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INTRODUCTION TO THE SPECIAL ISSUE: NEURO-MYTHCONCEPTIONS IN CONSULTING PSYCHOLOGY—BETWEEN A ROCK AND A HARD PLACE

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The growing popularity of neuroscience within consulting psychology is a blend of myth, hype, and grounded empirical research. This special issue of *Consulting Psychology Journal: Practice and Research* addresses recent advances, issues, and discoveries surrounding the neuroscience of coaching and consulting. To address these, the papers cover diverse topics from a variety of perspectives such as coaching, goal setting, interpersonal trust, and resilience. Each paper provides evidence-based research and practical implications for coaches, consultants, human-resources professionals, leaders, and organizations to enhance individual, team, and organizational effectiveness.

Keywords: executive coaching, trust, goal setting, motivation, neuroplasticity

It seems as though the topic of neuroscience in consulting psychology is growing in both popularity and seductiveness. A proliferation of brain-based research has been made possible by advances in both theory and technology (e.g., brain imagery, wearable technology). For example, it is well known that lack of sleep is associated with impairment of performance, health, memory, and emotional intelligence (Nowack, 2017a). However, up to now, it has been a bit of a mystery about what exactly is occurring at the neurological level during sleep. With recent advances in the use of diverse brain-imagery techniques such as functional magnetic imagery (fMRI), magnetoencephalography, and positron emission tomography, some new explanations have begun to emerge to explain the associations of lack of sleep with corresponding adverse mood, health, and performance changes.

Matthew Walker, director of the University of California Berkeley's Sleep and Neuroimaging Laboratory, and his colleagues studied 26 healthy participants and divided them into a sleep-deprived group and a control group (equal males and females between the ages of 18 and 30). The sleep-deprived group stayed awake during day 1, night 1, and day 2, while the control group was not sleep deprived and slept normally during the night. Each participant was shown 100 images that emotionally ranged from very disturbing (e.g., mutilated bodies) to very uplifting. Using this

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emotional gradient, the researchers were able to explore changes in brain activity using fMRI. They found that the more negative the images in the sleep deprived group caused significant activation of the amygdala that plays a large role in processing emotions and memory (Yoo, Gujar, Hu, Jolesz, & Walker (2007). Additionally, they found slowed activity in the ventrolateral prefrontal cortex (VLPFC), which influences logical reasoning and willpower among other functions. Conversely, brain scans of those who got a full night's sleep in their own beds showed normal activity in the amygdala and VLPFC. For the first time a neurobiological connection was able to be made between lack of sleep and socioemotional behaviors.

Two important points should be made about the growing interest in "neuroscience" explanations that are seen within consulting psychology. The first relates to the stability and half-life of our scientific knowledge and how this shapes future research and practice. The second is associated with the seduction behind the combining form *neuro-* in marketing organizational, team, and individual solutions by vendors and consultants, as well as the credibility the label seems to bring (Grant, 2015; Howard-Jones, 2014).

With respect to the first point, Brian Nosek of the University of Virginia and his colleagues (Open Science Collaboration, 2016) sought to replicate 100 different experimental and correlational psychological studies that were all published in 2008 (Reproducibility Project); this involved a collaboration of 270 contributing authors. The project used studies from three different peer-reviewed journals—*Psychological Science*, *Journal of Personality and Social Psychology*, and *Journal of Experimental Psychology: Learning, Memory, and Cognition*—to explore if they could get the same results as the initial published findings.

The mean effect size (r) of the replication effects ($M_r = 0.197$, $SD = 0.257$) was half the magnitude of the mean effect size of the original effects ($M_r = 0.403$, $SD = 0.188$). In general, 97% of the original studies published in 2008 had significant results ($p < .05$). However, only 36% of replications in the Reproducibility Project demonstrated significant results. Despite some criticism about how faithfully the replication team had adhered to the original design of the 100 studies it retested (Gilbert, King, Pettigrew, & Wilson, 2016), the Open Science Collaboration (2016) suggested that their findings led to a conclusion that there is still more work to do to verify whether we know what we think we know, at least in the field of psychology.

