The Neuro Change Practitioner Program

White Paper

NEUROCHANGE® NCP® PRACTITIONER

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Introduction

The Neuro Change Institute continues to lead the way in providing stimulating, evidence-based training that enhances lives. Our guiding light, the mind and brain sciences, are undergoing a rapid expansion in knowledge, creating the need for a living document that dynamically organizes the latest scientific evidence in a digestible format for our practitioners and the scientific community. Toward this end, we are releasing this white paper that distills some of the key scientific concepts and foundational scientific literature underlying the Neurochange Practitioner Program.

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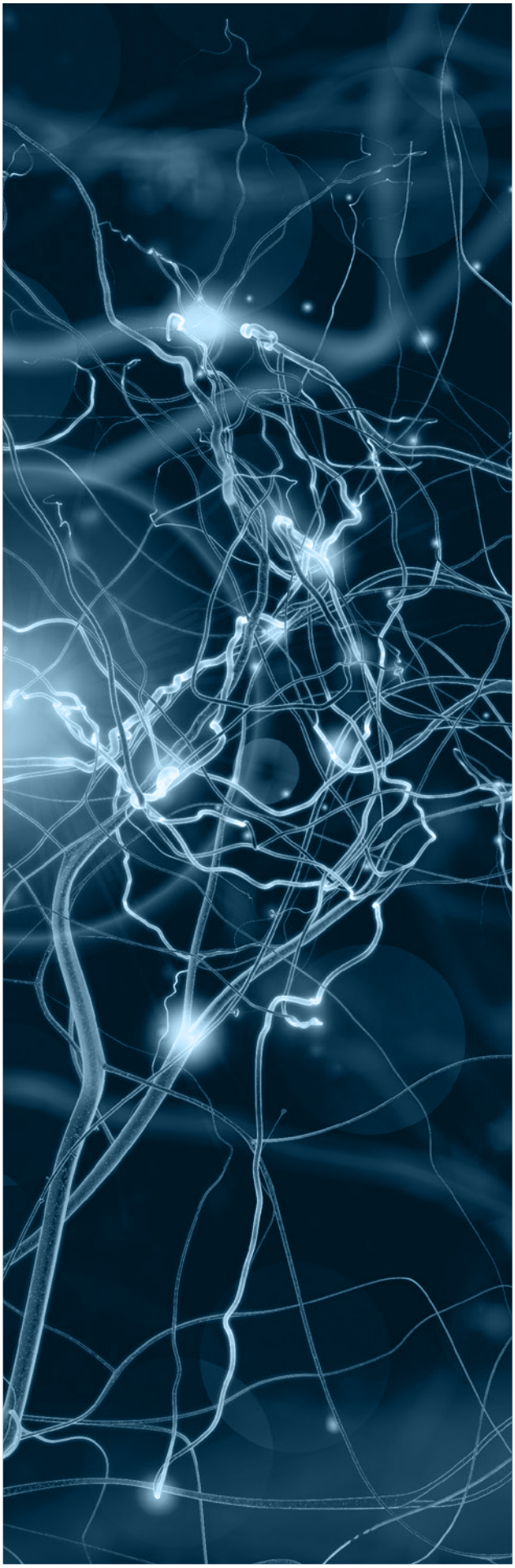
What is your purpose, and how will you get there? This is perhaps the deepest question that we can ask ourselves. The answer, of course, is as unique as your fingerprint. It is not something that can be provided to you by any teacher or program. Instead, you must discover your purpose and determine how to cultivate its realization in your life volitionally. This is not, however, to say that identifying and pursuing your purpose needs to be a matter of happenstance, stumbled upon only by the fortunate few while the rest of us wander blindly. To the contrary, revolutionary advances in the behavioral sciences provide a coherent set of guideposts to structure this pursuit that is available to anyone with the desire to learn and the will to commit to doing the work.

