially enhanced plasticity.
- *Bifidobacterium longum* – Improves longevity through antioxidant properties but also helps to increase BDNF.
- *Lactobacillus plantarum* – Reduces gut permeability, which has been linked to a number of brain disorders.

For weight loss in particular, studies demonstrate the beneficial effects of *L. rhamnosus*, *L. gasseri*, and *Bifidobacterium lactis* ([study](#)).

Studies looking at the guts of the Hadza hunter gatherer tribe in Tanzania – thought to be very similar to that of pre-civilized man – have found high quantities of the firmicutes phylum, particularly: *roseburia*, *blautia*, and *f. prausnitzii*. These are known for their fibre-degrading properties, as is the bacteria *prevotella* that’s also found in Hadza guts. This is due to the high fibre content of the tribe’s diet.

From this, we can begin to paint a picture of what a healthy diet might look like with regards to supporting gut health. It would be high fibre, and also contain fermented foods, dairy, and starch. Athletes with healthy microbiomes ate large quantities of vegetables, fruits, and nuts, and steered more toward whole grain breads.

Another obvious option is to try and use probiotic products to enhance your gut health. These are yogurts, tablets, and drinks that contain large amounts of bacterial cultures. Do these work? The good news is that some studies do seem to show an effect. These are currently quite limited in scope and number right now however and most conclude that it’s too early to draw concrete conclusions ([study](#)).

When choosing a probiotic, you should focus on the CFU count. CFU stands for “colony forming unit,” which tells you how many live and active microorganisms are found in a serving. Most products range between 5-30 billion CFU and generally more is better, though you also need to read which strains are actually in the product and whether these have been shown to do anything useful.

Also potentially effective are prebiotics, which include the likes of brewer’s yeast. This substance (taken as a supplement by none other than Bruce Lee) contains microflora that help to support the environment of the gut for healthy microbes ([study](#)).

Try to avoid simple sugars, acellular carbs, and highly processed foods, which provide a ready food source for the bad, inflammation-promoting bacteria ([study](#)).

THE CORRECT STRATEGY FOR FIXING YOUR MICROBIOME

But Dr. Bubbs warns against falling into the trap of a reductionist approach. You cannot control your bacteria precisely enough to try and raise specific quantities of microbes. And each of us has such a unique microbiome profile, that the same approach is not going to work for everyone. This is a trap that is likewise easy to fall into with micronutrient supplementation. Better is to aim to be generally healthy, and to listen to your own body.

Indeed, by far the most important property of a healthy gut biome it seems is *diversity*. The greater the range of bacteria, the more balanced it will be. Try to think of this like maintaining an organic garden. The best way to get rid of aphids is not to spray them with a chemical insecticide but rather to attract ladybirds to your garden and build a stronger ecosystem. The same is true of your gut and by having a broad range of bacteria in there, you will be healthier.

Likewise, expose yourself to a range of bacteria by not going overboard with the bleach around the house. Spend time outside and don't be afraid to eat your vegetables with a little dirt on them. Dirt is actually a great source of healthy bacteria!



It's a curious thought that it actually isn't in the best interests of *any* bacteria to kill its host. Perhaps then it is better to think not in terms of "bad bacteria" but rather imbalances.

The greater the range and diversity of natural foods you eat, the more diverse and stronger your gut biome will be. And this is where our modern lifestyles can actually be beneficial: head to your local supermarket and stock up on natural, whole food, that has been imported from as many different countries as possible! You could also try following the "50 foods challenge," which means trying to consume 50 different foods in 7 days each week.

Dr. Bubbs recommends that if you suffer from low energy, bloating, poor mood, or uncontrolled weight gain, that you try first try using a restrictive diet in order in cut back

the bacteria that is already there. That actually means reducing fibre intake and eating only very simple and bland foods for a while, while also seeking out antimicrobial foods and supplements such as garlic. This helps to trim back the overgrowth, allowing you to effectively start again. Consuming too much fibre when your gut is imbalanced will actually *worsen* your situation otherwise, as you won't have the microbiome to support breaking it down, and there won't be room for the new bacteria to take hold.

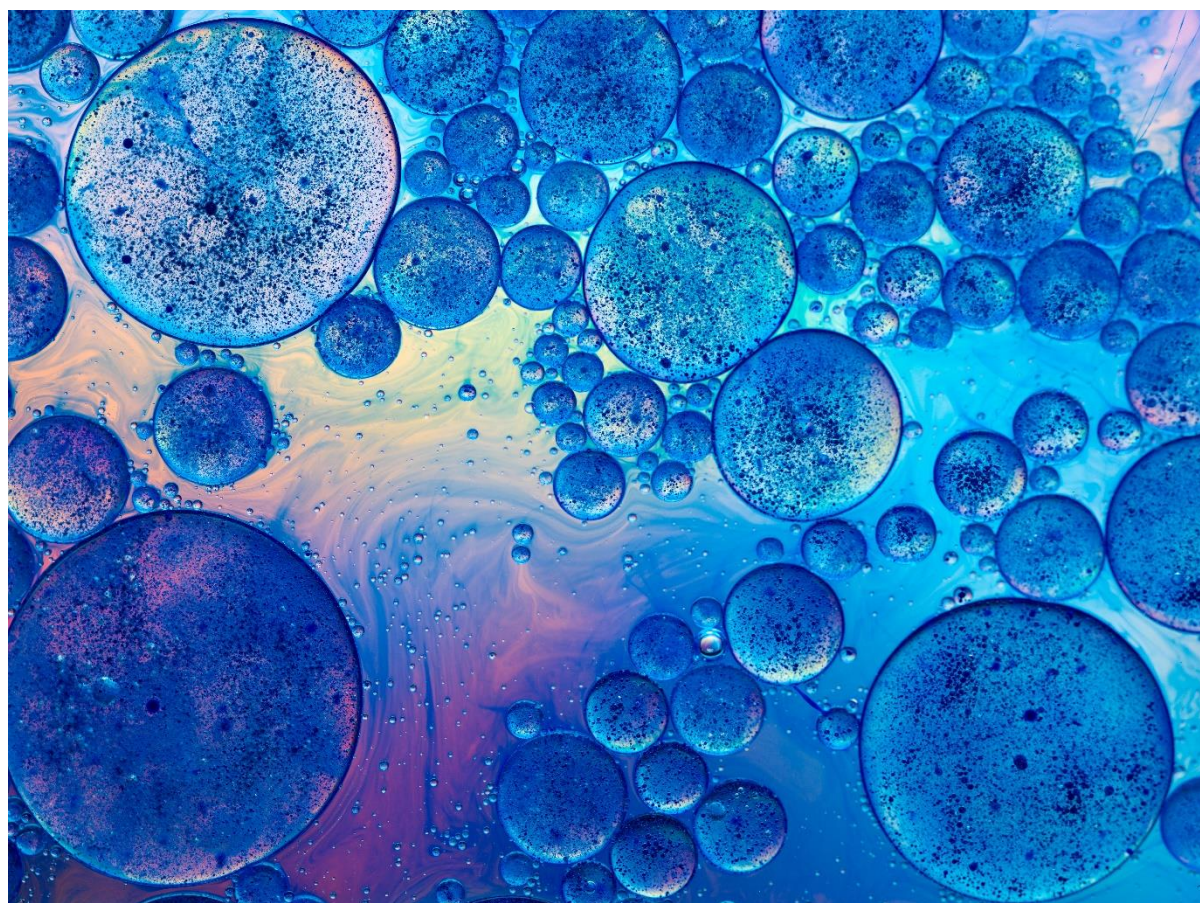
Once your symptoms have settled down, you can then begin to build your gut flora back up by introducing those more varied and complex ingredients.

OTHER FACTORS AFFECTING GUT HEALTH

Good sleep is also key to healthy gut health. Perhaps surprisingly, your microbiome actually has a sleep-wake cycle just like you, and sleeps best when you are asleep. If you don't sleep, you can cause damage to your friendly micro-allies.

Just as the microbiome is able to aid the performance of your mitochondria, it also transpires that the reverse is true: optimally functioning mitochondria *also* help support a healthy microbiome! Thus, fitness training, and especially HIIT could help to boost your microbiome. Overtraining however can be extremely *bad* for your gut health – as can any form of stress. The gut-brain axis is an important area of study looking at the interaction between gut health and stress. Our microbiota communicate with our brains via the vagus nerve, as well as the immune system, tryptophan metabolism, SCFAs, gut hormone signalling, and more pathways. This interaction is two-way and if you experience a lot of chronic stress, it can take a serious toll on your gut ([study](#)).

Only use antibiotics as a last resort, as they take a “scorched Earth” approach to the fight against bad bacteria and can completely eliminate your healthy gut flora. It may take over a year for this to grow back. If you do need antibiotics, then make sure to spend time rebuilding and monitoring your gut health.



A SIMPLE DIET THAT WORKS FOR WEIGHT LOSS AND PERFORMANCE

I'd like to present to you a simple diet that *works*. It's called the **Automation Diet**. But for the purpose of this book, it will be split into two slightly different versions:

- The Reset Diet
- The Muscle Fuel Diet

These two “expressions” of the diet will serve slightly different purposes, as we will see. The final diet proposed at the end of this book is the “SuperFunctional” diet, and is largely based on these very same principles.

But why automation? Because it is almost entirely automated, such that you don't need to think about it. I have designed this diet to fit easily in with your lifestyle, so that you don't need to constantly count calories, but will be able to improve your body composition in any way you choose.

The objective here was to prioritize *adherence* for those on a busy schedule. To do this, I am going to propose that you eat the same breakfast and lunch every single day, then give yourself an entirely free-reign for dinner.

There is a drawback to this diet. Meeting the terms of the “50 food diet” becomes more difficult, and you risk adaptation. That is why the full “SuperFunctional Diet” is a little more complex and designed to help you get as many of those powerful nutrients as possible, all without thinking about it.

But for the purposes of losing weight easily, or providing the body with the necessary fuel, this diet should prove simple and easy. By sticking to the very same meals at breakfast and lunch, you make it extremely easy to keep your caloric intake high or low, and to ensure that you receive a good range of important micronutrients.

This means you can stick to a rough number of calories each day without having any need to count them *precisely*. So, for example, you might consume 150 calories for breakfast, and 250 calories for lunch. You might also consume just 100 calories of snacks and drinks during this time.



Come 7pm, you will have consumed a total of 500 calories. This is a very small number, meaning that if your AMR is 2,500, you now have 1,999 calories to play with while still maintaining a caloric deficit. In other words, if you are trying to lose weight, you can now “relax” and will only risk going over your total calorie intake if you are completely careless with that final meal. In practice, it allows you to eat normally without worrying about weight gain.

If you *do* have an extremely big meal that puts you over 2,500 calories in total, then you will find that it is a one off and that it doesn’t hurt your overall weight loss. The thing to remember is that weight gain or loss does not occur on a daily basis, but rather across a large span of time. If you maintain a calorie deficit on average over 20 weeks with just a few occasions where you overate, it won’t matter.

Of course, if you want to *gain weight* then you simply do the opposite: you eat a highly calorific breakfast and lunch and ideally insert one or two more meals in order to keep your blood sugar high throughout the day and avoid dipping into a catabolic state. You can also ensure this is done in a highly nutritious and healthy way.

Why Breakfast and Lunch?

The reason I chose breakfast and lunch as the meals to keep consistent, is that those two meals are much less “social” for most of us. Dinner is something many of us enjoy with family or partners, or often partake in outside the home at a restaurant. This creates a huge social pressure to eat more interesting foods, as it effectively gives the other person permission to do the same. If you say to your wife or husband after work that you’re just going to have a healthy soup – and it’s Friday night and they were looking forward to pie with good TV – then you might meet friction. Likewise, it can be hard to choose plain salad when you are out with friends and everyone else is having steak – apart from anything else, they might try and apply pressure for you to “loosen up.”

Apart from anything else, it’s important to maintain a healthy relationship with food, and many of us feel that a nice dinner is something that we “deserve” after a hard/long day.

Breakfast on the other hand is often eaten rushing out of the door, and many of us *already* eat the same thing most mornings. Likewise, lunch is often eaten alone at a

desk. Of course if it's a Sunday roast and you choose to swap lunch and dinner, then this is a perfectly fine choice.

That said, there is another good reason to try the **automation diet**: it prepares you for the idea of intermittent fasting.

POWERFUL WAYS TO MAKE EATING REALLY WELL MUCH EASIER

As well as sticking to the same breakfast and lunch, you will also follow a few rules to ensure that you are not eating unhealthily for your final meal of the day. Likewise, if you are choosing your own first and second meal, then you may wish to observe these same rules in order to ensure those two meals picked by you are healthy.

Simply put then:

- Avoid all highly processed foods – that means anything that has gone through multiple stages after being killed or picked. Ultimately you *know* what kinds of foods fall into this unhealthy category: chocolate bars, sausage rolls, crisps, sweets, highly processed ready meals... These foods are not only empty calories, they also spike blood sugar, are harmful to our gut bacteria, and can cause inflammation. Inflammation as regulated by the release of cytokines into the blood isn't only acute – low level chronic inflammation is actually responsible for many health complaints. These possibly include depression and brain fog, as the brain can also be affected by low-grade inflammation.
- Do not fry food where avoidable. Fried food uses oil that has been chemically altered by heat, which in turn makes it unhealthy and prone to encourage weight gain.
- Do not eat foods that are extremely high in simple sugars. Simple sugars are those that are too easily digested and absorbed into the blood stream, which in turn means a spike in blood sugar and glucose.
- Avoid “empty calorie foods.” Keep in mind that hunger spikes are often caused by the body *craving* nutrients that it hasn't been able to obtain through the diet. Eating nutrient-dense foods is therefore more satiating. Not to mention that it provides all the benefits discussed earlier.
- Do not snack. Even when trying to add mass, snacking in an *unscheduled* manner is a slippery slope toward losing control over your diet and calorie intake.
- Avoid alcohol (though occasionally drinking with friends is fine!). Of course, do not smoke.

The following tricks and tips will help you to eat far healthier, and to stick to these rules:

- Use frozen vegetables as ingredients in cooking to significantly save time. For example, if you keep frozen mushrooms in the freezer, then you can simply throw these into a bolognese or similar meal when cooking, rather than having to chop them each time. Most of the nutritional benefit is maintained when foods are frozen. Likewise, you can do the same with things like onion flakes, tinned sweetcorn, frozen sweet potato, frozen courgette etc. The less chopping and clearing up you have to do, the more likely you are to add more nutritious ingredients to your cooking.
- Batch cook large amounts when you do cook. For example, rather than making bolognese for one night, make enough for 3 nights. Freeze what you don't eat into individual Tupperware and place in your freezer.
 - Both these tips require a freezer, so make sure that you invest in one.
- Keep processed foods and snacks out of the home. If it's not there, then you can't easily grab it.

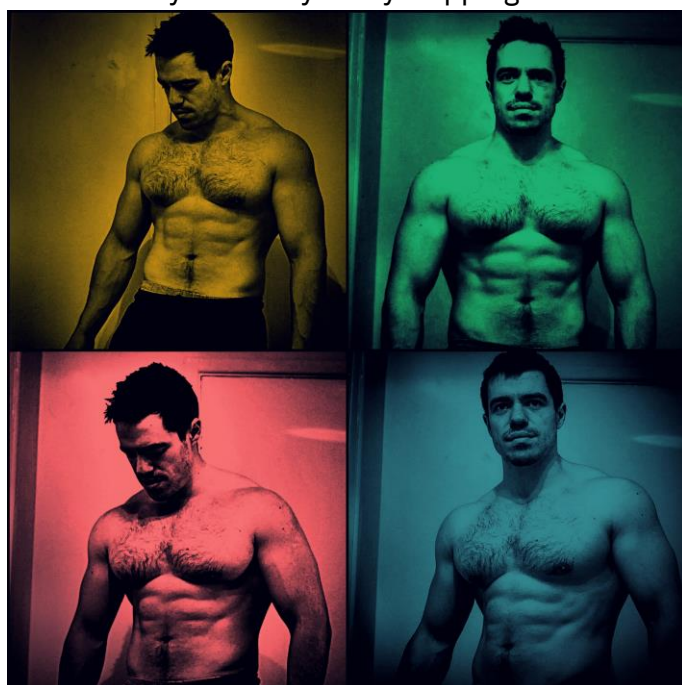
- Eat cold food more often. There is no rule that the last meal of the day must be an elaborate cooked meal! Why not have a salad, a sandwich, or something else that is easy to grab and eat?

NOTE: For simplified instructions for each part of the diet, see the “Program” section of this package. For food suggestions, see the Meal Guide.

FASTING

Fasting is a tool I highly recommend adding on top of this kind of diet, not only to aid with weight loss, but also to improve mental performance and physical health. Here is what you need to know.

The basic idea behind intermittent fasting is that you go through periods of not eating. There are lots of ways you can break this down, but perhaps the most popular option is the 16:8 fast. That means you’re fasting for 16 hours, then eating for 8. That might sound extreme, but when you realise that you will spend 8 of those 16 hours sleeping, you realise that you’re only really skipping breakfast and pushing lunch back in most cases.



Breakfast is so named because you are literally *breaking your fast*. You’re already in a fasted state when you wake up, and so all we’re doing is pushing that a little further.

At its most simplistic, one of the biggest benefits of intermittent fasting is that it provides an easy structure for reducing calories. Instead of needing to count every single calorie, you can instead just rely on the fact that you’ll be eating less because you have less time to eat. Many advocates of IF rave about the fact that they can “eat what they like” during their 8-hour window, and that they can keep their calories

down without the stress. This is indeed beneficial, though I would stress the importance of eating healthily during that time still. Good nutrition actually becomes even more important during this time if you want to ensure you’re getting all the things your body needs to perform optimally. And if you’re building muscle, then you’re going to need to chow down on a LOT of protein.