The second point is illustrated nicely by a provocative study by Weisberg, Keil, Goodstein, Rawson, and Gray (2008), who explored the seductive allure of neuroscience explanations for common life experiences. Three groups of subjects (novices, neuroscience-class students, and neuroscience experts) read brief descriptions of psychological phenomena followed by a good or bad explanation that did or did not contain logically relevant neuroscience information. Subjects in all three groups judged good explanations as more satisfying than bad ones. But subjects in the two nonexpert neuroscience groups additionally thought that explanations with logically *irrelevant* neuroscience information were more satisfying than explanations without such information. The authors suggested that even if expert practitioners can distinguish solid neuroscience explanations from those that lack credibility, it is likely that nonexpert coaches and consultants will not be as discriminating.

Finally, in a recent study, 385 college students in four separate experiments read brief descriptions of psychological phenomena, each one accompanied by an explanation of varying quality: good versus circular and followed by superfluous information including fMRI pictures (Fernandez-Duque, Evans, Christian, & Hodges, 2015). Superfluous neuroscience information (i.e., information that offered no further insight) was more alluring and seen as more credible than social-science information, and even more alluring than information from prestigious "hard sciences." Accompanying fMRI pictures had no impact above and beyond the neuroscience text, suggesting a perceptual bias that is conceptual rather than pictorial.

Taken together, these two studies support the argument that it is easier to enhance the value of practitioner-oriented products and services by including neuro-based explanations behind them, despite limited validity of the claims or a direct link to neuroscience research. It is increasingly popular today, in order to garner greater attention and interest, to package traditional interventions and consulting solutions under a "neuromarketing banner" without empirically based research to back up such claims or to merely repackage older theories and methods into "cutting edge" brain-based approaches (Grant, 2015). As a result, practitioners can be easily confused and even fooled about the relationship between current products and services and the neuroscience behind them. However, some neuroscience research and findings are empirically grounded and lend themselves to practical approaches and techniques for use by consultants, and these should be briefly acknowledged.

Neuro-Mythconceptions

The existing research today strongly suggests that neurons, among other brain cells, possess the ability to modify both their structure and function in response to a variety of internal and external stimuli, including coaching and training, and this is referred to as *neuroplasticity*. For example, numerous studies demonstrate links between chronic stress and poor health, including risk factors for cardiovascular disease and impaired immune function. The exact mechanisms of how chronic stress exerts these effects are not well known but current recent research points to the crucial roles of telomeres and telomerase in cellular aging and potentially in disease. Telomeres are DNA–protein complexes that cap chromosomal ends, promoting chromosomal stability. When cells divide, the telomere is not fully replicated because of limitations of the DNA polymerases in completing the replication of the ends of the linear molecules, leading to telomere shortening with every replication. Telomere length has become a popular subject among scientists who conduct research on how biomarkers are linked with chronic conditions, stress, and mortality.

Early stress research by Epel et al. (2004) compared telomere length in 58 healthy premenopausal women who were biological mothers of either a healthy child (n = 19, "control mothers") or a chronically ill child (n = 39, "caregiving mothers"). Women with the highest levels of perceived stress have telomeres shorter on average by the equivalent of at least 1 decade of additional aging compared with low-stress women. Additionally, recent meta-analytic research suggests that chronic stress induces physiological changes that result in shortened telomeres and associations with both mortality and morbidity (Schutte, & Malouff, 2014).

Clarifying some of the popular neuro-mythconceptions that exist today requires an explanation of some of the basic principles of neurogenesis (ability to grow new brain cells) and neuroplasticity (lasting change to the brain throughout an individual's life course). Neuroplasticity, like the concept of validity, is both specific and has some limits so it must be carefully defined and explained. It is important to point out that there is a difference between changes at the neural level (neuroplasticity) and resulting behaviors becoming more efficient and leading to visible performance outcomes that are meaningful for clients (Kleim & Jones, 2008; Nowack, 2017b).