There are no secret ingredients here. If you had the time, content expertise, and access to the necessary resources, you could find everything contained in **The Neurochange Practitioner Program (NCPP)**. This is because the research findings that form the program's foundation have been published in peer-reviewed journals, the gold standard in science. We have enlisted a team of experts to acquire, critically evaluate, and curate the most impactful discoveries pertinent to effective habit change. This is, in fact, an ongoing process, with the program undergoing constant revisions to reflect the dynamic evolution of scientific literature. Additionally, our experts have thematically organized this material into an accessible and engaging format based on principles of learning science, and they deliver this content themselves, interactively with course participants.

The intent of this white paper is to provide interested readers with an overview of some of the fundamental science behind the **NCPP**. Before zooming in on the specific content modules of the **NCPP**, we begin with a high-level overview that provides some of the relevant history and motivation under the program's "hood."



Foundations

Launched in the 1960s, the cognitive revolution began as a response to Behaviorism—the dominant approach in psychology during the first half of the 20th century that steadfastly avoided explanations of behavior involving unobservable mechanisms (things like attention, imagination, intention, beliefs, consciousness, etc.). Instead, behaviorists like B.F. Skinner and John B. Watson focused exclusively on understanding behavior based on the empirical relationship between stimuli in the environment (e.g., sights and sounds), observable responses to these stimuli (behaviors), and the effects of rewards (or punishments) on the future likelihood of these responses being repeated.

While this approach to understanding and predicting behavior had many successes, it floundered when attempting to account for complex phenomena like how a child acquires their native language rapidly and with minimal explicit teaching *(Chomsky, 1958)*. As if through osmosis, a typical child understands roughly 1,000 words by the time they reach the end of their first year, and by age five, this number has increased nearly tenfold *(Law et al., 2017)*. The fact that this schedule is exhibited by children around the globe, across a diversity of child-rearing cultures, argues strongly against language being acquired through simple stimulus-response learning of the sort advocated by the Behaviorists. Instead, language acquisition and many other aspects of complex behavior require explanations that involve specialized mental functions (a mind).

Inspired in part by the emergence of computer science, which revealed how very complex functions could arise from simplistic elemental mechanisms (think ones and zeros), a new interdisciplinary science of the mind took root. The premise is that, analogous to computers, we are information processors *(Gardner, 1987; Johnson-Laird, 1988)*. You may recognize names like Noam Chomsky (linguistics), Marvin Minsky (artificial intelligence), and perhaps even Ulric Neisser (cognitive psychology) as key instigators of this cognitive revolution. While academicians argue over the details, there is no debating the powerful influence that this new science of the mind continues to have on our views of and interdisciplinary approach to human behavior. We'll get there, but first, a few more core concepts deserve our attention.

Humans as information processors.

We use our senses to gather information from the world around and within us: "inputs," if you will. For cognitive scientists, the mind is the collection of functions that transform these inputs into outputs. These "outputs" include our conscious and non-conscious mental states (our perceptions, thoughts, emotions, beliefs, etc.), as well as our actions (e.g., walking, talking, cooking, and so on).

To understand what we mean by functions, imagine that you found a mysterious device lying on the beach. Curious, you decide to run some tests. You might, for instance, use the device's keypad to input the numerals "3" and "4." If, in response, the machine rumbled and then spat the output "12" on a slip of paper, then you would be tempted to assume that inside the box was a mechanism that was performing the function of multiplication. Being a good scientist, however, you would probably want to run a few more tests to evaluate this hypothesis and rule out other alternatives (e.g., perhaps the mechanism inside is instead adding the two inputs and tacking on another "5") before concluding that you had found a valid and reliable multiplication machine.

This admittedly simple example is intended to illustrate the reasoning that scientists employ to investigate the hidden mechanisms (or functions) of any information processing system, whether technological or biological like us. Analyses of what makes us tick occur at several distinct yet interrelated levels, all of which inform the **NCPP**.

Levels of Analysis

"The mind is what the brain does." This quote by Marvin Minsky (a founder of artificial intelligence) succinctly captures the philosophical essence of the cognitive revolution. Understanding exactly how this happens is one of the greatest and ongoing challenges in science and requires analyses on several distinct yet interrelated levels *(Marr, 1982)*. To truly understand how your brain creates your mind, you will need to conjure your inner philosopher, psychologist, and neuroscientist.

The Philosopher.