It’s certainly possible to maintain big muscles on this diet though. Terry Crews sticks to the Warrior Diet, meaning he has a four-hour window for eating. And he’s HUGE. That said, certain studies do suggest that fasting may increase the loss of lean body mass too ([study](#)) when compared with calorie restriction. I’ll be coming back to this shortly.

One of the most important benefits of fasting that often goes unnoticed is how it changes your psychological relationship with food. For some reason, being forced to stop eating food entirely is easier than simply “avoiding snacks.” This is a much more clearly defined target, and one that is completely set back when you fail.

Constantly resisting the urge to snack then has the effect of strengthening your will power. Later, when on the **automation diet**, or when trying to stick to a “normal” diet, you will find that you don’t have the problem of avoiding snacks and controlling those urges. This makes a massive difference to your overall physique.

The Science of Intermittent Fasting

Intermittent fasting certainly can work as a weight loss method for many people then ([study](#)) and this has been shown many times. But while some people say that IF is nothing more than an eating *strategy*, others argue that it actually has significant benefits when it comes to weight loss *and* general health.

The question: does intermittent fasting increase weight loss if calories remain the same? The answer is unfortunately uncertain, owing to insufficient research. Many studies focus predominantly on alternate day fasting (rather than strategies like 16:8) and don’t control for enough variables ([study](#), [study](#)).

How *might* IF be more efficient? More importantly, what about the other purported health benefits of intermittent fasting?

What happens in the body when you fast?

WHAT HAPPENS WHEN YOU EAT?

To answer this question, we first must consider how food – or a lack thereof – impacts on our body.

When you do not eat, you use up your blood sugar as your body turns to that readily available food source. Once that’s gone, you then turn to your glycogen stores in your muscles and your liver. These take anywhere between 24-48 hours to deplete (depending on what you’ve been eating prior and your activity levels), so you’re not going to exhaust this resource on a typical 16:8 fast and start burning fat, or even the Warrior Diet.

What this *does* mean though, is that when you eat subsequently, those calories are going to first be used to replenish your glycogen stores.

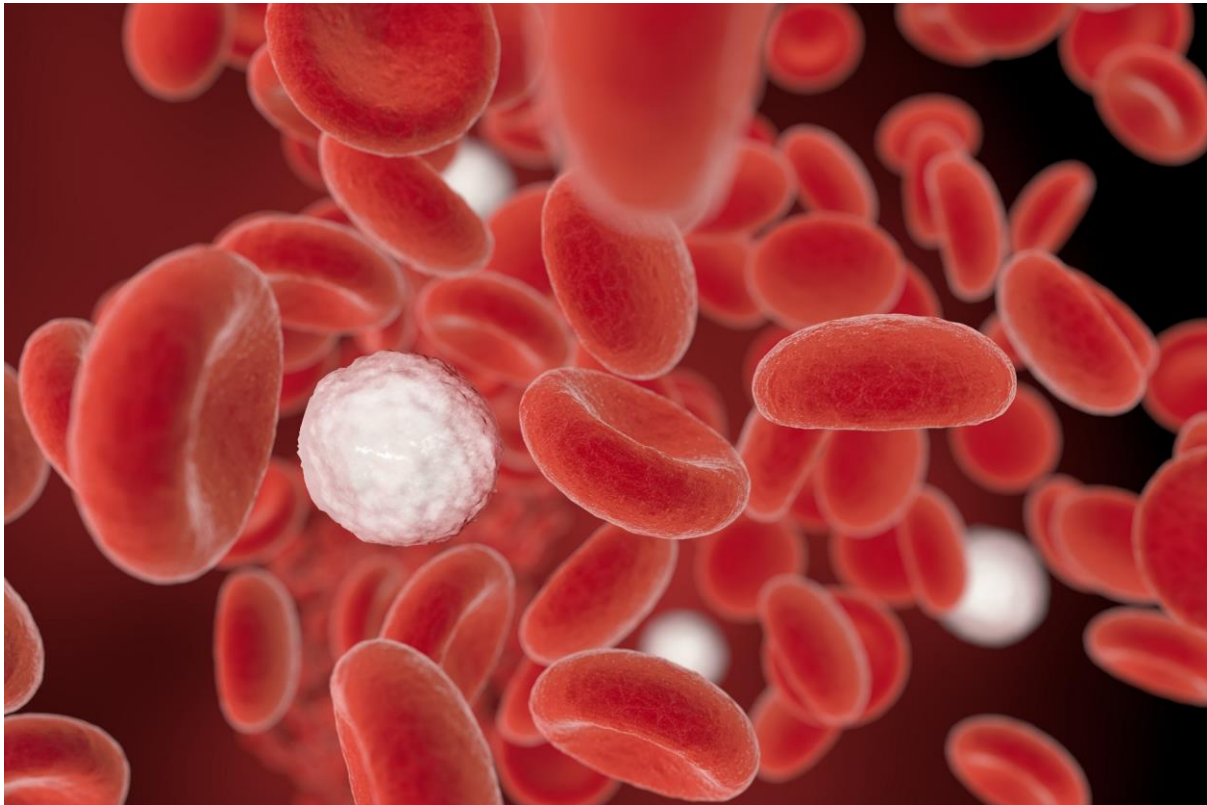
What it also means is that you aren’t constantly spiking your blood sugar throughout the day. When you spike blood sugar, this corresponds with a spike in insulin, secreted by your pancreas, which in turn can lead to fat storage. So, by fasting, you are at the very least avoiding these spikes and troughs. This can help to improve insulin sensitivity ([study](#)), potentially preventing conditions like diabetes.

Insulin encourages fat storage and also actively *prevents* the breakdown of fat ([study](#)). Insulin is also responsible for encouraging the storage of glycogen in the muscles however, and it’s also necessary for us to break down and absorb nutrients – ushering amino acids into the cells. We *need* insulin, as anyone with diabetes will tell you.

Spiking blood sugar also leads to an increase in serotonin – the feel good hormone – which is due to the tryptophan content in our food (which the body uses to create serotonin). Serotonin subsequently gets converted into melatonin – which is the sleep hormone as we know. These are also inhibitory neurotransmitters that reduce brain activity and heart rate. This is why after eating a big meal, you feel great and collapse onto the couch before falling asleep. This is the postprandial state we discussed before.

And of course, this is also when protein synthesis and muscle building occurs – largely thanks to the activation of the protein mTOR – Mammalian Target of Rapamycin. This is released in response to heightened presence of energy and nutrients, particularly

protein. It leads to increases in hormones like IGF-1 ([study](#)) and it makes it easier for us to put on muscle and fat.



Low blood sugar will conversely trigger a spike in cortisol levels – cortisol being the stress hormone. This is combined with an increase in noradrenaline, raising our metabolic rate and actually leading to heightened fat loss ([study](#)). In short, this your body going into “I must find food” mode – and it’s actually one of the processes that causes us to wake up in the morning! Our sleep-wake cycle is closely tied to our diet in fact, more on that in a moment! In short, whereas reducing calories may decrease your basal metabolic rate, fasting can actually increase it.

Cortisol also leads to the release of myostatin, a substance that breaks down muscle tissue – which is why so many muscle heads are keen to avoid letting their blood sugar dip whatsoever. Cortisol also acts in an antagonistic manner to testosterone. In short: if you have more cortisol, then you will have *less* testosterone.

The link between cortisol and mood explains both why we get “hangry” and why fasting has been observed to increase focus and mental clarity (at least that’s part of the explanation). This is a little like taking a cold shower to trigger a sympathetic response and increase focus – and it’s one of the benefits I’ve really enjoyed when using fasting myself.

At the same time, fasting means less energy is “spent” on your gut. Mastering fire and learning to cook allowed the human species to shrink our intestines and thereby use up less energy on digestion. That in turn might have allowed our bodies to support *bigger brains*. It stands to reason then that by digesting less in the mornings, you’re also leaving more energy available for other key processes – like thinking.

And as a side note, it’s really surprising how much of a difference not preparing breakfast can make to your productivity too! We spend a lot of time cooking, eating and

washing up. With that gone, you'll find your productivity sky rockets – especially if, like me, you found yourself using food as a way to delay productivity.

At the same time as all this is going on, our alpha cells secrete an alternative substance called glucagon in response to low blood sugar. Glucagon in turn encourages the release of energy from the stored glycogen in the liver and muscles.

It's what happens once that supply of glycogen is depleted that's really interesting though.

AUTOPHAGY: The breakdown of cells resulting in the recycling of waste products.

During activity, we burn a substance called ATP (adenosine triphosphate), which increases levels of AMP (adenosine monophosphate – the constituents of ATP). That in turn activates a protein called AMP-activated protein kinase, which reduces protein synthesis through the inhibition of mTOR. In short, mTOR and AMPK exist at opposite ends of the spectrum and help to regulate catabolism and anabolism.

For all these reasons then, being in a fasted state is excellent for encouraging fat loss – it ramps up our metabolism while guaranteeing that we'll burn fat and other supplies. At 18-24 hours, our insulin levels are at their lowest, ensuring lipolysis AKA fat burning ([study](#)). But for the very same reasons, many strength athletes assume that AMPK is the enemy.

In fact though, AMPK has an *incredibly* beneficial side effect called autophagy.

WHAT IS AUTOPHAGY?

Autophagy is a buzz word that has been doing the rounds recently since its discovery won Yoshinori Ohsumi the 2016 Nobel prize ([reference](#)).

You see, the problem with chasing after mTOR, is that while it increases protein synthesis and hypertrophy, it *also* leads to an uncontrolled growth and an increased number of errors and junk material. This in turn can result in numerous serious health problems including cancers, tumors, physical signs of aging, acne, and neurodegeneration – all things known to be on the rise in general ([study](#)). If you are constantly eating throughout the day, your body remains in a constant frenzy of anabolism.

Autophagy – which translates roughly to self-eating - acts as a perfect counterbalance to this. Essentially, autophagy describes how cells will recycle their waste components. In short, when fasting, the body needs to get its amino acids and other nutrients from somewhere, so it breaks down things like toxic waste products, damaged organelles, and more ([study](#), [study](#)). Particularly beneficial is mitophagy – autophagy of dysfunctional mitochondria (cellular energy factories) which in turn can reduce harmful reactive oxygen species that otherwise cause cell degradation over time ([study](#)). Autophagy can increase inflammation by identifying antigens in the short term, but will ultimately reduce long term inflammation by *removing* said antigens ([study](#)).

Through all these mechanisms, autophagy has been shown to promote the lifespan of many species of animal ([study](#)).

First, these elements are transported to a kind of ‘waste bag’ in the cell called the autophagosome, then they are taken to the cell’s lysosome to be broken down for energy and biomass. In short, this is cellular recycling.

How long do you have to fast to experience autophagy? Some reports suggest that it takes 12-16 hours to experience the full benefits of autophagy. Others have suggested 24-48 hours. A paper called “Progressive alterations in lipid and glucose metabolism during short-term fasting in young adult men”, suggested that 18-24 hours was the period that saw the greatest drop in insulin and the greatest *increase* in lipolysis – fat breakdown (that [study](#) again).

In all likelihood, the amount of time it takes to feel the full benefits of fasting would vary greatly depending on individual differences such as metabolic rate, as well as other variables such as activity levels (certain types of exercise like HIIT are particularly effective at using glycogen), and the amount of nutrients and energy stored prior to the fast.

Note that you can’t experience the full benefits of autophagy by simply cutting out carbs, OR through calorie restriction. Tiny amounts of leucine alone are enough to trigger the release of mTOR (which also means you shouldn’t use BCAAs while fasting to try and prevent muscle breakdown). Tryptophan is likewise found in many proteins. In short, you need to go *totally calorie free* in order to enjoy the FULL benefits of intermittent fasting. And actually, a dry fast would lead to even greater autophagy benefit. This is why, I personally don’t feel that alternate day fasting diets like 5:2 – which permit you to consume a certain number of calories during your fasted days - make as much sense as going completely nutrient free for a portion of the day. Alternate day fasts won’t trigger autophagy to the same degree, and they may still cause fluctuations in insulin etc. These work as a method of calorie restriction for many people, but that’s probably about it (personally I also find that a daily fast is much easier to stick to, but that’s a matter of personal preference).

Autophagy has been implicated by some as an explanation for why people who are starved for long periods of time don’t experience large amounts of excess skin around their stomachs. I was personally *very* impressed when I noticed a skin tag appeared to shrink after several weeks of intermittent fasting.

AUTOPHAGY AND FASTING – NOT A ‘MAGIC CURE’

That said, we also shouldn’t be tempted to make the very human mistake of putting everything into neat boxes.

Autophagy occurs all the time in our bodies on a lower level – fasting simply *ramps it up* to a significant degree. Likewise, you can be in varying states of autophagy – this is a spectrum rather than a binary. Several other things can also increase autophagy, including physical exercise (resistance training in particular), coffee ([study](#)), green tea ([study](#)), and resveratrol ([study](#)).

It’s also a mistake to ignore the potentially negative side effects of autophagy. While it can prevent the onset of cancer and reduce the progress of cancerous cells in the early stages, it can also actually support advanced cancerous cells which use its protective properties to aid their own survival ([study](#)). Likewise, certain diseases also seem to be able to benefit from autophagy, even turning it against us in order to attack healthy cells ([study](#)). Again then, we shouldn’t paint intermittent fasting as a ‘magic cure’ – but rather

a potentially useful tool that should be viewed in the larger context of health and nutrition.

That said, fasting for the necessary amount of time may increase autophagy by as much as five times ([study](#)), bringing many health benefits – counteracting the accumulation of damaged cellular components associated with age, and increasing metabolic efficiency ([study](#)).

LONGER TERM EFFECTS OF IF

Reading all this, you might be about to draw the conclusion that intermittent fasting is useful for your health and longevity, but only equivalent to calorie restriction for weight loss – with added risks for your muscle mass.

Actually though, there are several more reasons that intermittent fasting may be of interest.

Intermittent Fasting and Insulin Resistance

For instance, if you were planning to build muscle by keeping your blood sugar levels high in order to keep mTOR high and insulin up, you may find that you run into a little problem called insulin resistance. Being constantly overloaded with sugar leads the body to eventually respond by becoming resistant to insulin – increasing the likelihood of diabetes. Just as taking certain medications can cause the brain to eventually ‘adapt’ to raised levels of neurotransmitters and reduce the number and sensitivity of receptors, so too can constantly high levels of insulin cause the cellular receptors to adapt making us less able to utilize that insulin. Remember: we *need* insulin to build muscle, utilize energy, and absorb nutrients.



Conversely, fasting can help to improve insulin resistance ([study](#)), as well as boosting mitochondrial efficiency ([study](#), [study](#)). Remember: our mitochondria are our cells’ ‘energy factories’ – they are what we use to turn glucose into muscle or brain power.

In short, you can think of fasting as being a form of training. You force your body to become better at functioning with very low amounts of nutrients and energy. That way, when you subsequently have an abundant supply of energy and nutrients, you will be far

more effective at using them. You are subjecting your body to a short and controlled hermetic stressor, in order to make it stronger and more resilient – just as you are when training.

Keep in mind though that there are some studies that haven't been so positive. At least one suggests that in women, blood sugar control could worsen ([study](#)). In fact, fasting may affect women quite differently compared with men in general – even potentially dysregulating of menstrual cycles and harming fertility. A worrying recent study showed that fertility was impaired in both male *and* female rats on an IF diet ([study](#)). Female neurons have also been shown in studies to be more resistant to autophagy ([study](#)).

Intermittent Fasting and Fat Adaptation

There's another more positive potential impact of 'training' your body in this way too though – which is that it may help to make you more 'fat adapted'. Fat-adaptation is usually associated with the keto diet and other high fat diets. When the body is fat adapted, it is better optimized for burning fat, so that it will more readily turn to fat stores. How do you get better at burning fat? You practice! And through intermittent fasting, you may be able to become better fat adapted. Fat adaptation will upregulate genes associated with lipid metabolism ([study](#)), which often takes around 2-3 weeks. At this point, you'll find it easier to go for longer stretches of time without feeling intensely hungry, and you'll be able to rely more on fat during extensive exercise. You'll still be able to utilize glucose, it's just now your body has *options* and unsurprisingly, you could potentially perform and look better as a result.

Intermittent Fasting and Ketones

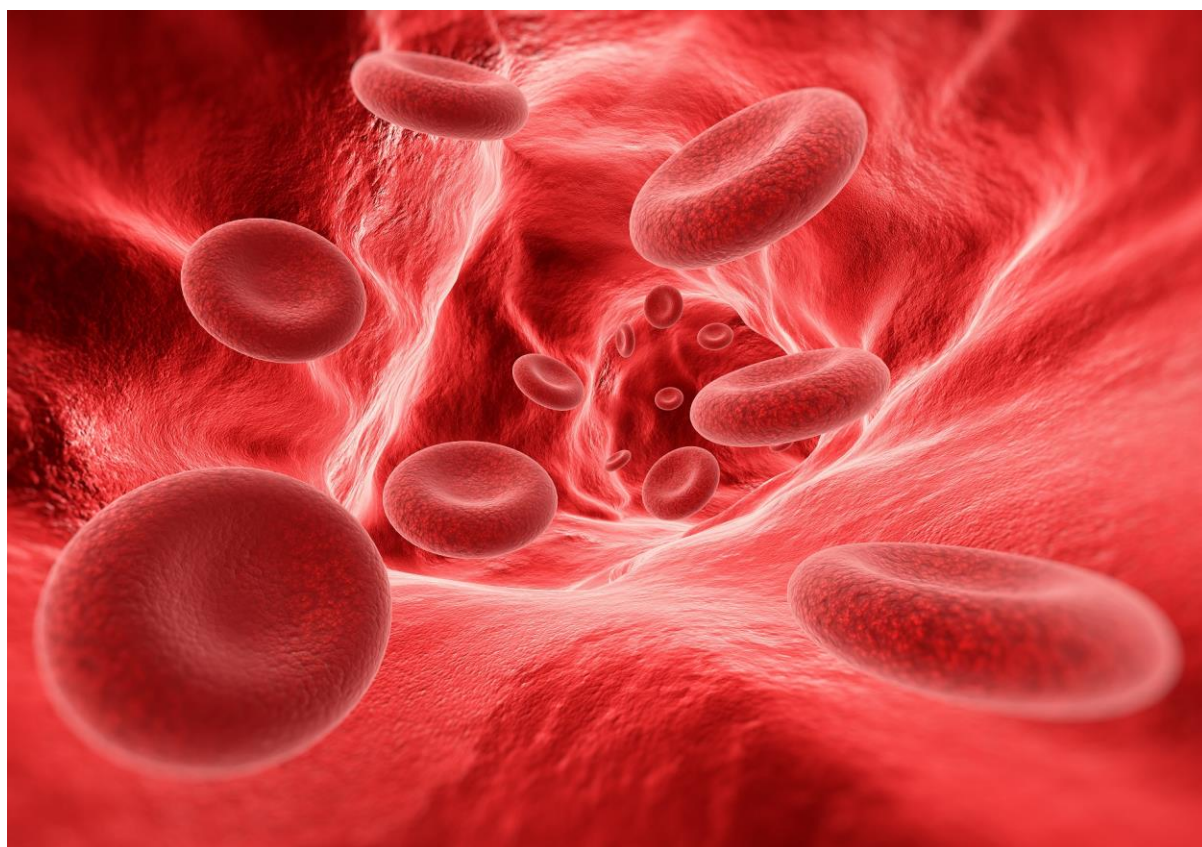
How about ketones? Ketones are organic compounds produced by the liver that are actually preferred by the brain for certain processes. Ketones also encourage the release of the brain-plasticity promoting BDNF. Proponents of the keto diet say that ketosis enables them to burn fat stores, while feeling highly energetic with mental clarity.