Table 1 summarizes eight major principles of neuroplasticity that have practical implications for coaching, training, and consulting; this is adapted from Kleim and Jones (2008). Reviewing each of these eight goes beyond the scope of this paper but the first two will serve to help explain some popular urban neuromyths that have been incorporated into best-selling books and packaged by a number of consultants as practical tips to facilitate everything from memory to learning, relationships, well-being, resilience, and performance.

Use It and Improve It

Extensive research has supported a significant association between (a) behavioral rehearsal and practice and (b) neurogenesis and neuroplasticity. For example, Woollett, Spiers, and Maguire (2009) used neuroimaging to study the neural changes in London taxi drivers given the requirement for exceptional memory, ability to navigate, and learning of over 25,000 city streets. Drivers in London must undergo extensive training over several years, acquiring what is known as "The Knowledge." The authors were able to demonstrate that both taxi drivers and nontaxi drivers activated a key memory area of the brain (hippocampus) during a navigation and scanning procedure but taxi drivers demonstrated significantly greater gray-matter volume in the hippocampus compared with bus drivers.

Table 1
Major Principles of Neuroplasticity

Use it and improve it	Using *specific* brain areas can enhance plasticity within that brain region
Use it or lose it	Failure to activate certain brain functions causes *loss*
Specificity matters	The *nature* of the behavioral rehearsal dictates neuroplasticity
Repetition matters	*Repetition* of newly learned or relearned behavior is required for lasting neural changes
Difficulty and challenge matters	Sufficient *intensity* facilitates plasticity
Salience matters	Emotion, motivation, and attention are all important *factors* for neuroplasticity
Age matters	Training induced plasticity occurs more readily in *younger* brains
Drivers matter	Some activities *coupled* with learning and memory facilitate greater neuroplasticity (e.g., physical activity/exercise and sleep)

Note. From "Principles of Experience-Dependent Neural Plasticity: Implications for Rehabilitation After Brain Damage," by J. A. Kleim and T. A. Jones, 2008, *Journal of Speech, Language and Hearing Research, 51,* p. S225–S239. Copyright 2008 by American Speech-Language-Hearing Association. Adapted with permission.

Additionally, expanded gray matter in the posterior hippocampal area was associated in a positive gradient with increasing navigation experience in taxi drivers. Similarly, extensive piano practicing has been shown to be associated with enhanced plasticity of white-matter areas of the brain (Bengtsson et al., 2005), and adults attending a juggling course showed detectable changes in brain structure within 3 months (Draganski et al., 2004).

Changes in the brain's physical structures as a result of mindfulness meditation have been well documented (e.g., Hölzel et al., 2011). In several studies by Tang, Hölzel, and Posner (2015), participants who had never meditated before went through a mindfulness-based stress-reduction-training program (MBSR) consisting of mindful yoga and sitting meditation (daily for 30–40 min). Anatomical MRI images of gray matter from 16 meditation-naïve participants were obtained before and after they underwent the 8-week program and compared with a wait-list control group of 17 individuals.

A significant increase in gray-matter concentration within the left hippocampus was observed in the meditation group compared with the controls, as well as change in gray-matter concentration in three additional brain areas (posterior cingulate cortex, left temporo-parietal junction, and cerebellum). It is important to note that MBSR is a multifaceted intervention program and some of the observed positive brain changes might have resulted from behaviors not specific to meditation or mindfulness (e.g., social interaction or stretching). However, participant-reported reductions in stress also were correlated with decreased gray-matter density in the amygdala, which is known to play an important role in anxiety and stress, convincingly demonstrating an association with behavioral practice and corresponding changes in the brain.