The most abstract level of analysis concerns why we think and behave the way we do. Think of this as the level at which a philosopher views the mind. To illustrate, we might ask whether the human mind has a characteristic default way of operating when not otherwise engaged in a task. What is this, and why is it this and not some other possibility? Explanations at this level often evoke discussions of natural selection and survival value.

The Psychologist.

We can also ask what functions of our mind create this default mode and how they relate to our behavior. This is the level from which a psychologist approaches the mind. Decades of research indicate that our default mode is characterized by self-referential thinking and mind wandering. Left to our own devices, the wheels of our minds tend to churn, judging our past actions or lack thereof, rehashing past conversations or anticipating possible future conflicts, experiencing guilt and shame over perceived failings, generalized fretting, feeling like an imposter, and so on. This internal dialogue can be an impetus for fear-based decision making and a tendency to avoid novelty and risks.

The Neuroscientist.

Finally, we can ask how our default mode of functioning is created biologically. What is the brain's hardware that gives rise to this self-referential dialogue? An abundance of research using advanced brain imaging techniques demonstrates that when we are not engaged actively in a task, oscillatory activity increases within a very specific network of interconnected areas situated predominantly along the midline of our brain, our Default Mode Network.

We hope this introduction whets your appetite for the science behind the *NCPP*. The 60 years of science precipitated by the cognitive revolution have enormous practical significance. Curiously, much of this work has been overlooked by the field of personal growth and development. Our mission is to address this void by delivering an evidence-based program that reliably yields results for those of us who are seeking to clarify our values, purpose, and goals and are committed to making the changes necessary to align our lives accordingly.

Below, we take a deep dive into the science that informs the six modules of the program: Beliefs, Mindset, Emotional Intelligence, Subconscious Mind, and Neuroplasticity I and II.

Beliefs

Brief Overview.

There is a rich history of studying beliefs in philosophy and psychology. For academics, beliefs are the conviction or acceptance that some idea is true *(Schwitzgebel, 2010)*. Individual beliefs do not exist in isolation. They are instead part of a larger inter-connected network—a coherent belief system. Belief systems provide us with a meaningful structure, based on our past experiences and anticipated futures, which guides how we perceive our experiences of ourselves and the surrounding world. Consequently, our beliefs often have significant emotional valence *(Connors & Halligan, 2014)*.

Our beliefs profoundly shape how we perceive ourselves and the world around us, including other people. They also define our goals and therefore play a significant role in choosing and guiding our thoughts and actions. These actions include not only our overt behaviors but also our perceptions, thoughts, and feelings *(Tullett et al., 2013)*. Moreover, our beliefs define our attitudes about our present and past circumstances and our views on how things ought to be in the future *(Pechey & Halligan, 2012)*.

An abundance of evidence supports the view that we are more successful in attaining our goals if they align with our beliefs and values and are thus internally motivated. Conversely, externally motivated goals that lack this alignment are associated with lower levels of motivation and less resilience to obstacles *(Elliot & Sheldon, 1998; Ryan & Deci, 2000b)*. Unsurprisingly, externally motivated goals are correlated with negative emotions, including stress, anxiety, and guilt *(Ryan & Deci, 2000a)*.

However, while we are consciously aware of some of our beliefs, many exist outside of our awareness, i.e., they are subconscious *(Bargh & Morsella, 2008)*. These non-conscious beliefs and associated attitudes nevertheless have a profound influence on our behavior. An example that has received a great deal of attention is the implicit belief that can bias how we behave toward people from other racial and ethnic groups *(Greenwald et al., 2022)*.

Whether explicit or implicit, our beliefs are subject to a variety of systematic biases. For this reason, there is value in questioning the veracity of our beliefs. Perhaps the most ubiquitous and influential of these is confirmation bias—a strong tendency to seek and interpret evidence in ways consistent with our existing beliefs while overlooking or discounting contradictory data *(Mynatt et al., 1977)*. What makes this ubiquitous bias so powerful is that we are often unaware of its effects on our behavior *(Nickerson, 1998)*. Fortunately, confirmation bias is not inescapable. In fact, the key to combating confirmation bias—challenging ourselves with information that is inconsistent with our beliefs—is a key to belief revision.