Again, we should avoid thinking of the body as being in either one state or another. While getting into full ketosis may take around 48 hours of full fasting, you can become slightly *more* ketogenic and prompt your body to produce more ketones. These ketone bodies, acetone, acetoacetate, and 2-hydroxybutyric acid, and may contribute to the mental clarity and improved fat adaptation described by IF fans. Of course, fasting can also be a very useful way to get into full ketosis occasionally without having to go carb-free – fasting for a couple of days is a shortcut to ketosis, especially when combined with HIIT routines.

FASTING VS MUSCLE MASS

So, does fasting lead to the degradation of the muscle? Well, Terry Crews would suggest not. And indeed, this is considered to be another of the big advantages of IF – it *doesn't seem* to cause muscle loss. How can that be when low blood sugar is known to trigger myostatin, lower testosterone, and deplete muscle glycogen?

One thing to keep in mind is that exercise, or more specifically mechanical stress, can also activate mTOR and thus elevate protein synthesis. Thus, weightlifting and fasting make excellent bedfellows. Not only that, but fasting is also known to spike levels of growth hormone ([study](#)) which protects muscle mass, encourages fat burning, and also has age-reversing properties. These aren't the huge game-changing spikes that some people paint them as, but they are certainly welcome.



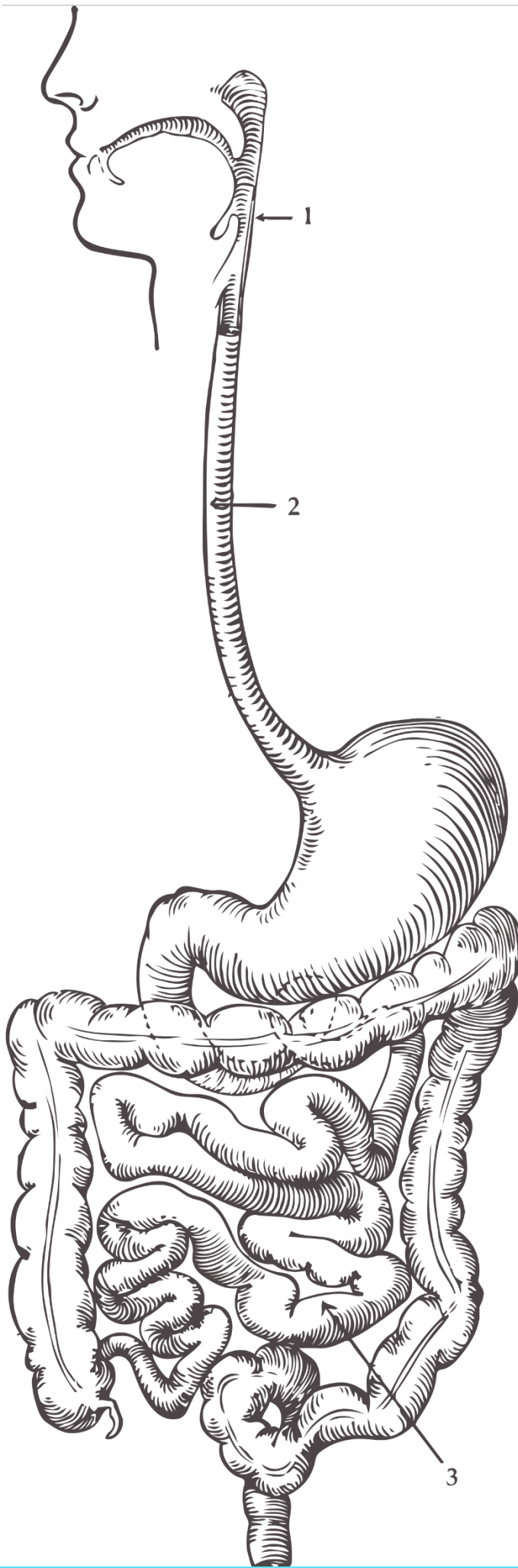
Autophagy may also be protective of muscle breakdown – the body can get what it needs from junk material, rather than from the muscles. Note though that you may well notice that your muscles look smaller due to depleted glycogen – and this *could* impact on your muscle endurance.

Looking at this from an evolutionary perspective, the question to ask is: why would the body want to cannibalize its precious muscle if fat AND waste protein materials are both available? It simply doesn't make any sense.

HOW TO USE INTERMITTENT FASTING

This evolutionary perspective is the lens through which many people view intermittent fasting. The presumption is that during our evolution in the wild, we wouldn't have had the same access to food. We would have been forced to go through periods of fasting due to the simple fact that eating required us to first locate and kill prey, or forage for fruit and veg. We didn't have any means of stockpiling food and so couldn't just snack on Mars bars throughout the day.

Thus, it is suggested that our very design is predicated on the idea that we will go through lengthy periods without food – and that this is in fact the *optimum* state of



affairs. Spending time in both fasted and fed states provides balance – ensuring we benefit from separate and equally important functions in equilibrium.

This also explains why we might find it easier to stick to such a diet. Evolutionary psychologists suggest that we might have a tendency toward “gorging” when we find food, seeing as we don’t know when we’re going to find food *next*. During a regular diet this is a problem, seeing as we can end up gorging constantly. During intermittent fasting though, you have *permission* to go crazy.

Recommended Resource: *Guns, Germs, and Steel* by Jared Diamond

But there is a counterargument. The book *Guns, Germs, & Steel* points out how actually, we might have been more likely to locate and settle in areas that gave us proximity to naturally replenishing resources. We might not have been able to farm, but we could locate ‘natural farms’ which would ultimately allow a small tribe to grow into a powerful culture. Such a lifestyle would have made “grazing” much more possible. And in fact, those with the ability to graze, might have been the very ones who survived to form today’s civilizations – especially those with access to protein.

I’ve described people in this book as being adaptoids. Those people with rounded backs and Dad bods are not maladapted athletes – but rather they are ideally adapted for the office based, carb-fueled lifestyles they live.

Recommended Resource: *The Fittest Book in the World* by Ross Edgely

There are examples of people thriving in all kinds of strange

conditions. In *The Fittest Book in the World*, author Ross Edgley describes how the Ecuadorian bull wrestling Chagra manage to remain incredibly fit and healthy into their advanced years despite their diet of steak and large amounts of Puntas alcohol. Plenty of people are claiming that the Carnivore diet is doing wonders for them. It may be that we can thrive in a whole variety of different circumstances.

More likely, what I have noticed observing many other people on various different diets, is that we are all so different as to benefit from entirely different strategies. Fasting might do nothing for one person, but be the catalyst to a body shape transformation for another.

Practically, I notice drawbacks and limitations when fasting too. For one, it makes you weaker. While exercising and lifting weights, I am significantly less effective if I have been undergoing an extensive fast. And while I start out more productive and alert, I find that I also sometimes experience anxiety as a result of my low blood sugar, and certain low energy.

I also have a strange issue with a very dry mouth in the mornings. Water won't quench that thirst – it needs to be milk or juice. It's almost unbearable for me to get past that first hour if I wake up this way. Other people report similar challenges – some struggle to sleep for instance. It also sucks that I can't use my preworkout due to the sugar content.

And then there is the theory of the “constrained model of energy expenditure,” which suggests that we will become more or less active depending on the number of calories we consume – that we will instinctively become slower and more sluggish when we eat fewer calories, thereby negating the benefits of calorie restriction. Maybe this is a mark against intermittent fasting, or maybe IF is the solution – seeing as it increases metabolism and provides an energy boost through hormonal changes.

*CONSTRAINED MODEL OF ENERGY EXPENDITURE:- THE OBSERVATION
THAT OUR ACTIVITY LEVELS INCREASE OR DECREASE IN ORDER TO
MAINTAIN A CONSISTENT CALORIE BALANCE.*

I apologize if you were hopping for something simple and entirely positive. Unfortunately, our biology just isn't that straightforward and there's still a LOT more research that needs to be done on this topic before we can draw any hard conclusions.

INCORPORATING FASTING INTO THE AUTOMATION DIET/SUPERFUNCTIONAL DIET
I personally find that performing an 18:6 fast makes a lot of sense. It gives me a big enough window to get enough protein and nutrients during the evening, but it is also long enough to ensure I get the best benefits of fat burning and hopefully some autophagy during the fast. Stopping at 16 hours might well mean giving up right when you're starting to achieve the biggest benefits!

At first, I found this hard to do, but with time it has become easier and easier. Another tip then is not to leap straight into this – just like you wouldn't run 26 miles the first time you went jogging. Start by just pushing breakfast back a little and then experiment with pushing it further and further.

During your fast, avoid *all* calories and nutrients. Stick with black coffee and water.

And I would also suggest that you use intermittent fasting... intermittently. After all, if you really want to know what life in the wild was like during our evolution, the answer is that it was largely *random*. We would have often eaten when the opportunity presented itself. Sometimes we'd go lengthy periods without food, sometimes we would have enjoyed seasons of prosperity.

There have been plenty of incredibly fit, focused, and energetic individuals who exist on a 'modern' diet. Plenty of bodybuilders who became massively and powerful using nothing but bro-science. Maybe this is just further unnecessary complication. But the problem is that more and more of us have become reliant on the quick shots of energy provided by simple carbs, and have trained ourselves out of burning fat.

So, my suggestion is that fasts be used as occasional ways to reset your system – to encourage fat burning, improve fat adaptation, and keep the body guessing. I'll go through periods of intermittent fasting from now on in order to enjoy the health benefits of occasional autophagy, and to ensure my metabolism gets fired up and doesn't become complacent. Because I'm staying flexible and changeable, I hope I can avoid any of the *potential* downsides of fasting regularly. And because I already eat less during the first half of the day (check out my previous videos), this fits naturally into my routine.

But just in case that comes off as negative, I want to re-iterate that I am sufficiently convinced by fasting to introduce it into the routine. I really think it has greatly improved my abs, it's excellent for clearing brain fog, and it seems to have a host of benefits. By combining it with other forms of diet, I feel I can get a lot of advantages I'm looking for.

To simplify matters for the program, we will be using intermittent fasting once or twice a week, depending on the level of the program.

NOOTROPICS AND SUPPLEMENTS

This book would be incomplete without a section on nootropics and supplements. By supplements, I am of course referring to bodybuilding/fitness/health supplements such as multivitamins, omega 3 capsules, protein shakes, and creatine. Anything you take as a pill, powder, or shot intended to improve your fitness, help you train harder in the gym, or improve your health in some way.



And by nootropics, I am referring to “smart drugs.” These are supplements that specifically benefit brain function. They range from straightforward nutrients, to easy-to-come-by drugs such as caffeine, to exotic and controlled substances such as modafinil.

We have already discussed the huge volume of different nutrients and superfoods available through the diet and what they can do for you. Almost all of these are available in supplement form as well.

However, just as it is folly to try and chase every single one of these things in your diet, it is also a mistake to try and chase every single one in supplement form. You will end up driving yourself mad, breaking your bank balance, and quite possibly having an overdose in something or other (so many products add vitamin B6, for example).

How about using nootropics to boost brain function specifically? Let's consider some popular options, such as modafinil.

Modafinil and Piracetam

Modafinil is a drug that was developed as a treatment for narcolepsy and the idea was that it would be able to help people who used it to stop falling asleep without warning.

Since then, modafinil has proven highly effective at helping people who *don't* have narcolepsy. Not only can it massively reduce tiredness and not only can it enhance focus but it also boosts memory and potentially reaction time. Word has it that 99% of CEOs in Silicon Valley are now using modafinil to get ahead. This is almost definitely bullshit, but it shows how rife it is at least *thought* to be.²



Modafinil appears to work by influencing the action of orexins – neurotransmitters that are tightly linked to our body clock, diet, appetite, and more. It also increases dopamine and several other key neurotransmitters.

² There is a potential argument for using modafinil in the very short term to enhance learning a complex topic. The benefits will still remain after you stop using it. I don't recommend this, but it is an interesting approach.

I have used modafinil to research articles and this book. The feeling is similar to caffeine but ramped up several notches. You genuinely find it easier to focus on specific things, but this can be positive or negative depending on *what* you are focussed on at the time. For example, should you procrastinate while using modafinil, then you will find you can get absorbed in whatever distracting task you are engaged in for *hours*.

Modafinil can also make you so focussed on something you are thinking about, that you actually miss important environmental cues: it can make it dangerous crossing the road for this reason.

Then there are the side effects. Modafinil is supposed to be without side effects, but for reasons we will discuss in a moment, it can actually cause everything from teeth grinding, to headaches, to diarrhea, to loss of appetite.

Another highly popular nootropic is piracetam. This increases a neurotransmitter called acetylcholine, which is an excitatory neurotransmitter that seems to play an important role in focus, memory and attention. People who use piracetam say they experience music and colours more vividly, they are wittier and quicker in conversation and they remember details more accurately.

Of course, there are also plenty of stimulants such as Ritalin and Adderall which are highly popular these days with students and others who are studying.

All of these nootropics are similar in as much as they are used to increase focus, memory, and other mental functions associated with being “on.”

At the other end of the spectrum are the likes of 5-HTP. This stands for 5 hydroxytryptophan, which is converted by the body into tryptophan and then into serotonin. This improves the mood and improves stress which many people find makes them more productive and better at working, while at the same time making them happier and more social.

Most people who use nootropics don't pick just one of these supplements either but rather use a selection of them in conjunction in order to get the precise results they're looking for. Many will work well in conjunction – for instance if you use Piracetam then it is often recommended that you also take a form of choline, seeing as the brain uses choline in order to formulate acetylcholine.

Conversely, they might use modafinil in conjunction with something like l-theanine in order to “take the edge off.” This can be effective in some cases, but in others it will actually mean they simply cancel each other out and you are left feeling “weird.”

While something like 5-HTP has a completely different effect as compared with modafinil, they are still very similar in as much as they ultimately both work by modulating amounts of neurotransmitters.

Do Nootropics Work?

But should you learn more? Do Nootropics work like the film *Limitless*?

Of course, as with all these things, the reality is not quite so simple as the pitch.

The problem with all the nootropics I've just described, is that they tend to favour specific neurotransmitters over other. And that's unfortunately a drastic oversimplification of how the brain works.

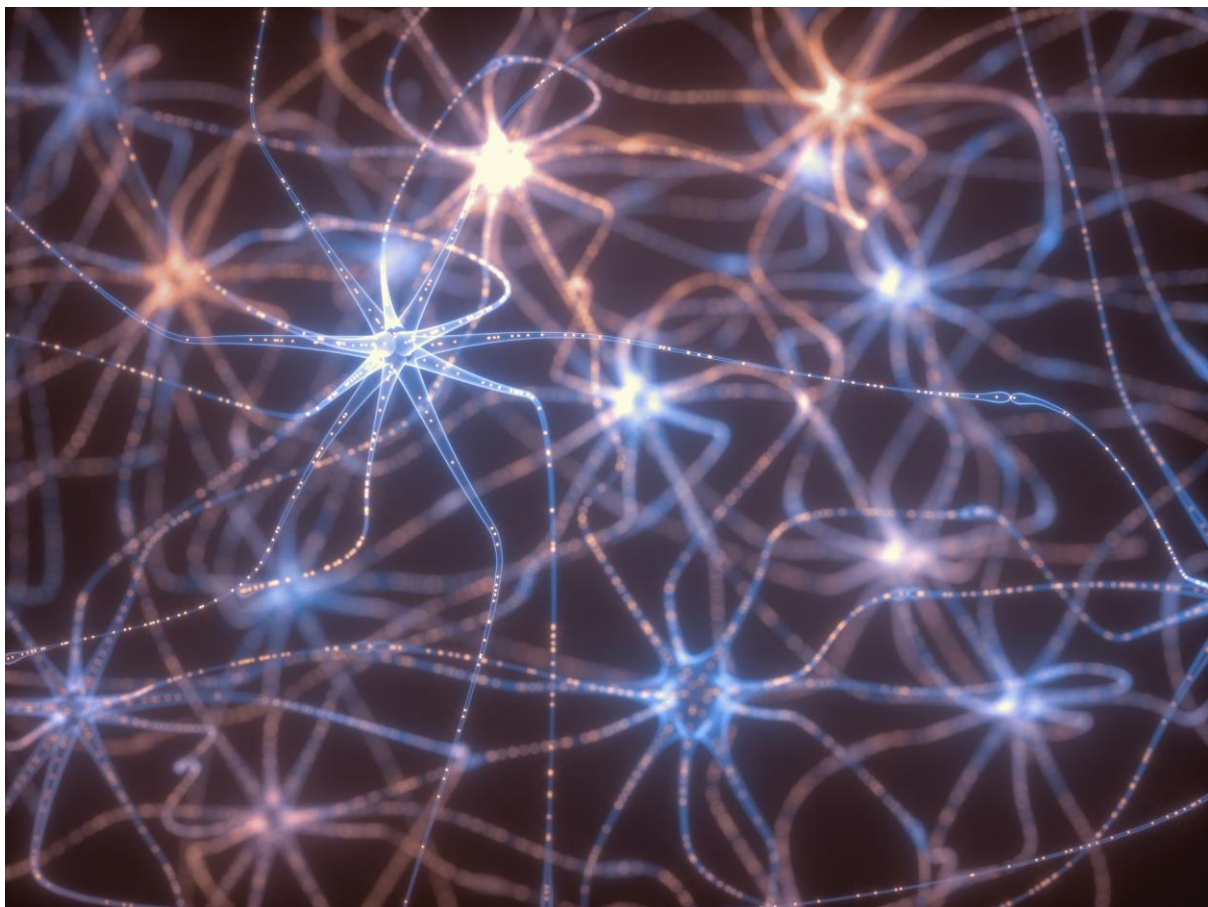
I've also described this as trying to tune a radio with a sledgehammer!