Schoen and Nowack (2013) looked at another stress-related inflammatory cytokine called *interleukin-6* (IL-6) in a group of adults practicing a stress-management self-hypnosis intervention for 12 weeks compared with a wait-list control group; the comparison was done by analyzing blood samples before and after the study. After 12 weeks, participants were observed to have a significantly lower IL-6 serum level from baseline compared with the control group, suggesting lower levels of inflammation. Further, participants reported a significant decrease in stress and in the use of negative-appraisal coping strategies (such as self-deprecating statements, perfectionism, and catastrophic and pessimistic thinking) relative to the control group. These studies, among others, support a direct causal relationship between stress-management techniques and neurological-related functioning.

Recent research has begun to explore the underlying neurobiological mechanisms behind how mindfulness meditation and other forms of stress management have been shown to improve markers of health. Building on cross-sectional research showing that mindfulness meditation may enhance the default mode network (DMN), which is involved in mind-wandering and internal reflection with connectivity to the important top-down executive-control network (key to attention, planning, and decision-making), a study looked at stressed job-seeking unemployed adults ($N = 35$); participants were randomized to either a 3-day residential mindfulness-meditation or relaxation-training program (Creswell et al., 2016).

Participants also provided blood samples before the retreat and at 4-month follow-up, which were assayed for circulating IL-6, a well-known biomarker of systemic inflammation. Those who underwent the mindfulness training had significantly lower levels of IL-6, a biomarker of inflammation, than those who did the relaxation retreat. Additionally, mindfulness training but not relaxation coupled the DMN with a region of the brain known to be important in executive functioning. This increased connectivity appears to help the brain manage stress (a known inflammation trigger), and it seems to play a role in the observed reduction of inflammation (Creswell et al., 2016).

Previous and current practice of new behaviors is required to translate observable neural change into skill improvement or actual health benefits. To illustrate, it was shown that doctors who had previous video-game experience and reported they were currently playing games made significantly fewer endoscopic surgical errors than surgeons who had no previous video experience (Rosser et al., 2007). A recent meta-analysis of mind-body interventions (e.g., yoga and meditation) also supported an association with regular behavioral practice and immune responsiveness (Morgan, Irwin, Chung, & Wang, 2014).

Additionally, recent findings have hinted that short, daily mental practices can influence changes in the brain. Valk et al., (2017) collected MRI data on 300 participants between 20 and 55 years of age throughout three different mental-training interventions. The groups underwent three types of 3-month exercise modules with weekly instructed group sessions and daily individual exercises completed via smart phone and online. Different and meaningful structural brain-network changes (cortical thickness) were observed through mindfulness-based attention, socioaffective skill practice (e.g., compassion, dealing with difficult emotions), and sociocognitive skills (e.g., cognitive perspective-taking on self and others) after 3 months. As such, different types of mindfulness meditation, much like different types of exercise (e.g., aerobic vs. nonaerobic), activate different neural pathways and result in different health outcomes.

Another related area of research has focused on the direct associations among exercise, physical health, and psychological well-being. Recent reviews also suggest that regular exercise confers both cognitive and overall health benefits, although the mechanism by which such physical activity confers these benefits hasn't been clearly elucidated. One theory is that physical activity stimulates the production of brain-derived neurotrophic factor (BDNF), a protein involved in neurogenesis and general "housekeeping" of the neuronal environment.

The most recent evidence has suggested that an increase in BDNF resulting from regular exercise enhances neuroplasticity and prevents neuronal loss, contributing to both cognitive benefits and psychological well-being (Dinoff et al., 2016). These studies have provided some limited evidence in support of how behavioral practice is associated with diverse structural brain changes and associated neurophysiological outcomes. In each of these studies, practice was overtly done by participants but it is not the only way to affect neuroplasticity.

Pascual-Leone (1996) described an experiment comparing mental rehearsal with actual practice of a five-finger piano exercise. The first group of participants was told to perform a sequence of finger movements fluently on the piano without pauses and without skipping any keys. They were tested on five consecutive days after a 2-hr practice session using focal transcranial magnetic stimulation (TMS). The TMS measured how much of the motor cortex controlled the finger movements needed for the piano exercise.