Based on these and other research findings, the NCPP provides training in the use of evidence-based tools that focus on three specific objectives: 1) developing an awareness of one's beliefs, 2) fostering greater alignment between one's beliefs and goals, and 3) revising self-limiting beliefs. While details are beyond the scope of this piece, we briefly introduce these approaches below.

Our program uses mindfulness training because it has proven effective in helping individuals become more aware of their beliefs and goals *(Brown & Ryan, 2003)* and in selecting goals that are in better alignment with their values, i.e., that are self-concordant *(Crego et al., 2021; Smyth et al., 2020)*. This process predicts more internal motivation, again putting us in greater control of our beliefs and their impact on behavior *(Donald et al., 2020)*. This awareness can reveal instances where our goals and beliefs are misaligned and decrease the perpetuation of habitual or automatized responses that may be maladaptive and self-reinforcing *(Aarts & Dijksterhuis, 2000)*.

Despite the tendency to be stable over time, beliefs can be revised, and abundant research indicates that cognitive dissonance is a powerful stimulus for belief revision. As noted earlier, beliefs often have significant emotional valence *(Connors & Halligan, 2014)*. Therefore, experiencing inconsistencies in our beliefs, or between the choices we make and our attitudes, is emotionally arousing, stressful, and often unpleasant. This state of cognitive dissonance is highly motivating, however, and we provide tools to effectively harness this energy to facilitate belief revision *(Horne et al., 2015)*.

Mindset

Brief Overview.

What do you believe about your potential for success? Do you see yourself as largely fixed and immutable or capable of growing to meet new challenges? The answer to this question is a reflection of what psychologists refer to as your mindset—a largely subconscious collection of beliefs that each of us holds about our own potential for personal growth and development *(Dweck, 2016)*. An abundance of data indicates that our mindset predicts the likelihood that we will persist even when encountering obstacles and setbacks and, therefore, our probability of successfully attaining our goals *(Hecht et al., 2021; Yeager & Dweck, 2020; Yeager et al., 2019)*.

Beginning with the ground-breaking work of Carol Dweck, researchers have drawn a distinction between individuals with a fixed vs. growth mindset. To use Dweck's own language:

> *Individuals who believe their talents can be developed (through hard work, good strategies, and input from others) have a growth mindset. They tend to achieve more than those with a more fixed mindset (those who believe their talents are innate gifts). This is because they worry less about looking smart and put more energy into learning (Dweck, 2016).*

The popularization of Dweck's fixed vs. growth mindset distinction has led to some distortions of these core concepts, namely their mischaracterization as mutually exclusive categories. Rather than being one or the other type, we are all, in fact, a blend of both growth and fixed mindsets, and this mixture can change based on circumstances, experience, and structured training *(Dweck, 2016)*.

Importantly for our purposes, consistent work and adherence to evidence-based training methods have been shown to increase the extent to which we approach life and its accompanying challenges with a growth mindset *(Chen et al., 2020; Paunesku et al., 2015; Yeager et al., 2016)*. Structured training is necessary because we will inevitably encounter obstacles when pursuing goals, often along with criticism and self-doubt. These are triggers for our fixed mindset beliefs and precipitate reactions inconsistent with a growth mindset, including feeling fearful and insecure, avoiding risks, and becoming defensive, deceptive, and uncollaborative *(Haimovitz & Dweck, 2016, 2017)*. The major aims of the NCPP are identifying the beliefs that comprise your mindset and providing you with research-backed tools that can help you to cultivate a more growth-oriented set of beliefs that will better serve your purpose.

In brief, the framework of the NCPP approach derives from research indicating that successful goal attainment involves two phases: commitment to goals (goal-setting) and implementation of goal-oriented behavioral strategies (goal-striving) *(Oettingen & Gollwitzer, 2001)*. Accordingly, we make use of a variety of devices to help practitioners access the beliefs that underlie their mindsets and employ evidence-based techniques such as Mental Contrasting of Implementation Intentions—a self-regulatory strategy that, when mastered, potentiates goal commitment and strengthens resilience and goal pursuit *(Duckworth et al., 2013; Duckworth & Seligman, 2005; Oettingen et al., 2009; Oettingen et al., 2001)*.