For instance, when you use something like modafinil, you are increasing the neurotransmitter called orexin. This is linked with our wake-sleep cycle and thus it helps you to stay awake longer and to stay productive longer.

But unfortunately, our wake-sleep cycle is also closely linked with various other cycles and biological rhythms in our body. Specifically, it is linked with our appetite, our bowel movements and more. So, when you change your orexin, you can actually lose your appetite and end up going to the toilet... rather a lot.

Likewise, if you use 5-HTP to increase serotonin, you also end up affecting your appetite. And seeing as serotonin is converted eventually into melatonin (the sleep hormone) you can actually end up sleepy and groggy too! Which is *far* from an effective way to improve your social skills – it just makes you less social anxious.

And when you increase dopamine with something like caffeine or L-tyrosine (caffeine increases dopamine indirectly by reducing adenosine), this can prevent you from sleeping and lead to burn out. It can also indicate to your body that something very important is happening, which in turn can trigger a release of other excitatory neurotransmitters such as cortisol and such as adrenaline. Your heart can end up racing, you can feel anxious and you can struggle to get to sleep.



No neurotransmitter acts in a vacuum. That is to say that you can't pick a single neurotransmitter to alter without expecting this to have profound effects *across* the brain and body, and on countless other neurotransmitters, brain areas and hormones as well.

And with that in mind, it becomes very difficult to recommend these kinds of supplements and medications.

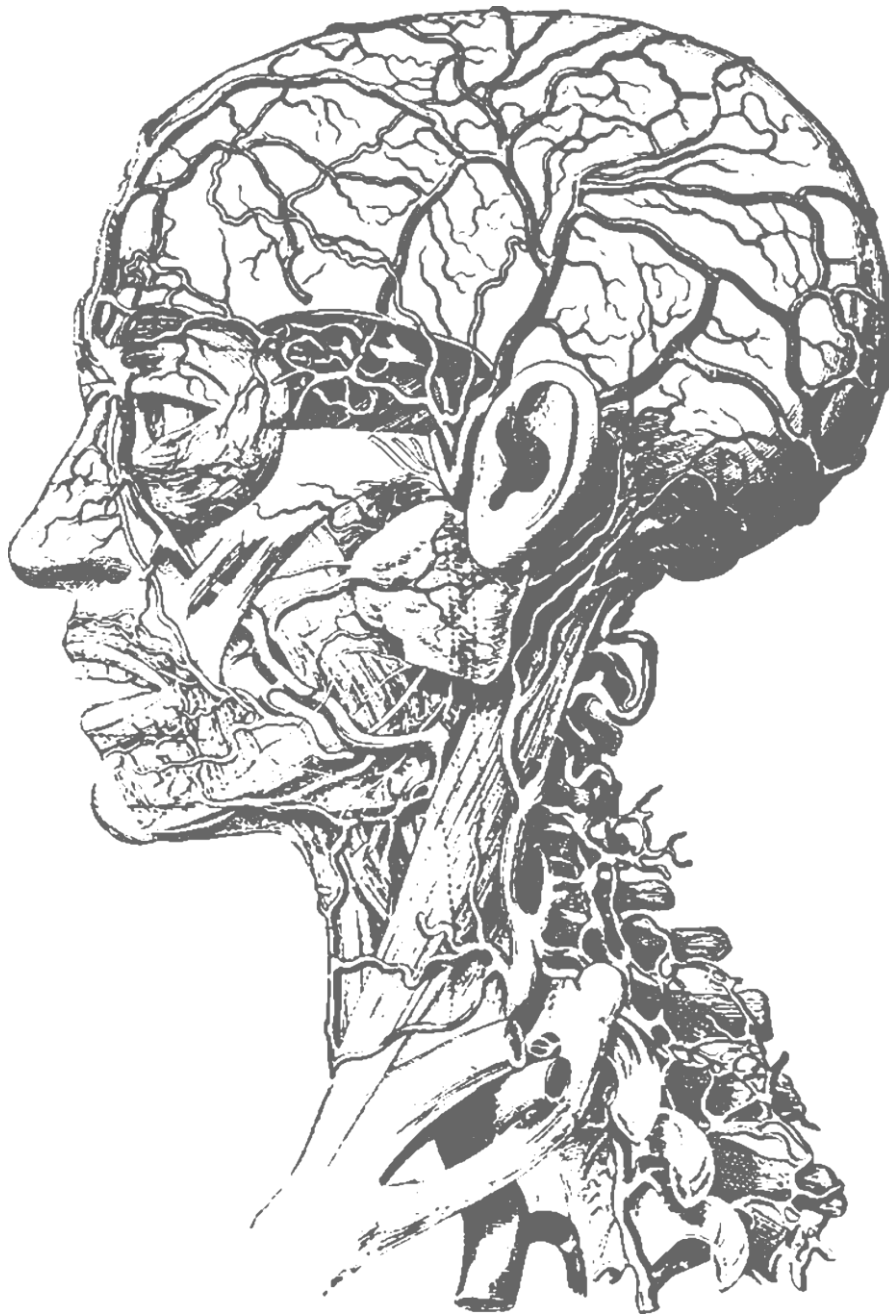
What's more, is that there is no neurotransmitter that is right for every single situation. You might take something to increase your dopamine for instance under the impression that this will then increase your focus and your memory. And that is certainly true, it will do those things.

But do you always want to increase your focus and your concentration?

What you may not realize is that focus and creativity are somewhat inversely correlated. That is to say that if you increase your focus, you may actually end up *decreasing* your creativity.

Remember that web of neurons in the brain? Well, creativity comes from our ability to explore those different nodes (neurons) and to find *novel* connections. Creativity really is simply the ability to recombine existent information in interesting ways. You take two ideas or two concepts and you combine them, and then you have a new, novel concept.

But if you increase your dopamine, you increase your focus on *one* specific brain area. You become more intensely focussed on one concept or one collection of ideas and in doing so, you lose that ability to make novel connections and to come up with new ideas.



Not only this, but you also lose the ability to relax and rest. So that when you finish work and you try to chill in the evening, you will still feel pent up and anxious. That means that you can end up feeling less rejuvenated the next day and thus find it harder to jump back into work.

This is why modafinil can make it so easy to get distracted by the *wrong task*, and can cause you to miss things going on around you. A healthy brain isn't *locked* into one state.

A healthy brain is not a brain that feels wired or highly focussed – it is simply one that feels like it normally does but... *better*. You should have the ability to *switch* between different brain states and different “modes” at will. And nootropics such as those we’ve described patently do *not* help with this.

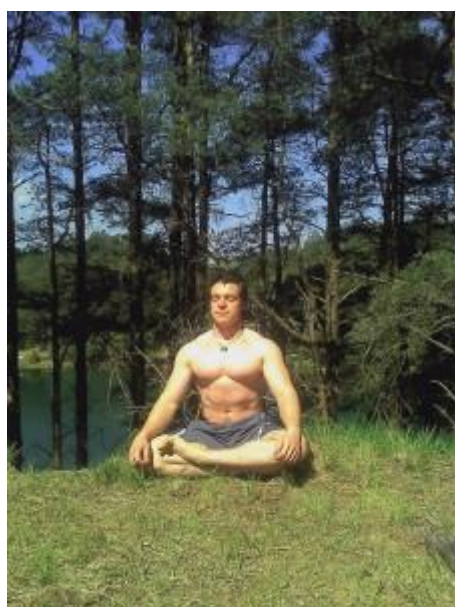
Finally, you need to consider the risk of tolerance and adaptation. This is the risk that your brain can adapt to the change in chemical balance and thereby become dependent on nootropics in order to function normally.

How might this happen?

Well a good example is caffeine. When you drink caffeine, you reduce the action of a substance called adenosine. This happens because caffeine molecules are very similar in size and shape to adenosine molecules. As such, they can end up getting trapped inside the same receptors and thereby preventing adenosine from being effective.

Adenosine is a by-product that is produced when our cells create energy. This is created throughout the day as we think, as we engage in activity etc. As an inhibitory neurotransmitter, it eventually starts to reduce activity in the brain, making us feel more and more relaxed and sleepy until we start to lose concentration and focus.

But if you keep drinking caffeine in large doses, then the brain responds by creating *more* adenosine receptors. It assumes that you have a chemical imbalance and it responds in kind. Therefore, you now find that you feel tired and groggy when you aren't drinking caffeine and you need *even more* tea or coffee in order to feel alert and awake. This creates addiction and it is what leads to withdrawal symptoms when you stop getting enough caffeine.



In fact, it has even been suggested that what most of us assume is sleep inertia (the tiredness we feel first thing in the morning) might *in fact* be simple caffeine withdrawal!

THE S.E.A.R. STACK

If you're currently disappointed that I haven't listed a stack for enhancing brain function or providing athletic performance... don't worry. While it is not "required" (as long as you follow the diets), I have devised an optional stack that will help to boost energy, focus, creativity, and learning capability.

This stack is based on my assertion that a healthy brain is one that can easily switch tasks and change mode. An *adaptable* brain.

This stack is designed to help you to more easily enter a flow state, while also helping you to learn more, and to perform better during workouts.

BUT it will do this without emphasizing the role of specific neurotransmitters. Instead, it will seek to increase your brain's available energy, its adaptability, and its recovery. Before I list the ingredients, I want to make one more detour and take a look at the misconceptions surrounding the mythical "flow state" that so many people are trying to accomplish with traditional stacks.

UNDERSTANDING THE FLOW STATE

The failure of popular approaches to nootropics is predicated on the fact that their users are aiming to achieve a particular "state" that they value over all others – not realizing that it is the brain's very adaptability that gives it its power.

A similar mistake is that many people think there is an ultimate state of performance, called flow. We touched on this briefly in a previous section.

Flow is described as the state in which we are 100% engaged with a task, to the point that we can handle that task without hesitation and thus perform much better. It is

described as being almost euphoric, and leading to countless breakthroughs in physical and mental performance.

I dislike the notion that there is just one “flow state” and that the neurochemistry of creative flow (being really in the moment while writing poetry, for example) should be identical to the neurochemistry experienced when snowboarding down a mountain.

People like Stephen Kotler want to commodify flow states – to turn them into a panacea that can cure every ailment, such that they can sell books and programs. In truth, a flow state is *merely* a state of intent concentration on a particular task. Normally this occurs when the challenge is set at just the right level, and the task itself is inherently interesting.

Flow states occur when we commit 100% of our cognitive resources to a given endeavour. Thereby, time appears to slow down, and we seem able to pull off feats that would normally be lost to us. Ideas come easily, and reaction times increase.

The precise neurochemistry and brain activity associated with these states can therefore vary greatly depending on the nature of the task. Brain imaging results would look extremely different being 100% focussed on a good book, as compared to being 100% focussed on a fight.



This is where the confusion regarding transient hypofrontality comes from, I think. This state describes the apparent shut down of the prefrontal cortex, the default mode network, and of the sense of self/ego. We lose the ‘inner critic’ that often distracts us from the task at hand and causes us to choke.

Many find this loss of “self” very liberating, and in fact seek flow states as a kind of intoxication. Freud would describe this as the Thanatos instinct. That is to say, it seems

that some people are simply trying to ‘escape themselves’, turning flow states into an alternative for the likes of alcohol.

I speculate that in fact, we can achieve flow *without* shutting down the prefrontal cortex entirely. It simply depends on *what* you are focussed on. If you focus on surfing, then of course that will mean you lose that inner voice. You’ll be focussed on balance and on the amazing view around you, not on what you had for lunch.

But if you are 100% focused on writing, then I suspect that you’d see less shut down of these areas. I put it to you that it is not hypofrontality that *causes* flow, but rather it is a symptom of *some* forms of flow.

And indeed, brain scans of rappers in flow show that a specific area of the prefrontal cortex (called the dorsolateral prefrontal cortex) shuts down, while the medial prefrontal cortex remains active ([study](#)).

If all it took for us to be in a state of flow was hypofrontality, then we’d be in flow whenever we were scared. When you’re standing on stage in front of lots of people, it’s your fight or flight response that makes you feel highly aroused and alert. This *does* shut down certain brain regions in a bid to help you focus on escaping, which is why we often croak under pressure. Likewise, cortisol and adrenaline are known to *blunt* creativity. Some writers and speakers have described this as a ‘frontal lobotomy’.

Hardly the ultimate state of human performance!

It is being in a state of *calm* arousal that was more attributable to flow. That means experiencing a sympathetic response – but *maintaining* your higher brain function as needed.

It’s the point at which *anything* becomes meditative.

Again, it’s simply being extremely focused on the thing you’re doing, to the point that it comes as easily and quickly as possible – while retaining the ability to switch gears immediately as needed.

This may be linked to something called heartrate variability. Heartrate variability refers to the change in our heartrate during inhalation and exhalation. Far from being steady, your heart rate fluctuates all the time and this happens at least partly in response to your breath, via the vagus nerve.

When you breathe in, this causes a minor activation of the sympathetic nervous system – thereby increasing the heartrate. When you breathe out, you trigger the *parasympathetic* nervous system and thereby enter a more relaxed state.

If your heartrate doesn’t vary in this way, then it may suggest that you are sympathetic dominant – meaning that you are overstressed and possibly overtrained. Low heartrate variability seems to predict injury and illness.

But what’s more, is that heartrate variability *also* seems to predict optimal performance in elite individuals such as navy seals and special forces operatives.

Consistent top performers in fact seem to have a different physiological response to stress than average performers. It has been observed that Olympic calibre athletes and Special Operations personnel demonstrate both stronger sympathetic responses to challenge – meaning they show heightened arousal ([study](#)) and greater parasympathetic

expression during rest. In other words, they are capable of being more 'on' during competition and more 'off' when they need to recover ([study](#)).

So once again, things aren't quite as clear-cut as they at first seem. While good heartrate variability is generally considered to be a good thing and important for health and recovery, it actually seems that the top performers exhibit *lower* heartrate variability during extreme stressors or what is known as a 'metronomic heart rate'. This suggests a much stronger sympathetic nervous system response ([report](#)).

And somehow top performers maintain this while also managing to remain clear headed and focussed. A doctor from Yale Medical School named Andy Morgan conducted fascinating research on the brains of men trained for mental resiliency under extreme stress and found that they produce greater amounts of neuropeptide Y (or NPY) and DHEA. DHEA is interesting because it manages to *buffer* the effects of cortisol on the hippocampus, perhaps allowing athletes and special forces operatives to maintain their special awareness for heightening performance during stress. DHEA is *also* a neurosteroid that increases the excitability of neurons – potentially helping to speed up synaptic transmissions and help our brain to run "faster."

NPY meanwhile is linked with blood pressure, appetite, learning and memory and that helps to reduce the effects of norepinephrine and thereby maintain the usefulness of certain prefrontal brain regions.



Imagine turning on the gas in your brain, releasing performance-enhancing neurochemicals and losing all distraction... while at the same time being able to maintain perfect clear-headedness and possibly even enhanced reaction times.

A related term is heartrate *coherence*. This is plots the pattern of variability as being either erratic and all-over the place, or calm and steady. In other words, it measures how often the dip and peak in heartrate occur – rather than how extreme those differences are. In a coherent state, the breathing becomes rhythmic, as do the heart rate variations. The heart rhythm pattern becomes predictable.

What's interesting, is that coherence also correlates with an increase in DHEA and massive *decrease* in cortisol ([study](#)).

This is why the Russians developed a stack called Adapt 232 for their astronauts and special operatives. This substance didn't focus on stimulating its users, but rather on helping them to maintain a calm arousal during stress, and encouraging their ability to *recover* after stressful training (thereby replenishing themselves to be able to better adapt to the *next* situation they found themselves in).

The name comes from the fact that Adapt 232 uses adaptogens that help to support adrenal function, as well as to stimulate DHEA production, not to mention BDNF. The supplements used in this stack were:

- Rhodiola Rosea
- Siberian Ginseng (Eleuthero)
- Schisandra

I have tried this stack and found it not to have a hugely noticeable effect. It is a little expensive and can cause stomach upset. Thus I don't recommend it specifically, but did take heavy inspiration from it when designing my *own* stack.

The take-home? The aim of a good nootropic stack, one designed to achieve something akin to flow, should not be to force the brain into one state. Rather, it should be to help the brain to *recover* better, so as to ALLOW it to enter a flow state (or any other state) as needed.

HOW THIS STACK ENHANCES ENERGY

So the stack I'm about to suggest is focused on this idea of helping the body to *recover* and keep your brain state flexible to adapt to the situation at hand.