As expected, performance (e.g., number of errors, accuracy, etc.) improved steadily over the course of the 5-day period. Once near-perfect performance was reached, the participants were then randomized into two groups with the first continuing daily piano practice for 4 subsequent weeks. The second group was only allowed to mentally simulate the exercise without any physical practice on a piano keyboard. Analysis of performance revealed that mental practice resulted in nearly identical reorganization of the motor outputs to the one observed in the group of participants that physically practiced the finger movements on the piano. This was one of the first studies to demonstrate that behavioral rehearsal as well as mental directly strengthens neural-motor pathways with associated performance improvements.

Taken together, research evidence has suggested that getting clients to "start" new habits and behaviors does appear to create significant and observable neural plasticity but that if the behavior is not maintained the advantages are unlikely to be translated into enhanced performance (*use it or lose it*). Understanding this aspect of neuroplasticity (*use it and improve* it) would appear to have important implications for consultants involved in executive coaching (e.g., How do we engineer deliberate practice outside of our coaching meetings with our clients? Do clients maintain new behaviors once the coaching engagement is terminated?) and training (e.g., How long do new behaviors have to be deliberately practiced and performed outside of a training program before new habits can be comfortably formed?).

Use It or Lose It

In the same study summarized above on London taxi drivers, Woollett and colleagues (2009) also explored structural brain changes in drivers who had retired compared with those actively driving each day. The authors found that full-time drivers had significantly greater gray-matter volume in the posterior hippocampus than retired taxi drivers, who had greater volume in this region than the control participants, who were retired but hadn't been taxi drivers. This study provided some preliminary evidence and support for the possibility of plasticity of the brain (at least in the case of the hippocampus) in both directions—both during acquisition of a new skill or in habit formation and again when the behavior ceases.

Another potent illustration of the use-it-or-lose-it aspect of neuroplasticity can be seen in a study of individuals with the immune-mediating disease multiple sclerosis (MS); participants took part in a comprehensive stress-management program to enhance quality of life and were compared with a wait-list control group (Mohr et al., 2012). In this study, 121 individuals with relapsing forms of MS were randomized into a comprehensive stress-management intervention (16 individual treatment sessions over 24 weeks and then a 24-week posttreatment follow-up) or a wait-list control condition. The treatment intervention involved participants meeting with licensed practitioners for 16 individual 50-min sessions spread over 24 weeks. The first six sessions included psychoeducation and problem-solving, cognitive restructuring, relaxation skills, and increasing positive life activities, along with strengthening social support.

MRI scanning was done at baseline and at weeks 8, 16, 24, 32, 40, and 48, using dye injection to detect MS brain damage. The primary outcome was the cumulative number of new brain lesions (indication of MS) during the active treatment period (weeks 8, 16, and 24) as well as enlarging lesions. Treatment with the comprehensive stress-management intervention produced a significant reduction in expansion of cumulative lesions compared with the control condition during the treatment period and a significant reduction in new lesions (69.5% vs. 42.7%, $OR = 3.07$; 95% CI [1.38, 6.81]; $p = .006$). This study was one of the first to clearly establish an association between a behaviorally based, comprehensive stress-management intervention and relevant brain changes in an active immune-mediating disease with no known etiology at the present time.

However, there were *no* statistically significant differences between the treatment group and control group on any analyses during the posttreatment follow-up weeks (Mohr et al., 2012). Participants with this debilitating immune disease who practiced a set of structured stress-management techniques during the treatment period significantly minimized the development of new lesions in the brain as well as reduced the enlargement of existing lesions compared with controls, but once treatment was over these positive effects, as measured by MRI scanning, appeared to reverse course altogether.

The authors speculated that perhaps participants who implemented new stress-management coping skills during the study were unable to sustain these new coping behaviors once the support of the active treatment was terminated. Although this study was not powered to detect clinical outcomes, and its findings were not conclusive enough to make specific clinical recommendations about the use of this stress-management intervention to manage MS, it was well designed to demonstrate neuroplasticity in both directions. Despite some limitations, this was an elegant study that nicely illustrated the concept of use-it-or-lose-it with respect to this aspect of neuroplasticity (Kleim & Jones, 2008).