Emotional Intelligence

Brief Overview.

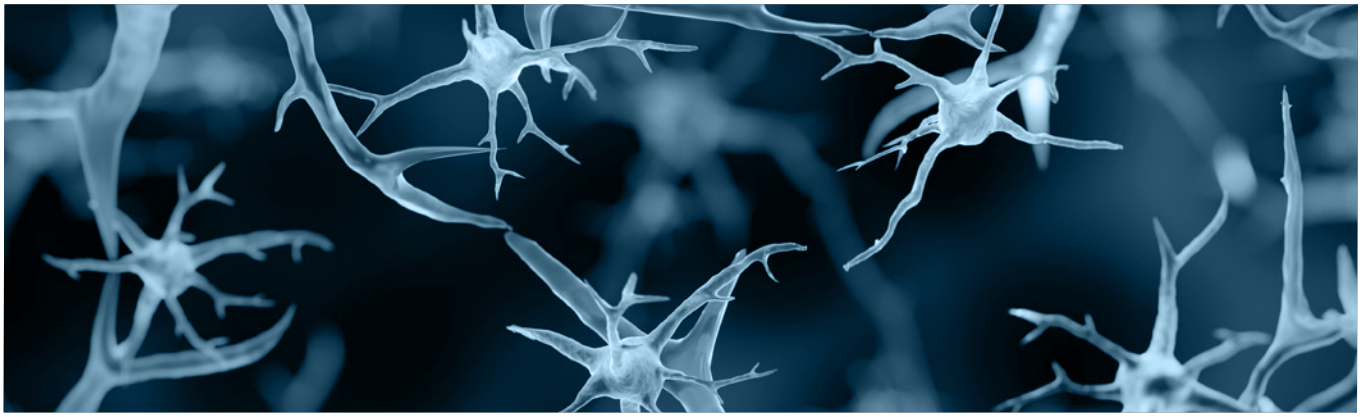
When you imagine an intelligent person, who do you picture? If you are like most of us, you might imagine a brilliant scientist like Albert Einstein or perhaps someone you went to school with who aced their exams. These individuals certainly reflect a form of intelligence, the kind that is captured by traditional standardized tests and expressed as an intelligence quotient. Many behavioral scientists have, however, come to appreciate that intelligence comes in a variety of forms *(Gardner, 1987)*.

In particular, emotional intelligence—the ability to understand our own feelings and recognize and influence those of others—has received a great deal of attention *(Mayer, Salovey, et al., 2008; Mayer et al., 2001)*. Similar to "mindset," emotional intelligence has received widespread attention and, in some cases, been stretched well beyond what that research indicates *(Paul, 1999)*.

While researchers continue to debate the merits of different theoretical frameworks, the following components are generally acknowledged as foundational to emotional intelligence. Self-awareness—the ability to understand our own feelings and the impact they have on others—is considered paramount. Possessing self-awareness opens the door to self-regulation—the ability to manage and control our emotions in contextually appropriate ways. Social awareness—our ability to understand the emotions of others—is critical for empathy. Finally, emotionally intelligent individuals display well-developed social skills—learned abilities that enable them to behave competently and appropriately within social situations.

The value of any form of intelligence resides in its contributions to success and quality of life. Individuals possessing high levels of emotional intelligence excel at understanding themselves and navigating the social world adaptively. Unsurprisingly, these characteristics are positively related to a variety of desirable behaviors and outcomes. For instance, the emotionally intelligent have larger social networks of better quality, exhibit pro-social behaviors, and have more positive peer and family relations. The emotionally intelligent also display lower rates of undesirable behaviors such as illegal drug and alcohol abuse and fewer poor relationships with friends and family *(Mayer, Roberts, et al., 2008)*.

Of direct relevance to our purposes, emotional intelligence is critical for successful coaches *(Ackley, 2016; Thelwell et al., 2008)*. While some individuals are fortunate to be endowed naturally with high levels of emotional intelligence, there is a substantial body of research indicating that gains can be made through training in the four main components: self-awareness, self-regulation, social awareness, and social skills *(Cobb & Mayer, 2000; Guseh et al., 2015; Johnson, 2015)*. The NCPP uses evidence-based techniques to help practitioners improve their emotional intelligence in ways that will positively impact their coaching.