However, it also has more functions. One is to increase brain plasticity by raising BDNF and nerve growth factor. Raising plasticity will not have a stimulant effect, but will help with your ability to develop new skills and pathways. This will help us to get more benefit from all the other types of training on this list.

Remember: we earlier concluded that intelligence was opportunity/training X adaptability. If your brain is plastic and you train it, it will get better.

This stack also includes **cognitive metabolic enhancers**. These work by improving blood flow and energy supply for the brain, thereby helping to make it better able to adapt to a situation, and helping you to feel more awake and alert at all times.

The added benefit is that these substances also have the added benefit of together burning fat, improving energy for the muscles, and raising testosterone. It will help to support muscle growth, increase focus and motivation, and hopefully help you to perform at your best, with no feeling of being "wired" or overly alert.

The stack is called the Support Energize Adapt Recover Stack, or SEAR Stack. It is an optional augmentation for the SuperFunctional Diet.

The SEAR Stack

- Vitamin D – Immune support, testosterone production, mood boosting, sleep regulation
- Vitamin C – Immune support, antioxidant, testosterone and nitric oxide support, mood boosting
- Citrulline – Healing (especially combined with vitamin C and omega 3), fat burning, vasodilation

- Inositol – Energy, fat burning, recovery (through replenishing neurotransmitter receptors)
- Ashwagandha – Brain plasticity ([study](#)), increased DHEA ([study](#)), reduced cortisol, anti-stress
- Lutein – Mitochondrial function (energy), fat loss, brain plasticity
- Creatine – Work capacity/muscle endurance, brain energy
- Curcumin – Brain plasticity, anti-inflammatory
- Omega 3 Fatty Acid – Anti-inflammatory, anti-stress, recovery
- Magnesium threonate – Sleep aid, muscle relaxation, testosterone support, brain plasticity
- Protein shake – Muscle building

I do advocate the addition of a protein shake in order to help achieve the target 1gram of protein for each 1lb of bodyweight. Whey protein is an extract from milk that simply offers an affordable, convenient, and bioavailable source of protein.

Follow the instructions for each supplement. Take magnesium threonate and zinc together before bed. Make sure to consume lutein with a source of fat (that can include the omega 3 fatty acid), and don't worry about loading and cycling for creatine (there is a large chance this is done only to line the pockets of supplements manufacturers).

While this stack is powerful and potentially very helpful in supporting everything we are trying to accomplish, keep in mind that the diet and program themselves are more important and will have a greater impact on your success.

THE SUPERFUNCTIONAL DIET

As with our training, the ultimate goal of our diet is to take all of the concepts we have learned thus far and apply them together in a singular program.

The final SuperFunctional Diet then, is built upon the following foundational pillars:

- Choose breakfast and lunch from a “menu” of calorie-controlled, nutrient-dense meals
- Enjoy dinner
- 1 gram of protein per 1lb of body weight
- Ensure a wide variety of different foods – ideally 50 different ingredients per week at least
- OPTIONAL: Use intermittent fasting intermittently (fasting for 16 hours)
- OPTIONAL: SEAR Stack

This program includes a separate supplement including a number of different meal suggestions. Use this as a guide, but not a set-in-stone or restrictive selection.

File 9: integration

Perhaps one of the biggest challenges we need to address if we are to become “SuperFunctional” is our energy levels. Unfortunately, energy is something that most of us just simply don’t have enough of. If you hope to start a new training program, then

One thing that many people don’t realize is that energy is finite. This is a resource that you can’t simply continue to dip into indefinitely.

And thus we don’t get into the kind of shape we want to be in.

A lot of people assume that the reason they haven’t successfully stuck with a previous training program is that they didn’t have time.

This is rarely the case. When was the last time you watched more than one episode of a program back-to-back? Or lost 25 minutes playing with your phone?

THAT is more than enough time to start making a big change right there.

The problem then is energy, and by extension, motivation. You didn’t have enough energy or motivation to train because you had a hard day and you were spent.

That suggests to me that right now, your current routine is using all of your energy and drive, meaning that you don’t have any left in order to start improving your health and lifestyle.

And stress – particularly social stress that comes from a work environment – is the biggest culprit.

So many people will go from not exercising at all because they’re too tired and stressed, to taking on a training program that is hugely too ambitious for them. So for example, they might decide that they are going to try and work out four times a week at the gym. That sounds like a reasonable and modest goal, until you realise that they’re going to be training for an hour, probably travelling for 30 minutes, and likely showering for 20. Throw in getting changed, and preparing for the next day, and suddenly you’re introducing about 8 hours of work into your routine.

Eight hours is not a small amount. In fact, it is an entire working day!

Not only is this a huge amount of time, but it’s also a huge amount of energy you are expected to expend. And if you aren’t exercising right now, it’s probably because you don’t have the time or energy! What is going to change this time exactly?

The same goes for trying to take up meditation (which requires will power), a diet, or even a stretching routine. All of which are things we want to do.

If you want to add 8 hours of training into your routine, you need to *earn back* that amount of energy. You can do this by cutting things from your current routine first OR by optimizing your current routine and becoming more efficient.

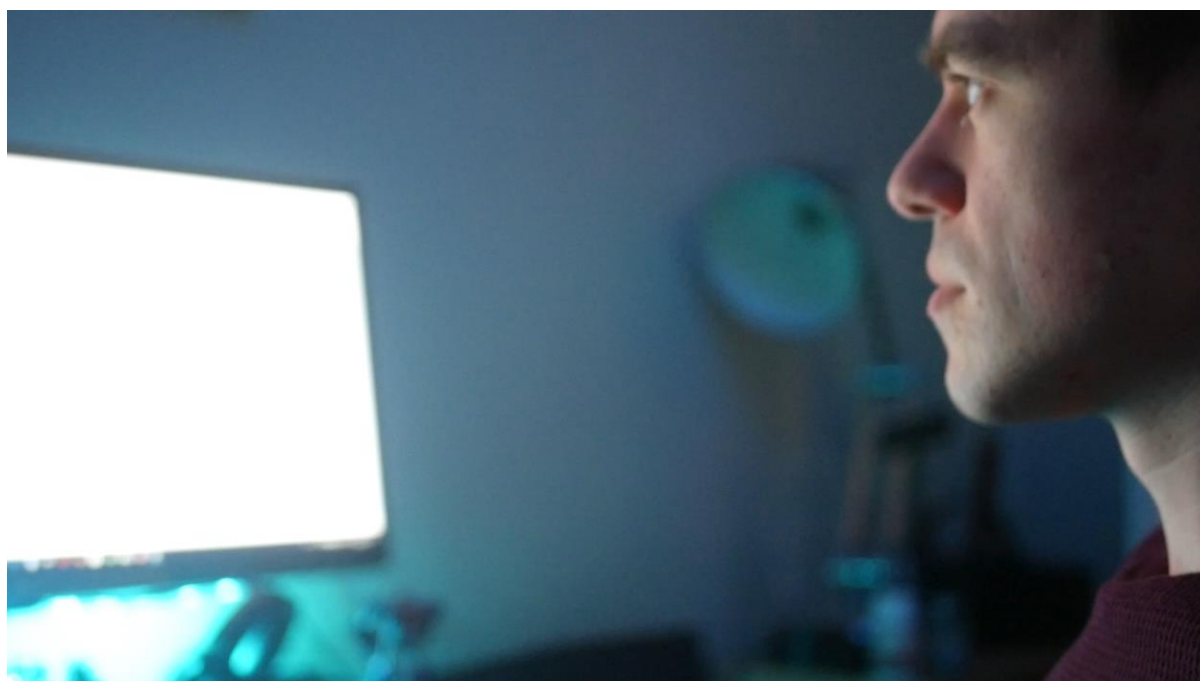
You can also do it by finding ways to increase your energy FIRST so that you can use this as fuel for everything else.

Kaizen is the Answer

Kaizen is a Japanese word meaning “improvement.” However, it is also often used in a more specific context, as an approach to project management and efficiency.

The term was born in manufacturing, where it described the way in which making a small change to a process in an assembly line could result in HUGE increases in efficiency and net profit thanks to automation and force multiplication. This concept quickly caught on in the worlds of business and self-development respectively. In both contexts, small changes can add up to big impact.

Often kaizen is taken to mean that you should engage in “microworkouts” and the like. That you should try to form new habits by doing something extremely small and easy.



While this can be useful advice in the right context (and a concept we will explore more in a moment), it is not true kaizen.

An example of a kaizen approach would be to look at everything you do in a typical workflow: that means every step you take from booting up the computer, to making coffee, to answering emails, to uploading articles.

You’d then see which of these steps was taking the longest, and see if there was any way to make them each more efficient – to thereby gain more time and freedom.

For instance, if you fix your computer’s booting up speed by five minutes, that could result in 25 minutes of extra time *per week*. What if you stopped taking so many coffee breaks? Or what if you slightly altered the order of your main tasks, such that you didn’t need to switch between programs so much? A few changes like this and you could save *hours* every week to become significantly more productive. In a work context, this can be a highly effective.

Suggested Resource: How to Save An Hour A Day by Michael Heppell

What does this have to do with our training program?

Simple: you can take this exact approach to your current lifestyle in order to *make* time and energy for the things you want to do. That might mean investing in a dishwasher so

that you can spend less time washing up in the evening – even getting a cleaner if you can afford one!

It might also mean doing some kind of chore on the commute home, such that you don't need to do it when you get back in the evening.

It might mean speaking with your employer about working from home one day a week (or five), or even doing what I did and entering the gig economy – working online so that you can set your own work hours.

Suggested Resource: Thriving in the Gig Economy: Freelancing Online for Tech Professionals and Entrepreneurs by Adam Sinicki (Me!)

Either way, this kind of thinking makes your daily grind more efficient. Therefore, you suddenly *can* fit in a few hours to work out and you have the energy to do so to boot! And the same goes for whatever else it is that you would like to achieve.

Likewise, you can do this by finding ways to more efficiently fit your training program in around your current routine.

Commuting to the gym and showering are two big issues. A few solutions include:

- Working out from home by creating a basic home gym
- Working out at the gym near your home/your work
- Working out right before your usual shower time

For the other types of training we discussed in this book, such as training knowledge and training brain power, you will often be able to fit this in in a number of creative ways. For example, how about training your brain on the train home, or practicing gazing meditation while walking down a high street?

In short, we need to become more efficient both in our training and in the lifestyle surrounding our training.

Be realistic though. Develop a routine that you actually *can* stick to, and do everything in your power to make this as easy for yourself as possible – that might mean leaving a piece of exercise equipment right in your living room for example so you can grab it easily while watching TV.

SCHEDULED REST AND FUN

A word of caution: while Kaizen will help you to become highly efficient and to fit more into your day and your routine, you should *not* allow your life to become moving from one task to another. Aside from risking burnout (addressed in **Overtraining and Enhancing Recovery**), you NEED some time to rest and have fun in order to stay motivated.

No one can be disciplined and strict 100% of the time. And nor should they be! Remember we discussed the importance of pillars in the section on emotional intelligence.

If you have 20 minutes this evening and you need to force yourself to engage in a stretching regime, then you might find that it's very hard to do so when you have a computer game you really want to play, or a TV show you want to watch.

But if you know that *tomorrow* evening you have scheduled some time to do exactly that, then you'll find it's much easier to do the good thing you know you need to do.

It's not that we're completely removing down-time – it's just that we're being more strategic about how and when we enjoy it. That way, we will find it easier to separate work and play, such that we actually work when we need to rather than procrastinating and “half” doing both things.

OVERTRAINING AND ENHANCING RECOVERY

Anyone can write a training program that will get them ripped and strong. One hundred sets of your one rep max on exercises targeting all the muscle groups, followed by a 10-mile run. Daily. That ought to do it.

The problem is writing a training program like this that someone can also actually *stick to* and that won't kill them in the process. That's the hard part.

What is a very *real* danger for the average gym rat and especially a “Super Functionate” is **under recovery**.

I use the term under recovery, seeing as some object to the notion of “overtraining.” Overtraining is a thing yes, but it's not a thing you're likely to encounter. That's because overtraining in the most literal and precise sense is a *very* rare phenomenon with profound symptoms that can last for months. Unless you are going through military training or you're a pro athlete, then you probably aren't overtrained. So, for your purposes, overtraining probably isn't a thing that you need to worry about.

But that doesn't mean that you don't need to rest. Under recovery is a serious issue that affects *far* more people than you might think. It probably has affected you at some point or another and may even be affecting you right now.

Recall that training is “biphasic.” That means that it has two phases. Phase one is the workout itself, when you break down your muscle or stress your cardiovascular system and trigger change in your body.

Phase two is when you rest and that damage is repaired, allowing you to come back stronger, faster and fitter.

In order for your training to be effective, you *need* to give your body time to heal and repair the damage you've inflicted. That means resting up and it means providing the necessary building blocks – i.e. proteins and energy – for it to make those repairs.

If you *don't* give yourself this time to recover, then you will be piling damage on top of damage and thereby leaving progress on the table. Gradually this adds up and the debt you incur is too much to easily pay back.

More to the point though, you will also put yourself at risk of injury and adrenal fatigue. And while this isn't technically “overtraining,” it is nevertheless what most of us *refer* to as overtraining.

So, What's the Risk?

In this state of “under recovery,” you will now be considerably more likely to sustain an injury. Your muscles are weakened because they're still recovering from the *last time* you put them through hell and you may well have slight damage in other areas that you're unaware of too – in your ligaments or hamstrings for instance.

And *that* means that you're going to be much more likely to compensate for the damage with incorrect movement patterns. If you have a slightly dicky knee, you might be more

likely to squat with bad form and do more damage to it – or do more damage to your back.

And the longer you keep this going, the more likely one of these injuries is to be serious.

Meanwhile, you will also become increasingly more likely to get a cold or a flu. That's because you aren't allowing your body to spend enough time in the anabolic, recovery state. In other words, you're in a state of constant physiological stress.

You likely know this already, but when your body is in fight-or-flight mode, when it is sympathetic dominant, blood and energy are diverted from your digestion, your immune system and all other secondary systems and sent to your brain and your muscles instead so that you can... well... *fight or fly*. (Note: you cannot actually fly.)

This is why chronic stress is so bad for us. Fight or flight was only ever meant to be a short-term response to an immediate threat. When you spend all day worrying about debt, or repeatedly beat yourself up in the gym without the proper recovery, you suppress your digestion and your immune system.

Of course you're going to get ill. And then you're going to spend more time out of the gym than you would have done if you had just taken a shorter break.

Fight or flight was only ever meant to be a short-term response to an immediate threat.

And likewise, you might even find you become deficient in key nutrients *even though* they're in your diet.

Does all this sound familiar? If so, then it means you're not putting enough emphasis on the recovery portion of your training.

And if a fitness YouTuber ignores this aspect of your training because "overtraining doesn't exist" – when it's really just a matter of semantics – then they not being particularly helpful.

Your Other Lifestyle Factors

Some people won't know what I'm talking about. Some people never get ill and never get injured and can easily burn the candle at both ends. There are lots of potential explanations for this.

But for others, three days a week of moderate training might be enough to lead to injury, flu and downtime. So, what's going on?

The answer lies with the *rest* of your lifestyle.

I love training and I love training *hard*. But historically, this has been an issue for my overall progress. I find myself going through periods of making amazing progress, loving every workout and going 100%. That lasts a couple of months. Then I injure myself, get a bad cold or both. Or I get behind on work and become incredibly stressed.



Cue about a month off working out. Then I return.

But then I asked myself: why was this never a problem when I was in my teens and early twenties? I remember at university I would often do a night out of solid drinking, get in at 4am and then do a workout. That's how committed I was! Am I just getting old? That is too depressing a thought to face.

And fortunately, the answer is not to do with age. It's to do with *all the surrounding stuff*.

Because when I was at uni, I had about 8 one hour lectures a week and the rest of the time I slept, or had fun with my buddies.

In my early 20s I lived with my best mate and worked purely as a freelance writer. I'd often wake up at 1pm in the afternoon!

Today, I have a mortgage. That means there's a minimum amount of work I have to do. My business has also grown out of control. I write 10,000 words a day... *in just the second half of the day*.

The first half of the day often involves video editing to deadlines, covering events in London and discussing things with colleagues. I drive my wife to and from work every day. We're doing DIY.

And oh yeah, I have a baby girl who is 8 months old as I write this. She does not have quite the same respect for sleep that I am learning.

Point is, I'm super busy. And often a bit stressed. Certainly overtired.

And I'm not alone in this. Not by a long shot.

So, is your "recovery" really recovery? Not really. It's just "time away from the gym." That is not the same.

Because in order to fully recover from the gym, it's not enough that you simply 'not train'. You have to *actively recover*. That means you need to be lying down, chilling out, packed full of protein and comfortable. To successfully add muscle you need to *live like a lion*. To increase your grip strength, you need to give your nervous system a *lot* of time to recover.

If you are chronically stressed about work, you're rushing around all day and you're not sleeping properly. Then you aren't *actually* recovering. Suddenly, your routine isn't *that much easier* than those professional athletes we referenced earlier.

A professional athlete actually *does* spend a lot of their time simply sleeping and eating. And they taper off their training entirely just before a competition.

And it actually cuts both ways. Because if you spend your down time when away from a very stressful job working out in the gym, then you're not recovering from that either. The overall workload has simply become too much and this won't just hurt your workouts and your health – it will hurt your productivity in the office.

And it's a terrible slippery slope, because then you're going to get behind, and then being behind will make you more stressed...

21ST CENTURY SYNDROME

This is a very modern problem. So much so that it has actually been dubbed “21st century syndrome,” which is just a trendy name for “adrenal fatigue.”

Adrenal fatigue is what happens when you spend so long in a highly aroused state, that your adrenal glands actually stop producing the necessary amounts of adrenaline. The result is that you lose motivation and energy and it can drastically damage your performance in the gym, actually weakening the “mind muscle connection” (studies show that adrenaline increases 1RM).

There is some debate as to whether adrenal fatigue is a real thing or not, but suffice to say that *something* like this definitely affects a great many of us.