For coaches and consultants, the importance of this aspect of neuroplasticity (use it lose it) has important implications for goal initiation, goal pursuit, and successful behavior change in our clients. Using reminders to prompt mindfulness of stated goals, utilizing implementation intentions (i.e., with an "if-then" framework) to enhance goal pursuit (Nowack, 2017b), incorporating self-monitoring and reward systems to help achieve goals, and having goal "mentors" and support networks to ensure persistence to challenging goals are all examples of ways to enhance habit formation. Neuroscience research in the area of neuroplasticity has provided an empirical rationale for consultants to track and evaluate client and team changes over longer periods of time, explore mechanisms and strategies to minimize relapse, and help clients maintain new behaviors as long as possible.

Overview of the Special Issue

Despite the growing popularity and marketing appeal of neuro topics in consulting psychology and current mythconceptions that exist, research does support the basic claims that structural brain changes and psychophysiological manifestations of such changes are indeed linked to ongoing behaviors and affect. This special issue of *Consulting Psychology Journal* (CPJ) has gathered a collection of articles that present the current research and findings with practical implications for consultants working with individuals, teams, and organizations. The topics covered are relevant for today's practitioners and include insights, findings, and evidence-based strategies to address executive coaching, successful goal setting and striving, facilitating high-trust teams, and enhancing resilience. Finally, this special issue offers summary perspectives from an influential list of neuroscience thought leaders and contributors to the field of consulting psychology.

In a groundbreaking neuroscience-based empirical study of coaching, Richard E. Boyatzis and Anthony I. Jack (2018) provide evidence of a more effective approach to coaching clients that may transform future training and practice. They first introduce tenets from intentional-change theory, and then they review findings from an initial brain-imaging study that examined neural differences between two approaches to coaching: one called *coaching with compassion* (i.e., coaching to the positive emotional attractor); and the more typical approach to coaching, called *coaching for compliance* (i.e., coaching to the negative emotional attractor).

Their paper challenges conventional coaching approaches, suggesting that the primary focus should not be on understanding and listening to the problems. It is not useful in coaching to focus predominantly on negative concerns or grievances. They argue that using data-based feedback in coaching (e.g., debriefing 360-degree-feedback reports, reviewing graphs, or considering assessment-center data) results in activation of the task-positive brain network and leads to diminished motivation, self-reflection, and willingness to set behavior-change goals. Their review of a previously published, neuroscience-based coaching study using fMRI data supports a shift in coaching to focus on the client before presenting any feedback and to keep it going as long as possible before turning to a review of results and a solution-based orientation. Their article is one of the first that uses neuroscience to guide coaches and consultants to approaches and techniques that maximize insight, acceptance, and motivation for successfully changing behavior.

Elliot T. Berkman (2018) reviews the emerging brain science on goals and behavior change, with particular emphasis on its relevant to consulting psychology. He begins by articulating a framework that parses behavior change into two dimensions, one motivational and the other cognitive. He provides a useful model for practitioners to understand why new behavior is so difficult, and he breaks it down into two dimensions that give rise to behaviors and habits. The first includes the skills, capabilities, and knowledge required to engage in a new behavior and involves cognitive processes such as attentional focus, inhibitory control, and working-memory capacity (i.e., the "way"). The second is related to the motivation to engage in a new goal and behavior and the nature of the drive for achievement (i.e., "the will").

Berkman provides specific questions and tips/suggestions for consultants to help their clients facilitate behavior and sustain new goals over time based on current neuroscience research. He details the role of the task-positive or executive-functioning neural network and provides evidence to debunk the popular ego-depletion effect with implications for client coaching. Finally, he provides background on the role of motivation in goal pursuit and goal striving and offers "lesson learned" form neuroscience about the "will" that will help consultants facilitate successful behavior change. And he supplies a table that gives an overview of functional neuroanatomy involved in goal pursuit and goal achievement with a map to the major neuro-networks, primary regions of the brain that are involved, and major functions; this will be invaluable to CPJ readers.