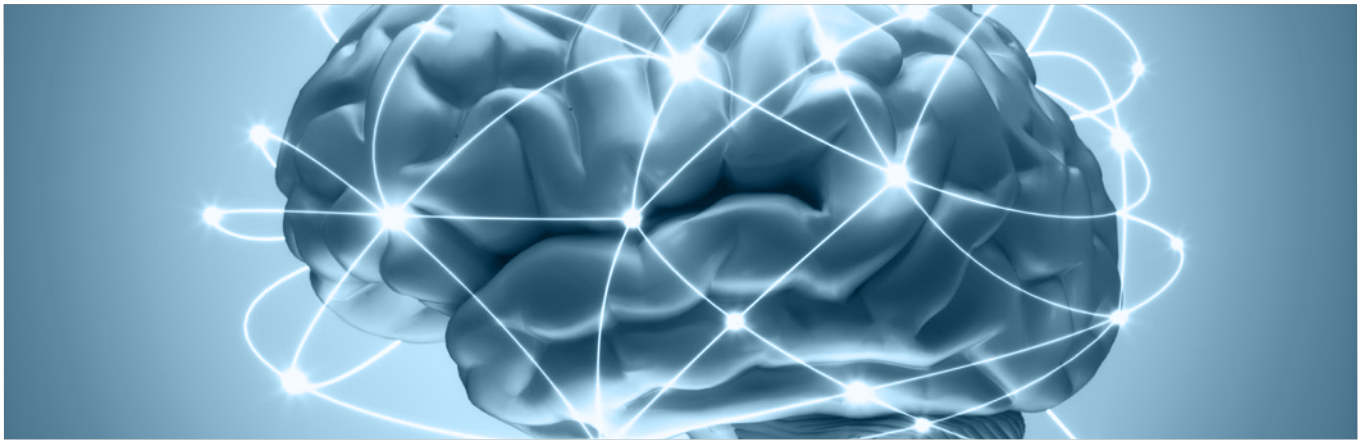
Subconscious Mind

For many, the term "subconscious" brings to mind Dr. Sigmund Freud, still the most frequently cited individual in published scientific literature. Freud's legacy is controversial, and with few exceptions, this fact led to mainstream psychological researchers focusing their attention exclusively on conscious processes during much of the 20th century. However, the tide changed, and a large and growing body of evidence demonstrates that our perceptions, motivations, beliefs, emotions, and actions are heavily influenced by mechanisms operating outside our awareness. This research work indicates that subconscious mental functions not only impact our behavior profoundly and automatically but are also far more sophisticated and flexible than previously believed *(Bargh & Morsella, 2008)*.

In the NCPP, we focus on understanding and harnessing the subconscious mind's contributions to the pursuit and achievement of goals and overcoming obstacles to success. The basis for our work lies in a large body of evidence demonstrating that our perceptions of people, objects, and events in our environment facilitate specific behavioral responses, often without our conscious awareness *(Higgins & Bargh, 1987)*. This is possible because, even in the absence of our awareness, perceptual information can activate (or prime) internal representations (stored knowledge) that, in turn, have become associated with specific behavioral responses. In many cases, these responses are desirable. Not always, however. In these circumstances, techniques proven capable of forging new associations between perceptual experiences and more adaptive behavioral responses hold great potential for positive change.

We provide training in the use of a variety of evidence-based tools that capitalize on the power of subconscious processing. One, the implementation intention technique, was developed to automatize desired, goal-directed behaviors in a manner that minimizes conscious intent *(Gollwitzer & Schaal, 1998)*. A large body of research indicates that this approach is effective in a wide variety of contexts and across a broad demographic range *(Achtziger et al., 2008; Freydefont et al., 2016; Schweiger Gallo & Gollwitzer, 2007)*. In short, implementation intentions involve creating linkages between situations and goal-directed responses that are very specific with regard to what, when, and how. If your intention is to quit smoking, for example, then one implementation intention might be "if tempted to light a cigarette when I smell smoke, then I will immediately chew a stick of nicotine gum." The objective here is to remove conscious decision making and, thus, the opportunity to stray off course. With repetition, this association between the perceptual experience of smelling smoke and the behavioral response of chewing gum becomes increasingly automatic and subconsciously engaged.