The reason this happens so much these days, is that we are constantly wired – with our technology having a lot to answer for in this regard. You've probably heard by now that looking at screens makes us produce cortisol and interferes with our sleep. Then there's the fact that so much of what's on our phones is designed to “hack” our dopamine systems and elevate arousal. We're addicted to Facebook, addicted to Candy Crush (that reference is already dated, but you know what I mean) and many of us find it hard not to “check in” with work even on our down time. Thanks to email, our employers and clients can reach us at any time of day, wherever we are. Walk down the road and you'll be bombarded by adverts designed with flashing lights and shocking imagery to activate your salience network. Meanwhile, you'll be surrounded by unnatural urban sights, honking horns and thousands of people walking directly toward you.

Many of us are so over-worked and out of sync that we rely on caffeine to wake up in the morning and stay focused in the face of so many distractions (guilty!). Caffeine has its merits, but it is effectively *stress in a cup*.

Throw in ongoing stress about work, relationships, debt and whatever else and eventually something's going to snap.

Right, so what can you do about it?

The first thing I recommend is considering some **active recovery**. Be more mindful about your time recovering, and whether or not you are actually getting quality down time.

One of the most important things you can possibly do is to get *lots* of sleep. There are many studies showing just how *incredibly* getting more sleep will boost your performance ([study](#)).

In one study, it was found that basketball players optimizing their sleep could increase their sprint times and free-throw accuracy. Mood and vigour also improved. In another study, it was found that swimmers who slept 10 hours a night for 6-7 weeks could increase their 15 meter times, reaction time, turn time and mood.

Swimmers who slept 10 hours a night for 6-7 weeks could increase their 15 meter times, reaction time, turn time and mood.

You might not be able to manage 10 hours of sleep a night, fair enough. But you should really strive for 8, even if it means going to be earlier.

At the same time, try to manage stress. That might mean learning meditation, or it might simply mean setting aside plenty of time to just relax. Prioritize your recovery a little and maybe commit yourself to fewer activities. The meditation parts of this program will help significantly with this.

Drinking lots of water is also critical. Most of us live in a constant state of dehydration which actually triggers a stress response and inhibits our ability to digest food, rebuild muscle and more. Water is crucial for countless chemical reactions within your body and if you train regularly, then you need even more. The same Breaking Muscle article recommends drinking $\frac{1}{2}$ your bodyweight in pounds in ounces of water every day. So, if you weigh 180lbs, you're going to drink 90 ounces – about 11 glasses.



Finally, most important of all is simply to eat more. If you train hard, then you need more energy in the form of fats and carbohydrates to fuel workouts and recovery, and you need more protein in order to restore the muscle tissue you're breaking down. If you are prone to injury and fatigue, just try increasing the amount of food you're eating between workouts and you may be surprised at the difference it can make.

This is why this program includes a "Muscle Fuel Diet" which is designed to provide the muscles with the nutrients they need AND to provide the body with the calories it needs. I have tested all this stuff, and when I attempted to train using gymnastic strength training *while* cutting calories (to make myself lighter and therefore better at planche – it makes sense!) I actually experienced multiple injuries and setbacks.

The more you push your nervous system, the MORE important it is that you eat. Once you've adapted, you can cut the calories back in order to enjoy a more ripped physique.

If you *really* want to get serious, then stop using your phone in the evenings, stop taking caffeine and don't let your blood sugar drop.

DELOAD WEEKS

While quality recovery is important, quantity doesn't go amiss either and it's a very good idea to occasionally schedule a deload week. This is a week when you either aren't training or where you switch to non-intensive training such as stretching and skills work. This is the perfect time to focus on flexibility for instance, or to try a little hand balancing. Or how about upping the brain training or the learning? But, the aim is to *not* aim for your 1RMs or to use intensity techniques. Ideally, you'll take an entire week off.

This is going to be a **key part of the SuperFunctional Program**. So pay attention!

You will not lose muscle during this time. It takes several weeks before the body will begin breaking down muscle tissue and your extra myonuclei will hang around for *much* longer (possibly indefinitely) making it much easier to regain any lost tissue anyway.

But what you *will* do is give yourself time to recover from any minor niggling injuries that could develop into something more serious later on. You'll give your body time to refuel and rebuild and you'll allow your nervous system to recover. If you're wondering whether you should train while on holiday then, the answer is "absolutely not." Go somewhere all inclusive, eat all the meat, lounge in the sun... this is the *perfect* time to do some active recovery! It has taken me a *long* time to learn this.



A deload week could even help you to overcome the "repeated bouts" effect. That means in other words, that it may be able to avoid adapting to your training too much, to the point that you no longer see benefits.

It takes several weeks before the body will begin breaking down muscle tissue, so you don't need to worry about muscle loss. Tendon strength takes even longer to be lost, and

the nervous system adaptations can last for years. And increased myonuclei means that any muscle lost will come back quickly anyway.

A deload week as often as once every 6 weeks or even every 4-5 weeks is absolutely to be encouraged.

And this also frees up a LOT of opportunity to increase our mobility training and mental training, seeing as we're training for much more than just muscle here.

Also: Listen to your body. If you need to take time off sooner: *then do it*. You can even try testing your grip strength in the mornings with a hand dynamometer, which correlates with recovery and cortisol:testosterone ratio. Find a hand dynamometer and use it first thing to get an average base-line for your grip strength. Then, if you find that you wake up weak one morning, take the day off of your physical training.

To re-emphasize the importance of recovery, think about this: the ultimate "hack" for building more muscle (though not one that I recommend) is to take steroids. And the way that anabolic steroids work is to enhance *recovery*. Steroids raise testosterone, which is the number one anabolic hormone, and that puts the body into 'repair mode'. It also lowers cortisol, preventing fat storage and rapidly accelerating recovery.

They also help to improve drive, motivation and energy – which of course are also linked with recovery AND have a huge impact on your training and your progress.

Steroids also have a ton of negative health effects and are illegal. But my point is simply that if you really want to enhance your physical performance, then you should *prioritize recovery*.

That said, there are some other ways you can get at least *some* of these same benefits, as we have listed above. The S.E.A.R. stack will also help with this.

WHAT IS YOUR "SECRET IDENTITY JOB?"

How much do you want to improve your physical and mental performance?

Really?

The big problem a lot of people face when trying to improve their health and fitness, is that it is ultimately their last priority. They might tell you otherwise, but in truth, they are unwilling and/or unable to make big lifestyle changes in order to support their goals.

And this *obviously* neuters their ability to see change.

A lot of people are simply too stressed and too tired a lot of the time to train, meaning that when they get home at the end of the day, all they're left able to do is to crash out on the sofa.

This is why I believe that in order to become the very best version of yourself, you really need to think about addressing the *rest of your lifestyle* rather than just your fitness and health.



In particular, I think that means taking a long hard look at your job, and potentially switching careers. If your job currently leaves you with zero energy or motivation left to do anything other than crash at the end of the day, is it really a good job?

You might feel that you don't have the option to change careers. Perhaps you need to support your family and you don't feel you could easily find the same rate somewhere else.

Or maybe you love the challenge of your work and don't *want* to train.

That's fine. This is just a question of priority. But if your health, performance, and personal capability are your priorities – and I would argue that they should be for a lot of people – then you shouldn't let your work eat up all of your free time and energy.

After all, that same work is *also* probably hurting your ability to spend time with your family, to travel, or to enjoy proper down-time.



This is why I suggest that you at least *look* for what I call a “secret identity job.”

A secret identity job is essentially a job that a superhero would get as their alter-ego.

Peter Parker is a photographer, Clark Kent is a journalist, Bruce Wayne and Tony Stark are rich business owners/entrepreneurs, Matt Murdock is a lawyer, Barry Allen is a cop.

All these jobs fall into one of two categories: either they give the character a huge amount of free time and flexibility to go off doing whatever they want, *or* they bring them closer to the crimes and criminals they want to stop.

So for our purposes, we either want a job that can allow us to work *around* our training (instead of the other way around), or we want a job that somehow helps us to train – by challenging our brains or our bodies on a daily and regular basis.

For me, the answer was to become an online freelance copywriter. This has afforded me a huge degree of freedom and control over how I spend my time, and as a result I’ve been able to commit to the kind of training program I otherwise never could.

I fully recognize the challenges and limitations of changing your job – I’m a new parent so I get it. But if you really want to focus on your personal development, you can’t let a job take up 90% of your energy and time. At least be on the lookout for better, or consider discussing flexi-time with your employer.

And after all, if you are working so hard that you have no time to look after your own health, that really should be a sign that something isn’t quite balanced in your lifestyle.

INCIDENTAL TRAINING

Another concept that is important to understand heading into this program, is the idea of **incidental training**.

Incidental training means turning every day activities INTO training. That means that you train throughout the day, by making your usual activities more difficult, or by multitasking.

For example, instead of sitting in front of the TV, you might hold a low-squat position while watching TV. When bobbing your baby to sleep, you might use the opportunity to do one-legged calf raises. While working at the desk, you may use a passive stretch for your hips.



Alternatively, incidental training can also mean doing things like squeezing a grip trainer while you wait for the kettle to boil, or doing 5 pull ups every time you pass through the doorway to your office.

Incidental training has many advantages. For one, it allows us to fit more training into our regime when time is a limiting factor. At the same time, this also prevents long stretches of mundane routine and “uncomfortable comfort” (i.e. sitting at a desk typing for hours).

Incidental training is also useful for “greasing the groove.” In skill acquisition, this means repeating the same movement or skill over and over in order to further and further strengthen the relevant neural pathways. This can speed up the rate of learning and also prevent the loss of skills. It’s ideal for practicing such movements as planche.

Recommended Resource: *Power to the People!: Russian Strength Training Secrets for Every American* by Pavel Tsatsouline

Finally, incidental training offers significant benefits when it comes to weight loss. This is because it increases the amount of calories burned during the day, by upping your activity levels.

This is where a lot of people who diet end up going wrong. The mistake is to assume that your hour of weight lifting or cardio is likely to make any kind of noticeable dent in your overall calorie burn. It will not! A typical workout might be likely to burn 150-800 calories (much higher numbers for an hour of cardio), but that’s *including* the 66 calories (roughly) that you would have burned that hour anyway. And if you train like this three times a week, that’s not a whole lot in the grand scheme. Better is to think about how you burn calories throughout every day.

Even a healthy lifestyle choice such as walking for the bus or climbing the stairs can be considered incidental training. But for *SuperFunctional* incidental training, why not *jog* to the bus or even hop?

Likewise, if you're training to build muscle, then why not try curling weights while waiting for your computer to boot up? Why not curl your shopping bags while getting your groceries? Why not curl them with one finger to build finger strength?

The Risks and Counter Measures

The risk with incidental training of this nature is that it will interfere with your recovery, and eventually lead to burn out or injury. This could be especially true for things like squeezing a grip trainer, seeing as grip training has been shown to be intensive for the nervous system.

Likewise, the question is whether you can really cause enough stimulus for the muscles to encourage hypertrophy while waiting for your computer to boot up.

Studies show that micro workouts involving cardio are sufficient for increasing cardio fitness to some degree, and that they actually help to improve adherence. Beyond a basic level of fitness though, you're likely looking at HIIT sessions, which are still very intense and will leave you sweaty and panting for a good while.

It *is* possible to encourage growth in your muscles in a short space of time by using intensity techniques like drop sets to flush them with metabolites and cause muscle damage. Target a single muscle group, do a couple of drop sets, and in 10-15 minutes you can get a decent burn going that will equate to growth the next day. But doing this repeatedly throughout the day will take time, leave you sweaty, and potentially prevent recovery.

Lifting a very heavy weight on the other hand for just a couple of repetitions is even more likely to be effective in increasing your mind-muscle connection, your correct movement patterns, etc. Again though, there is some risk of burning out your CNS here, and of introducing injury. And it's hardly convenient!



So we need to be strategic.

High rep and high weight work *can* be useful throughout the day as a way to “top up” your training, to make up for shorter or missed workouts, or to feed the muscles with enhanced blood flow, to encourage recovery and growth. You *can* trigger significant changes in a short space of time, as long as you have been training long enough to know what triggers your body to change.

This is one way I’ve been coping with the lower energy levels and reduced free time that come from being a parent.

Seeing as “strength is a skill,” you can see the precise same benefit by performing very light deadlifts if you keep a barbell in your garden. Pull ups are also a great example, as are things like attempting handstands or planche. Keep some parallettes by your TV and have a go every now and then throughout the evening. You’ll be reinforcing neural connections through a process called myelination, thereby improving the efficiency of the movement, and thereby the strength.

Training Other Things

The other thing to remember is that weightlifting is not the only kind of training. Remember, we’re not just training strength but the mind, agility, flexibility, the senses and more. You can easily do this while doing other mundane tasks.

Flexibility is something that can be practised anywhere, any time. Again, stretching in the shower is ideal, as is stretching before bed to improve sleep.



Or what about throwing a few punches next time you’re watching TV?

Why walk somewhere when you can jog? Or jog backwards and develop your legs and coordination in a whole new way? Who cares what people think.

Why stand when you can stand on one leg and improve your balance?

Why write when you can write left handed?

Why go through the gate when you can jump over it?



EVERYTHING can be training.

HOW TO MAKE EVERYTHING INTO BRAIN TRAINING

As we have seen, when you learn a new skill or ability, you greatly increase plasticity. If you learn to play an instrument for example, or learn to play chess, then your brain will become more adaptable by releasing relevant hormones and neurotransmitters to grow new neural connections (**all this is discussed in the Neuroscience chapter previously in this book**).

This is extremely good for us, and can have profound effects on our cognitive ability and our mental health.

So, if you want to perform your best, then you should go and learn lots of stuff, right?

Exactly.

Problem is, you may not have time to be constantly learning new skills and abilities.

Likewise, many people reading this will struggle with finding time for their meditation practice.

The good news? You can learn and improve focus during literally every single task. And the way you do this, is by focussing *more intently* on that activity. Mindful ironing is a concept that involves meditating *while* ironing.

Think about it: if you can turn your stretching routine or a Tai Chi set into meditation, there is no reason that you can't do the very same thing with ironing. Focus on the movement, and the feel of it, and don't allow your thoughts to travel anywhere else.

Alternatively, if you want to use this as an opportunity to trigger plasticity as well, consider ironing as quickly and effectively as you possibly can.

With flow states, we see that we are most able to enter flow when a task is difficult enough to be challenging and difficult, while not being *so* hard as to be crushing and disheartening. When something is too easy, our mind wanders. When there is an appropriate level of challenge however, we produce dopamine and we start paying attention. The cogs of attention and learning begin to turn, and we start assessing our own performance and laying down new pathways as appropriate.

How can you make something like ironing into a challenge? Simple: you iron *the best you ever have*. If you try your very hardest, then you will find that you are able to really focus on what you're doing, and to gain something from it – even coordination and dexterity.

The same goes with hand writing. If practicing dexterity, don't just scrawl down notes: make your handwriting the best it can possibly be, while also writing as quickly as you possibly can.

When speaking, aim to listen as carefully as possible, and to provide answers that are as witty as they possibly can be.

I have been trying to read stories to my daughter in a way that is as entertaining and engaging as possible. In doing so, I've seen huge improvements in my ability to read scripts on camera for The Bioneer YouTube channel.

In doing this, you will not only gain greater plasticity and focus, but you will also see yourself develop better skill in *everything you do*.

file 10: program

We've spent a great deal of time discussing the hows and whys. Now it's finally time to begin our training. Below, you will find the full program, along with detailed instructions on how to best use it.

PROGRAM DESIGN

Why is the program designed the way it is? How does it take everything that we have discussed in previous chapters and use this to inform its methods?

Here are some of the key strategies employed.

Periodization: A periodised structure (multiple training routines in a program) is used in order to take us through set stages. The aim here is to benefit from the lasting effects of training and brain training. We should see plastic changes in the brain, alterations in gene expression, and increased satellite cells in the muscle.

Therefore, the hope is that by training – for example – with a pump program and THEN a bodyweight program, we can see greater benefits in the latter. The increased blood flow will enhance recovery for example, while the mind-muscle connection will make it easier for us to control our muscles.

Likewise, the periodised nature is intended to allow a gradual improvement, in order to prevent injury. Here, the pump training will help to strengthen bone density and connective tissue, thus preventing tears and injuries during the intensive bodyweight exercises.

PPL: PPL is “Push, Pull, Legs.” This is a structure for training that breaks exercises down into three categories: those that involve pushing movements, those that involve pulling movements, and those that target the legs. The reason for this, is that those three types of exercise have minimum overlap. Pulling movements typically involve the lats, the biceps, and the traps. Pushing movements typically involve the pecs, the shoulders, and triceps.

This structure allows us to train with intensity, without running out of time or causing overtraining. Were we try to train the full body with such a range of exercises and approaches, we would be working out for hours at a time and would likely sustain injury quickly. This also gives each muscle group sufficient time to recover.

Our “Legs” day will also incorporate core training.

However, push, pull, legs, is also superior for our purposes as compared with “split routines.” These are programs designed to focus on individual body parts each workout, and come primarily from bodybuilding. This type of training doesn't really allow for typically “functional” or movement-oriented exercises. For example, if you are training biceps on one day and lats on the next, you will find you repeat a lot of the same movements.

There are some benefits to using whole body routines in particular. For one, it is thought that training the same body part more than once a week actually helps to improve gene expression. And there is more than enough time for recovery.

Likewise, full body routines allow movements that literally train the entire body, or that train seemingly disparate parts of the body (for instance the squat press trains the legs and shoulders predominantly; crawls train legs, core, and arms). As well, full body routines are superior for cardio and fat burning. As mentioned, this challenges the heart to work harder to deliver energy to the upper limbs, and then the lower limbs.

There is the option to train PPL twice, but this would not leave enough time for the nervous system as a whole to recover given the intensity of the latter stages of this program.

Therefore, a good compromise is to use a routine called PPLFb – Push, Pull, Legs, Full-Body.