Paul J. Zak (2018) describes how he spent a dozen years characterizing the neurologic basis for interpersonal trust and psychological safety as well as the constituent factors that can be used to create high trust within organizations. He details how his lab was one of the first in the world to discover the role of a brain chemical, oxytocin (OT), that produces the "I want to help" effect. By taking blood samples before and after various types of social interactions, his research demonstrated that when one is trusted, one's brain produces OT in proportion to the degree of trust shown. Further, the amount of OT released predicts the degree of reciprocation.

Oxytocin is a quickly produced brain signal, turning on when we are shown trust and shutting down during periods of high stress or extreme competition. His article helps practitioners understand the three distinct forms of empathy: (a) empathic distress, (b) empathic concern (compassion), and (c) perspective-taking (the process of inferring the mental state of others). The first two are associated with affective states, while the third is believed to be a primarily cognitive process. Empathic distress is characterized by reactive and aversive feelings (e.g., worry, anxiety, and discomfort) that are focused on the self. His research supports the finding that empathic concern, and not empathic distress or perspective taking, is associated with endogenous OT release.

Zak also outlines eight factors that are the building blocks of organizational trust and can be directly translated into both organizational practices and leadership behaviors based on our trust model. These factors are each described and the author includes examples of execution of these factors as brief case descriptions in order to show how to implement management interventions aimed to enhance trust within the organization.

Golnaz Tabibnia and Dan Radecki (2018) provide a broad review of the latest research concerning the neuroscience of resilience and discuss the implications for cultivating resilience in individuals. They start with an overview of the neuroscience of emotions and stress and how the brain regulates them. They then review behavioral lifestyle pathways to improving resilience, including physical activity/exercise and its relationship to BDNF; caloric restriction and its effects on physical health; and the importance of sleep in terms of immunocompetence, cognitive functioning, and distal health and well-being outcomes. They also discuss the importance of socially connecting, including the expression of gratitude, and its relationship to resilience.

Second, the authors discuss the efficacy of cognitive coping strategies such as verbal expression of emotion, affect labeling, and cognitive reappraisal. They also discuss cognitive-bias modification, cognitive therapy, and mindfulness meditation techniques (there are a variety of methods and they appear to have affect-specific neural pathways) that can all directly down-regulate distress. Finally, the authors note some approaches to coaching individuals to become more resilient, and they briefly summarize the neural basis of growth mind-sets, self-affirmation, and expectations to improve learning and coping skills.

Robert W. Eichinger (2018) presents a summary of the neuroscience behind resistance to change and a practitioner's perspective about the papers included in this special issue. He presents information on the knowing-versus-doing gap and describes examples from brain science about why behavioral change is so difficult, noting practical implications for practitioners who want to ensure clients develop new habits and routines to become both more effective and healthier.

He briefly discusses what we know so far that might be helpful for improving talent and leadership development in six areas: brain design, neuroplasticity, automaticity, working memory, motivated reasoning, and mindfulness. Finally, he discusses techniques to manage the "auto brain" to enhance personal, executive, team, and enterprise change. His wisdom and sage advice for consultants about the application of neuroscience for coaching, training, and consulting are both refreshing and useful.

Conclusion

What we know about the neuroscience of coaching and consulting will undoubtedly change and will be revised—it is the evolution of science as we know it. Each article in this special issue on the neuroscience of consulting will add to the existing literature and guide practitioners with new evidence-based approaches and techniques to enhance productivity, trust, behavior change, and resilience for employees at all levels within organizations. Despite some marketing "hype" and neuroscience based mythconceptions, the research behind these special issue articles undoubtedly will help coaches and consultants to more accurately peer beyond the current "rock and hard place" to discern fact from fiction and advance both research and practice in the future.

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