An elaboration of the implementation intention technique involves adding mental contrasting. Here, individuals envision their desired future goal state and contrast it with anticipated obstacles *(Oettingen et al., 2009)*. For our smoker, this might involve imagining breathing easier, not feeling shame and guilt for needing a cigarette break, etc. This is contrasted with imagining how it would feel if they were invited to join the work group for a smoke after lunch. This addition has proven highly effective in a wide variety of domains, including quitting smoking *(Mutter et al., 2020)*, getting people to take action to prevent the spread of COVID-19 *(Kim et al., 2022)*, reducing alcohol intake *(Wittleder et al., 2019)* and meat consumption *(Loy et al., 2016)*, and improving adherence to a program of physical activity *(Sheeran et al., 2013; Wittleder et al., 2019)*.



Neuroplasticity

One of the most striking things about the brain is the fact that it is continuously being reshaped by our experiences and behaviors. In turn, these brain changes support and strengthen the very same behaviors moving forward. This neuroplasticity is the physiology of learning, and understanding and exploiting its power is integral to the NCPP.

Science has long recognized that the development of the immature brain is guided both by the unfolding of a genetically programmed plan and by experience. In fact, deprivation of specific experiences during this developmental period can have permanent effects on brain organization *(Hubel & Wiesel, 1963; Wiesel & Hubel, 1963)*. However, as recently as the early 1980s, the prevailing view among neuroscientists was that experience-dependent changes in brain organization cease once we reach adulthood. In fact, early discoveries suggesting otherwise initially had great difficulty getting published *(Kaas et al., 1983; Merzenich et al., 1983)*.

Today, the consensus is that changes in our experiences and behaviors induce reorganizational changes in brain function and structure throughout the lifespan. This brain plasticity occurs when we experience either decreases or increases in stimulation. An extreme example of both occurs when an individual undergoes an amputation. As a result of being deprived of normal stimulation, areas of the brain that were involved in experiencing sensations or controlling movements of the now-absent hand are repurposed and become responsive to the use of the remaining hand. Remarkably, even after more than 30 years, the effects of such extreme deprivation can be partly reversed. When an amputee receives a hand transplant that restores sensory and motor stimulation to the brain, patterns of activity shift back toward normal and support improvements in feeling and use of the new hand *(Frey, 2020; Frey et al., 2008)*. Dramatic examples such as this show that the organization of even the fully mature human brain is very much dependent on our experiences. Fortunately, such extremes are not required to change your brain in ways that support your behaviors.

Neuroplastic changes in our brains are happening all the time and across multiple scales in time and space. Learning to write with your non-dominant hand is one way to illustrate these co-dependent changes in your brain and behavior *(Philip & Frey, 2016)*. Within minutes to hours of initiating practice, synaptic connections between neurons in areas involved in movement and sensation of the non-dominant hand are strengthened. Practicing consistently for days to weeks produces new synaptic connections within the neural networks that support the increasing refinement of movement patterns. Months to years of practice will result in the recruitment of additional motor and sensory neurons, causing an expansion of the brain territory devoted to representing the left hand. Structural changes, including increased myelinization of neurons within these regions, also become evident at this longer time scale *(Kaas et al., 1983; Sanes & Donoghue, 2000)*.

The training and tools provided in the NCPP incorporate design features that have been shown to enhance neuroplasticity and solidify corresponding behavioral changes. For instance, neuroplasticity is driven by consistent, incremental practice over time, and these changes are significantly enhanced when training is undertaken deliberately, with focused attention (Merzenich et al., 1996). By taking such facts into account, we seek to optimize behavioral changes in our practitioners and their clients.

We hope you have enjoyed this glimpse into the scientific basis of the NCPP. There is a great deal more to be had by those who undertake the training, and the program is constantly evolving to keep pace with the rapid changes in evidence.

Resources

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