Another strategy is to incorporate movements that *do* challenge other parts of the body, though not enough to prevent recovery. For example, a squat press will likely not result in absolute failure in the shoulders, seeing as other parts of the chain will fatigue first (or the whole body as a unit will become insufficiently strong). By incorporating this movement far enough from the push day then, you can provide additional stimulus without preventing recovery.

In fact, “feeder workouts” are workouts designed to target a recovering muscle with light weights and high repetitions, thus to stimulate recovery with increased blood flow. This is also one of the best ways to overcome DOMS. This tells us that occasionally training the same muscle group close together is not always harmful. As long as it is well designed.

The “focus” of a workout does not have to be completely set in stone and binary. You can make a workout “mostly push” and there will be no serious comeuppances! We should try to think less in neat boxes, and more as adaptoids!

All these techniques are employed throughout this program.

Bang for Buck Exercises: As mentioned, in order to overcome the sheer volume and variety of things we are looking to train, the routines will generally use as many “bang for your buck” exercises as possible. With limited time, we gravitate toward exercises that have *multiple* benefits. These are more challenging of course, which is another reason we must build up to them.

Mechanical Drop Sets: Mechanical drop sets are among the most important concepts in this routine. To reiterate, a mechanical drop set means going from an intense and difficult movement, to a slightly simpler one, within a single set. This allows you to continue to train, even after you have reached failure on the first type of exercise.



Powerbuilding: Powerbuilding is the combination of powerlifting and bodybuilding into a single workout. It is achieved by placing very heavy/technically complex lifts at the start of workouts, then using lighter loads and more isolated movements toward the end. You might perform bench press then, followed by push ups, and the chest press machines. Or you might do deadlifts, followed by chin ups, then dumbbell rows, then bicep curls. This is a great way to structure a program with different tempos/loads/volumes and the same principles have been applied here, only with a greater selection of movements (such as gymnastic strength training and cardio within a single workout).

Concurrent Periodization: Concurrent periodization means training for more than one goal simultaneously. Powerbuilding is one example of this. Another way to accomplish this end though, is by using different dedicated “days” within one microcycle (usually a week). This is another concept lifted for the SuperFunctional Program. You’ll often be doing cardio of some form along with resistance training and brain training, within the same week.

I was tempted to use concurrent periodization as the main focus of the SuperFunctional Routine at Level 4. However, so many different movements lend themselves to both cardio and resistance, that it made more sense to combine the different objectives into singular, comprehensive routines.

PROGRAM STRUCTURE

This program will be structured in levels. Readers should remain at each level for the recommended period of time OR until they reach certain mile stones (this will be explained at each level). Each level will also have an accompanying diet, as well as several types of “incidental exercise” that can be performed.

If you feel that level one is too basic for you, then of course you do have the option of skipping ahead. However, I highly recommend that if you should decide to do this, you skip immediately to the end. The reason for this, is that the previous levels are each designed to build on one another. I would also recommend thinking very carefully before skipping ahead, as if you have no experience with some of these training methods, you may risk causing injury.

That said, level 0 is an entirely optional starting point for those that are currently in sub-optimal health, or who wish to ease themselves into the program as gently as possible.

LEVEL 0

The purpose of this level is to ensure a good basic level of health. That means proper hydration, good sleep, and some basic mobility. The diet is kept extremely simple in a bid to reset the microbiome and to weed out any potential allergies or other issues. This simplicity also allows us to easily correct poor body composition and bulk or cut. If you are overweight, then you can use the reset diet in order to lose weight and get to a good starting point.

In a nutshell: adding intense training onto a poor foundation of basic health will be destructive rather than helpful. 10 minutes of meditation will help to improve focus and reduce stress, which may aid with adherence at later stages.

Perform this at your discretion if you are: completely inexperienced when it comes to exercise and training, over-or-under weight, unwell, or interested in easing yourself in as gently as possible.

- **Reset Diet**
- O.N.E. Workout (4 x week)
 - Basic Mobility Routine (4 x week)
- 10 Minutes Meditation (3 x week)
- 20 Minutes Walking (2 x week)
- Lifestyle maintenance and health preparation

Duration: 2 months OR until you achieve your ideal bodyweight/composition

LEVEL 1

The purpose of this level is to build muscle size and work capacity. Pump training (volume training) serves to build strength in an injury-free manner (due to the lower complexity of the movements), as well as to improve blood supply to muscle, and to strengthen tendons and ligaments to prevent future injury. It also helps to build the mind-body connection. The rapid increase in visible muscle and performance can also serve as great motivation to keep training.

Rests between sets are kept to a minimum. This provides a form of metabolic conditioning, and trains work capacity.

Steady state cardio is intended to increase the size of the left ventricle to lower heart rate and improve stroke volume. 60 or 30 Minutes of running is recommended, but you could also use cycling or similar. Aim to increase distance.

The Muscle Fuel diet is used in order to offer the necessary calories and protein to support the increased muscle size.

- **Muscle Supply Diet**
- Steady-State Cardio (1 x week)
- Pump Training (4 x week)
 - Basic Mobility Routine (4 x week)
- Level 1 Brain Training (3 x week)
- Incidental Training

Duration: 3 months

Note: I recommend combining the brain training and stretching into a morning or evening routine. The mobility routine will immediately follow the pump/volume training.

LEVEL 2

The purpose of level 2 is to build power and max strength. This is achieved through lifting large weights, using overcoming isometrics, and training the grip, etc. This is combined with a highly nourishing/calorie rich diet and HIIT training. The former will support the nervous system during this more taxing form of training, the latter will further enhance mitochondrial density to increase work capacity.

The full body workout is included in order to help target specific smaller muscles that might otherwise have been overlooked by a routine focussing purely on the “big three” compound lifts.

Resistance-cardio is incorporated into the routine in order to avoid unnecessarily fatiguing the nervous system and to avoid losing the muscle mass built up during the previous level.

- Power Training Routine (4 x week)
- Full Mobility Routine (4 x week)
- Level 2 Brain Training (3 x week)
- Incidental Training
- **Muscle Fuel Diet**

Duration: 3 months OR until you can bench 2x your own bodyweight

LEVEL 3

The purpose of this level is to “plug gaps” not covered by traditional training modalities. That means we are looking to drastically improve mobility, to strengthen lesser-trained muscles, and increase agility and performance.

This should involve a cautious approach that is completely “ego free.” This combined with a now solid foundation of strength, mobility, nutrition, and cardio, should help you to avoid injury or overtraining. We must continue consuming larger amounts of calories and protein for this same reason.

One day of steady state cardio is included to help maintain work capacity and cardio performance, and to keep us light for the complex movements. Combining HIIT with highly technical movements can potentially lead to nervous system burnout.

- Powerful Movement Routine (4 x week)
 - Mobility Routine (4 x week)
- LISS (1 x week)
- Level 3 Brain Training
- Incidental Training
- **Muscle Fuel Diet**

Duration: 3 months

Level 4

Level 4 is the final expression of SuperFunctional Training. The objective is to perform a single routine that incorporates many of the elements of each prior stage. This should build muscle size and endurance, while simultaneously supporting and enhancing mobility, boosting max strength/explosive strength, and more.

Elements of brain training and mobility are now incorporated into the physical training itself. Likewise, the routine provides additional opportunity for meditative practice, and for developing such things as ambidexterity on top of the already established set routines.

- SuperFunctional Training Routine (5x Week)
 - Mobility Training (5x Week)
- Level 4 Brain Training
- Incidental Training
- **SuperFunctional Diet**

Duration: Indefinite

Optional: At any point after 6 months of Level 4, you may choose to adopt the training program from levels 1-3 for 2-8 weeks. This can help you to improve areas that might be lagging behind, and to attack those older routines with greater strength and endurance. This also helps to prevent adaptation.

REST

Incorporate a deload week every 5th week OR when transitioning to the next level.

During deload weeks, you can continue to use the mobility routine. However, all other training should stop – including brain training. This is important to help reboot motivation and inspiration, so that you feel ready to jump back in. It also helps to prevent adaptation.

LIFESTYLE ADAPTATION

We have discussed many different methods for increasing energy and health by making changes to your lifestyle. It is recommended that you make these changes to support your performance during training, and to enhance the results.

Here are some highly recommended lifestyle adaptations to include:

Class: Ideally, supplement this training with dance class, or martial arts

Learning: Be constantly learning a new subject/skill

Time Outdoors: One of the easiest “hacks” to feel MUCH better, is to spend more time outdoors. Aim to get at least 10 minutes.

Process Fixes: Apply kaizen and process fixes to your home and lifestyle to gain more time and energy.

Wear minimal shoes, and try training barefoot on occasion

Sleep Hacks - Improve your sleep by:

- Opening a window to allow natural temperature change

- Taking a warm bath or shower before bed

- Blacking out the room

- Investing in a high quality mattress

- Using CBT techniques to get to sleep quickly

- Use a daylight lamp to slowly wake yourself as naturally as possible

When showering in the morning, use cold showers.



LIST OF INCIDENTAL TRAINING METHODS

The following are incidental training methods that you can incorporate throughout your day in order to gain additional benefit. Some are considered essential, and have been starred.

- *Neck training with self-resistance – Ideal for bus commutes, or when waiting in queues etc.
- *Big idea thinking - Useful for walks and other periods of waiting
- Passive stretching
- *Grip trainer – Keep one by the kettle or toaster and practice
- *Left handed tooth brushing
- Passive stretching – Try holding a stretch while working
- Left handed mouse
- *Whenever you squat, it should be a full squat with heels on the ground
- *Muscle control to be practiced – isolating and moving individual muscles
- “Grease the groove” by practicing technically complex movements regularly, stopping before fatigue
- Mentally rehearse technically complex movements
- Listen to audio books
- Focus intently on mundane tasks/perform them with the utmost speed and precision
- Purposefully subject yourself to “uncomfortable” situations – including social situations
- Practice box breathing and other breathing techniques
- When heading a short distance, try running
- When visiting somewhere you have been before, try to recall as many details about that place and then see which ones were correct
- Pick up items from the floor using feet to test/develop foot dexterity

DIARY

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Level 0	O.N.E. Workout 10 Minutes Meditation Reset Diet	O.N.E. Workout 20 Minutes Walking Reset Diet	Rest 10 Minutes Meditation Reset Diet	O.N.E. Workout 10 Minutes Meditation Reset Diet	O.N.E. Workout 20 Minutes Walking Reset Diet	Rest Reset Diet	Rest Cheat Day
Level 1	Pump Pull Day Level 1 Brain Training Muscle Fuel Diet	60 Min Steady State Cardio Level 1 Brain Training Muscle Fuel Diet	Pump Push Day Level 1 Brain Training Muscle Fuel Diet	30 Min Steady State Cardio Muscle Fuel Diet	Pump Pull Day Level 1 Brain Training Muscle Fuel Diet	Pump Full Body Day Muscle Fuel Diet	Rest Cheat Day
Level 2	Full Body Level 2 Brain Training Muscle Fuel Diet	Spot Strength Workout Level 2 Brain Training Muscle Fuel Diet	Rest Muscle Fuel Diet	Overload Workout Muscle Fuel Diet	Rest Level 2 Brain Training	Full Body Muscle Fuel Diet	Rest Cheat Day
Level 3	Movement Push Day Muscle Fuel Diet Level 3 Brain Training	Movement Leg Day Muscle Fuel Diet Level 3 Brain Training	Rest Muscle Fuel Diet	Movement Pull Day Level 3 Brain Training Muscle Fuel Diet	Movement Full Body Level 3 Brain Training Muscle Fuel Diet	30 Min Steady State Cardio Muscle Fuel Diet	Rest Cheat Day
Level 4	SuperFunctional Push Day Level 4 Brain Training SuperFunctional Diet (Fast)	SuperFunctional Pull Day Level 4 Brain Training SuperFunctional Diet	Rest SuperFunctional Diet (Fast)	SuperFunctional Legs/Core Level 4 Brain Training SuperFunctional Diet	SuperFunctional Full Body Level 4 Brain Training SuperFunctional Diet	Rest SuperFunctional Diet	Threshold Run LISS Run Cheat Day



MOBILITY ROUTINES

Dynamic Stretches

These are stretches that involve lightly swinging the body part outside of the usual range of motion. Use to limber up before a routine. Do not “bounce” into the movement.

High Leg Swings * 8 {Swing leg straight up}

Side Kicks * 8

Arm Swings * 8

Arm Swings Figure of Eight * 8

Air Squats * 8

Spinal Rotations * 8



Figure 3 Arm Rotations

Foam Rolling

Repeat each for 15-30 seconds.

Quads – Lie on your front and move forward and back across the quads

Hamstrings – Sit on the roller and roll forward and back

Hip flexors – Sitting down, work a roller into the area where the legs meet the hips

Glutes – Sit on the foam roller and move forward and back by using your feet

Feet – Work a tennis ball into the sole of each foot. Using a golf ball also works.

Upper back/shoulders – Using a roller or tennis ball

Mobility Routine

Use this either immediately following a workout, or to start your day in conjunction with meditation.

Opener 1 * 30 Seconds {Hold onto a doorway over your head and lean forward to open up shoulders bending arms behind}

Deep Air Squats 2 * 30 Seconds {Lean forward to improve ankle mobility}

Wrist Flexion 1 * 60 Seconds {Bend the hand gently back and forward 30 seconds each}

Touch Toes 2 * 30 Seconds | Pancake 2 * 30 Seconds {Pancake is touching toes on ground}

Downward Dog 1 * 1 Minute {Classic yoga move}

Bridge 1 * 1 Minute {Bend over backward and touch the floor}

Knees to Chest 2 * 30 Seconds {Bilateral to save time}

Quad Stretch 2 * 30 Seconds {Bilateral to save time – Add plantar flexion for jump height – Pull leg up behind holding by top of foot}

Side Split Progression 1 * 1 Minute | Butterfly Stretch 1 * 1 Minute {Sit cross legged and push knees to floor}

Cobra 1 * 1 Minute {Lie on stomach, arch head upward}

(Total 9.5 minutes)



THE WORKOUTS

Key
1RM = 1 Rep Maximum
70%1RM = 70% of your one rep max
12 to failure = Means 12 (or however many) repetitions using a weight that will cause you to fail at this point.
AMRAP = As Many Reps As Possible – Perform as many reps as you can, minimizing rest time, in a set time period
Failure = The point at which form seriously deteriorates
80%F = Means that completing that many of that exercise with this weight should be 80% of what you are capable of.
* = “times” or “multiplied”
3 * 10 * Failure = This is how a typical exercise is written. This means 3 sets of 10 reps, each one using enough weight that this is the failure point.
[] = Drop sets live inside square brackets. No rests between these exercises.
= This denotes “Or”
> = Used to show drop sets. Press Up > Press Up On Knees means you drop straight to press ups on the knees with no rest in between. Bench press * Failure > Failure > Failure means you lower the weight 3 times in order to keep going past failure.
< = Means “up to” as in “up to 1 minute”
{ } = Additional notes go inside curly brackets

THE O.N.E. WORKOUT

O.N.E. stands for ‘Only Necessary Exercise’. The idea is that if this is the *only* thing you can manage to do in the day, then it will be better than nothing.

Simply, the workout is:

1 bodyweight compound ‘push’ exercise (press ups, handstand push ups, ring dips, clapping push ups)

1 bodyweight compound ‘pull’ exercise (pull ups, chin ups, inverted push ups³)

1 bodyweight legs workout (jumping squats, 1 legged squats, jack in the box)

I simply take these and do 3 sets of each, for a high number of reps (100 fast push ups, 15 pull ups, 20 jumping squats). The whole thing should take about 10 minutes. If you prefer, you can perform it more like a circuit and do 30 seconds of each +30 second rest, 5 times round.

Point is: this routine means that every muscle group gets at least a *little* attention and you’re also doing a lot of reps so you’ll be getting some resistance cardio in there too. As the name suggests, this should essentially cover all the basics – all the “necessary” exercise.

PUMP/VOLUME ROUTINE

Push Day – 30 second rests

³ An inverted push up means holding onto a bar that is suspended about waist height from the ground. You hold onto it with an overhand grip and pull your upper body upward, keeping your heels on the floor and body straight. It is so named because it looks like you’re doing a press up upside down!

Mechanical Drop Set: [Bench Press * 10 to Failure > Failure > Press Ups * Failure] * 3
 Military Press 3 * 10 * 80%F
 Mechanical Drop Set: [Cable Flyes * 12 to Failure > Cable Press * Failure {Same weight}] * 3
 Drop Set: [Incline Chest Press * 12 to Failure > Failure > Failure > Burns] * 2
 Tricep Push Downs 3 * 15 * 80%F
 Mechanical Drop Set [Single Arm Tricep Dips * Failure > Tricep Dip * Failure] * 3
 Flush Set: Chest Press * 100 | Push Ups on Knees * 100
 5 * 1 Minutes Battle Ropes | 10 * 1 Minutes Heavy Bag

Pull Day - 30 second rests

Mechanical Drop Set: [Pull Ups * Failure > Inverted Push Up * Failure]
 Cable Row 3 * Failure
 Mechanical Drop Set: [Bicep Curls * 12 to Failure > Hammer Curls * Failure > Cheat Curls * Failure] * 3
 Chin Ups 2 * Failure
 Drop Set: [Cable Curl * 10 to Failure > Failure > Failure > Burns] * 2
 Chin Ups 2 * Failure
 Flush Set: Lat Pull Down * 50
 10 Minutes Rowing Machine

Legs/Core – 30 second rests

Squat 3 * 10 * 70%F | Leg Press 3 * 10 * 70%F
 Squat Jump 3 * Failure
 Ab Crunch Machine 3 * 12 to Failure
 Lunge Walking 2 * Failure
 Mechanical Drop Set: [Hanging Leg Raises W/Weight * Failure > Hanging Leg Raises * Failure > Frog Kicks * Failure]
 Drop Set: [Leg Extension * 12 to Failure > Failure > Failure] * 2
 Drop Set: [Hamstring Curl * 12 to Failure > Failure > Failure] * 2
 Burpees 3 * Failure
 Bicycle Sit Ups 3 * 25

Full Body – 30 second rests

Press Ups * 30 | Failure
 Dumbbell Clean and Press * 10
 Burpees * 10
 Barbell Rows * 10
 Barbell Curls * 10
 Squat Jumps * 10 | Failure
 Pull Ups * 10
 Hanging Leg Raises * 10
 Tricep Dips * 10
 Plank 1 Minute
 Rest 30 seconds and repeat entire program two more times

POWER TRAINING ROUTINE

Full Body – 1-2 minute rests as needed

Warm up sets help to prevent injury at extremely high loads by training the movement and increase potential max strength by providing post-activation potentiation.

Foam Rolling

Trap Bar Deadlift Warm Up Set 1 * 10 * 10%1RM

Trap Bar Deadlift 4 * 4 * 90%1RM

Bench Press Warm Up Set 1 * 10 * 10%1RM

Bench Press 4 * 4 * 90%1RM

Squat Warm Up Set 1 * 10 * 10%1RM

Squat 4 * 4 * 90%1RM

Mobility Routine

Spot Strength (Performed Twice) – 1 minute rests

This workout is designed to target the areas not specifically hit with a typical big lifts style routine.

Foam Rolling

Cable Face Pulls 2 * 10

Shrugs 2 * 4 * 90%1RM

Squatting Press 2 * 4 * 70%1RM

Bent Press 2 * 4 * 70%1RM

Incline Bench Press 2 * 10 * 70%1RM

Decline Bench Press 2 * 10 * 70%1RM

Trap Bar Farmer's Walks 5 * 1 Minute (AMRAP)

Weighted Chin Ups 3 * 5F

Mobility Routine

Overload Workout – 1.5 minute rests

This workout is designed to increase the weight you are used to moving, and to strengthen tendons and bones. It also improves work capacity.

Foam Rolling

Ballistic Isometric Bar Bend 1 Minute

Trap Bar Deadlift Warm Up Set 1 * 10 * 10%1RM

Rack Pulls 4 * Failure * 100%1RM

Bench Press Warm Up Set 1 * 10 * 10%1RM

Accommodating Resistance Bench Press 4 * Failure * 100%1RM

Suitcase Carries 5 * 1 Minute (AMRAP) | Overhead Carries 4 * 1 Minute (AMRAP)

Weighted Lunge Walking 5 * 1 Minute (AMRAP) {Barbell across shoulders}

Kettlebell Swings 1 Minute * 3 {Use roughly your barbell curl 5RM}

Clapping Push Ups 2 * 10

Jump Squats 3 * 10

Mobility Routine

POWERFUL MOVEMENT ROUTINE

Note that the expectation for these workouts is not that you are able to do full planche.

Practicing planche progressions might mean holding pseudo planche or crow pose – easier versions to develop the necessary core and straight arm strength. Refer to the bodyweight training document for progressions.

Push Day – 1 minute rests

Foam Rolling | Dynamic Stretching
 Handstand Push Ups 2 * Failure | Handstand Push Ups Against Wall * 2 * Failure
 Planche Progressions 1 minute * 2
 Straight Arm Press/Progressions 1 minute * 2
 Military Press 3 * 8 {Weight such that you stop just short of failure}
 Ring Dips⁴ 2 * 10 {Weight such that you stop just short of failure}
 Drop Set [Explosive Dips * Failure > Dips * Failure]
 Drop Set [Clapping Push Ups * Failure > Archer Push Ups * Failure > Push Ups * Failure]
 Drop Set [1 Arm Tricep Dip * Failure > Tricep Dips * Failure > L-Sit * Failure]
 Finger Push Ups 2 * 8
 Mobility Routine

Leg Day – 1 minute rests

Foam Rolling
 Dynamic Stretching
 High knees 2 minutes warm up
 Squat / Leg Press 3 * 3 * 90% 1RM
 Air squats | Hindu Squats ATG 1 * 10
 Barbell Glute Bridges 2 * 10 * 30-40% 1RM
 Pistol Squats 2 * 10 (or failure)
 Weighted Step-Ups⁵ | Weighted Lunges 2 * 8
 Squat Tuck Jumps⁶ 3 * 10 {max height}
 Sprints 3 * 1 Minute
 Kettlebell Swings 2 * 30 * 25%1RM
 Mobility routine

Pull Day – 1 minute rests

Foam Rolling | Dynamic Stretching
 Front Lever Progressions 1 Minute * 3
 1 Armed Chin Ups | Progressions 2 * 6
 Rope Climbs 1 Minute * 2 {AMRAP}
 Bicep Curls 2 * 8 * 80F
 Rows 2 * 8 * 80F
 Rock Climbing 10 Minutes | Weighted Vest Pull Ups 3 * Failure
 Drop Set [Clapping Pull Ups * Failure > Archer Pull Ups * Failure > Pull Ups * Failure > Pull Up Negatives * Failure]
 Wrist Curls 2 * 10 * 50%1RM
 Pronated Wrist Curls 2 * 10 * 50%1RM
 2 * 1 Minute Hang
 Mobility Routine

Core Day – 1 minute rests

Foam Rolling | Dynamic Stretching
 Front Lever Pull Ups 2 * Failure
 Hollow body hold 2 * 1 Minute or Failure
 Weighted Frog Kicks 2 * Failure

⁴ Perform dips using gymnastics rings

⁵ Hold a weight across the shoulders and step up onto a raised platform

⁶ Squat all the way down, then jump up and tuck

Mechanical Drop Set [Leg raises * Failure > Frog kicks * Failure]

V-Sit > 1 Minute

Myotatic Crunch 2 * 15

Around the worlds 2 * 10 {Hanging legs drawn in a circle}

Side Plank Oblique Twist 2 * 10

Pike Pulses 2 * 20

Supermans 2 * 10

Bicycle Crunches * Failure

Heavy Bag 10 Minutes | Shadow Boxing 10 Minutes

Mobility Routine

Full Body – 1 minute rests

Muscle Ups / Progressions 2 * Failure

Straight Leg Deadlifts 2 * 6 * 70%1RM

Bent Press 2 * 6 {Stop Short of Failure}

Squatting Press 2 * 6 {Stop Short of Failure}

Briefcase Carry 2 * 1 Minute (AMRAP) {Hold a dumbbell in one hand and walk}

Overhead Dumbbell Lunge Walk 2 * 1 Minute (AMRAP)

Pull Up Bar Face Pulls 2 * 6

Mobility Routine

SUPERFUNCTIONAL ROUTINE

Pull Day – 40 second rests

Dynamic Stretching

5 Minute Bodyscan Meditation

Cartwheels * 10

Trap Bar Deadlift 2 * 4 * 90%1RM

Planche Progressions Holds 2 * Failure | Front Level or Front Tuck Lever Holds 2 * Failure

Weighted Rope Climb 2 * Failure

Rope Climb 2 * Failure

Pronated Grip Barbell Curls 2 * Failure {Use a very slow eccentric – counting to 5}

Drop Set [Alternating Dumbbell Curls * 10 to Failure > Hammer Curls⁷ * Failure > Cheat

Hammer Curls⁸ * Failure > Chin Ups * Failure] * 2 {Same weight for drop set}

Lat Pull Down 2 * 4 to Failure

Drop Set [Pull Ups * Failure > Inverted Push Ups * Failure] * 2

Quasi Isometric Pull Up 1 Minute

Mobility Routine {Eyes closed and combined with kinaesthetic meditation}

Legs and Core Day – 40 second rests

Foam Rolling

5 Minute Bodyscan Meditation

Squat 2 * 4R * 90%1RM | Squat Press 2 * 4 reps at 80%F

Pistol Squats * Failure {Eyes Closed}

Overhead Weighted Lunge Walk 2 * Failure

Depth Jumps 2 * 15 | Jump Squats 2 * 15 {Depth jump unless not available}

Calf Jumps 2 * 15

Raised One-Legged Weighted Calf Raises 2 * 15 to Failure

Pike Pulses 3 * 10 | V-Sit 2 * Failure

Drop Set [Hanging Leg Raises * Failure > Frog Kicks * Failure] * 2

Bicycle Crunches * 50

Plank 2 * 1 Minute | Hollow Body Hold 2 * 1 Minute

Quasi Isometric Air Squat 1 Minute {Eyes Closed}

10 Minute Heavy Bag

Mobility Routine {Eyes closed and combined with kinaesthetic meditation}

Push Day – 40 second rests

Dynamic Stretching

5 Minute Bodyscan Meditation

Ballistic Isometric Bar Bend 3 * 6 Seconds * Three joint angles

Bench Press 3 * 4 * 90%1RM

Handstand Push Ups 2 * Failure | Assisted Handstand Push Ups 2 * Failure {Eyes Closed}

Bent Press 2 * 6 to Failure

Drop Set [Weighted Dips * Failure > Dips * Failure > Press Ups * Failure]

Drop Set [Clapping Press Ups * Failure > Press Ups * Failure]

Drop Set [One Arm Tricep Dips * Failure > Tricep Dips] * 2

Battle Ropes 3 * 1 Minute at MHR | Press Ups 3 * 100

Mobility Routine {Eyes closed and combined with kinaesthetic meditation}

⁷ Dumbbell curls but with a neutral grip (palms facing in). Curl across the body.

⁸ Swing the body to lift the weights when you can no longer do so with isolation

Full Body – 40 second rests

5 Minute Bodyscan Meditation

1 Minute Juggling

Muscle Ups / Progressions 2 * Failure | Weight Vest Explosive Pull Ups 2 * Failure

Straight Leg Deadlifts 2 * 4 * 70%1RM

Mechanical Drop Set: [Knuckle Push Ups * Failure > Finger Push Ups * Failure] * 2

Squatting Press 2 * 6 {Stop Short of Failure}

Briefcase Carry 2 * 1 Minute (AMRAP) {Hold a dumbbell in one hand and walk}

RTO Support Hold⁹ >1 Minute (support yourself on the rings for 1 minute)

Pull Up Bar Face Pulls 2 * 6

Metcon Circuit – 10 Second Rests:

Spider-Man Crawls 1 Minute (AMRAP)

Dumbbell Clean and Press 1 Minute (AMRAP)

1 Arm 1 Leg Push Ups | 1 Arm Push Ups

Bicycle Crunches 1 Minute (AMRAP)

Kettlebell Swing 1 Minute (AMRAP)

Hollow Body 1 Minute

Rest 1 minute and repeat circuit once**Advanced:** Add training mask or breathe through straw

Mobility Routine {Eyes Closed and Combined With Kinaesthetic Meditation}



THE DIETS

Remember:

Men:

$$\text{BMR} = 66 + (6.23 \times \text{weight in pounds}) + (12.7 \times \text{height in inches}) - (6.8 \times \text{age in years})$$

Women:

$$\text{BMR} = 655 + (4.35 \times \text{weight in pounds}) + (4.7 \times \text{height in inches}) - (4.7 \times \text{age in years})$$

To turn this into your AMR, you then multiply that amount by:

- 1.2 if you're sedentary (little or no exercise)
- 1.375 if you're lightly active (you exercise 1-3 times a week)
- 1.55 if you're moderately active (you exercise or work about average)
- 1.725 if you're very active (you train hard for 6-7 days a week)
- 1.9 if you're highly active (you're a physical labourer or a professional athlete)

THE RESET DIET (AUTOMATION DIET)

The aim is to maintain the precise same breakfast and lunch every day, to simplify your diet, and to lose fat weight.

Calculate your calories in, based on the AMR calculation above. Calculating precise amounts to meet calorie targets is time consuming, but by having consistent meals, you

⁹ Support your weight on gymnastic rings with straight arms and palms facing forward

can solve this problem. Make a note of your quantities, then prepare the same amount of each day! Revisit monthly to adjust to your new metrics.

Suggested breakfast meal:

Fruity Muesli Cereal

Nutritious | Extremely Quick | Extremely Affordable | Great Source of Energy

This option makes the cut for the density of nutrients – and of course any time you eat a bowl of milk you'll be getting *some* beneficial protein.

To make this one, you are going to take a muesli cereal (no added sugar) and then add:

- Sliced grapes
- Sliced bananas
- Sunflower seeds

This also has the added bonus of being a good source of energy. Adjust quantity such that this makes up 10% of your AMR.

Suggested lunch meal:

Greek Salad

Low Carb | Nutritious | Extremely Quick | Extremely Affordable | Low Calorie

This is very easy to make and is also extremely affordable. It is nutrient dense, simple, and low calorie.

To make a Greek salad, simply cut cucumber, red pepper, and cherry tomatoes into small cubes. Do the same with some feta cheese (just a small amount if you want to keep it low calorie).

Eat with one or two eggs. Prepare the night before and refrigerate.

Stir together and enjoy! Adjust the quantity such that this makes up 20% of your AMR.

Dinner guidance:

Dinner is an opportunity to enjoy what you eat. However, it should be fairly conservative so as to avoid providing the remaining 75% of your calorie intake. It should also still be relatively “simple.” The point is simply that you don't need to “stress” about this decision.

Total calorie deficit should be around 200-300 calories. However, if it is occasionally over or under that number, this does not hugely matter. The aim is to maintain a calorie deficit over time, not get caught up in the minutiae.

Also: no snacking in between meals with additional calories. Even coffee should be black until evening.

It is always recommended to include one cheat day to improve adherence and prevent adaptation.

THE MUSCLE FUEL DIET (AUTOMATION DIET)

The muscle fuel diet works similarly to the reset diet. The difference is that you are now placing greater emphasis on reaching protein targets, and on providing a calorie surplus. We don't want to go “overboard,” so we are looking to add 200-300 calories to our AMR and *at least* 1 gram of protein per 1lb of bodyweight. Again, we do this with a consistent breakfast and lunch, then relax in the evening.

Adjust amounts and supplement with protein shake to reach calorie and protein goals.

Suggested breakfast meal:

Scrambled Egg

High Protein | Low Carb | Nutritious | Extremely Quick | Extremely Affordable

Simply take whole eggs and beat in a jug until mixed. Add butter to a pan and melt. Add eggs to pan and toss to keep them scrambled. Eggs provide the good types of fat that raise testosterone, as well as all the amino acids, choline, and much more.

Adjust quantities to provide 15% of your AMR.

Followed by:

Cottage Cheese + Fruit

High Protein | Nutritious | Extremely Quick | High Calorie | Low Carb | Great Source of Energy

Exactly like it sounds. This is cottage cheese, with fruit in it. Recommended fruits include strawberry, blueberry, and banana.

The cottage cheese is again a fantastic source of protein (casein protein specifically, which is slow release). Adding fruit improves the flavour and provides more recovery-boosting micronutrients.

Adjust quantities to provide 20% of your AMR.

Suggested lunch meal:

Chicken Caesar Salad

High Protein | Low Carb | Nutritious | Extremely Quick | Extremely Affordable

An easy salad + protein meal that you can make is a chicken Caesar salad. To make this one, you just need a cooked chicken breast and a side salad. Make the side salad the same way as before, but now add to it some croutons, cheddar flakes, some avocado, and some olives cut in half.

You can add a Caesar dressing, or you can make your own. To make your own, use some vinegar, a little bit of lemon juice (squeezed from half a lemon), and a pinch of salt and/or olive oil.

Eat with an optional side of bread with butter. Follow with fruit (recommended: apple) and a piece of dark chocolate.

Adjust quantities to provide 35% of your AMR.

Dinner guidance:

Again, the aim is not to worry about dinner, but to aim to reach the goal of 200-300 calories over AMR as often as possible. Enjoy the meals and this time aim for a variety of different foods.

Note: Supplement with the necessary amount of protein shake/increase the amount of chicken and eggs to boost protein and calories.

THE SUPERFUNCTIONAL DIET

The aim of the SuperFunctional diet is to select from a wide-variety of meals, each of which you will adjust to meet your calorie goals. These should provide your precise AMR unless you are actively still trying to lose or gain muscle. AMR should be calculated *prior* to your training however.

The full list of food options is included in the meal plan supplement (or you can make your own). Aim to consume 20% of your AMR for breakfast, 20% for lunch, and 15% on snacks throughout the day. Supplement with protein shake as needed.

The SuperFunctional Diet also recommends a 2X “fasting” day. Here, you will skip breakfast and lunch entirely, aiming for a 16-hour period of no eating. This includes supplements such as BCAAs and even milk in coffee.



BRAIN TRAINING

LEVEL 1

Mindfulness Meditation 10 minutes

Dual N-Back Training 5 minutes | Mental Chess/Arithmetic 5 minutes

Non-Dominant Handwriting 5 minutes: [Dream Recall | Memory Retrieval]

LEVEL 2

Mindfulness Meditation 5 Minutes

Bodyscan Meditation 5 Minutes

Hakalau Meditation 5 Minutes

Dual N-Back Training 5 minutes | Mental Chess/Arithmetic 5 minutes

Non-Dominant Handwriting 5 minutes: [Dream Recall | Memory Retrieval]

LEVEL 3

Mindfulness Meditation 5 Minutes

Bodyscan Meditation 5 Minutes

Image Streaming 5 Minutes

Dual N-Back Training 5 minutes | Mental Chess/Arithmetic 5 minutes

Non-Dominant Handwriting 5 minutes: [Dream Recall | Memory Retrieval]

LEVEL 4

Mindfulness Meditation 5 Minutes

Hakalau Meditation 5 Minutes | Sense Meditation 5 Minutes {Alternate}

Image Streaming 5 Minutes

Breath Holding O₂ * 3 | Breath Holding CO₂ * 3 {Alternate}

Dual N-Back Training 5 minutes | Mental Chess/Arithmetic 5 minutes

Non-Dominant Handwriting 5 minutes: [Dream Recall | Memory Retrieval]

Thank you for reading SuperFunctional Training! Best of luck with your training, and have fun with it! If you have any questions, then don't hesitate to get in touch at: Adam@TheBioneer.com.

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