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FRIENDS OF NVT

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INTRODUCTION

Welcome to Issue 7, Volume 9 of our Friends of NeuroVisual Training Newsletter, where we explore the cutting-edge developments shaping the future of vision and cognition. This month, we review a recent study titled "Functional Clustering of Sentence Structure Responses: A Study of Cortical Substrates for Sentence Comprehension".

Also, don't miss our special 'How To' article for this issue: "Memory Overlay during NVT Training"! This highlights a key aspect of NVT – enhancing memory and neuroplasticity in athletes. It discusses the practice of incorporating a memory overlay into NVT sessions. Athletes are tasked with memorizing 10 words during their physical activities, promoting memory recall and reinforcing neuroplasticity through memory loops. This simple yet effective technique aims to improve athletes' cognitive and physical performance.

Thank you for your support! We look forward to creating more NVT centric content for you! We encourage you all to leave questions and/or comments below.

If you missed an issue, please visit https://inneuractive.com where all issues are available for free. Please tweet and share with your friends as we plan to release more great content.

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WHAT'S IN OUR LATEST ISSUE:

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Article Review: "Functional Clustering of Sentence Structure Responses: A Study of Cortical Substrates for Sentence”

Sentence comprehension is a complex cognitive task that has been a subject of extensive inquiry within the field of neuroscience. In a recent study, titled "Functional Clustering of Sentence Structure Responses: A Study of Cortical Substrates for Sentence Comprehension", Woolnough and his team employed an array of neuroscientific techniques, and aimed to investigate this process.

The methods used in this study were designed to provide insights into the neural dynamics underlying sentence comprehension. Patients with epilepsy played a central role in the research, with intracranial electrodes surgically implanted to monitor their brain activity (stereotactic EEGs and subdural grid electrodes). This approach provided a unique opportunity to capture neural responses directly from various brain regions during sentence comprehension tasks. The stimuli and experimental design created a controlled environment for investigating sentence processing. Participants were presented with different types of stimuli, including eight-word sentences, Jabberwocky sentences, word lists, and pseudoword lists. By including Jabberwocky sentences, which are grammatically correct but don't make sense, the researchers were able to separate the part of sentence understanding that deals with sentence structure from the part that deals with the meaning

To decipher neural activation patterns, Woolnough focused on high-frequency broadband gamma activity (BGA) in the brain. BGA served as a surrogate marker for neural activity and was quantified as a percentage change from baseline levels. This measure provided insights into the timing and magnitude of brain responses during word presentation. Linear Mixed Effects (LME) models played a pivotal role in dissecting the factors influencing BGA over time. These models included fixed effects such as word frequency, lexicality, word length, and word position, allowing researchers to account for various linguistic properties. Additionally, random effects were introduced to accommodate individual differences among patients.

A surface-based approach was employed to visualize and analyze brain responses comprehensively. The surface-based approach is significant because it provides a way to comprehensively study and understand brain responses during sentence comprehension. Instead of just looking at individual electrode activations, this allows researchers to map and analyze these activations on a standardized population brain surface. This involved mapping electrode activations onto a standardized population brain surface. This approach enabled researchers to examine responses at specific brain regions, revealing the spatial organization of sentence-related activity. One of the most intriguing aspects of the study was the identification of functional clusters within the brain. Researchers employed k-means clustering on the principal components of individual electrode structure responses. This technique allowed them to group electrodes with similar patterns of sentence structure-related responses, unveiling the brain's organization in sentence processing.

The study produced insights into the neural mechanisms behind sentence comprehension. Notable findings included the discovery of two distinct frontotemporal networks responsible for different aspects of sentence comprehension. One cluster exhibited a gradual increase in activation as sentences progressed, signifying the buildup of semantic information. This indicated that this network was primarily involved in the accumulation of meaning across a sentence. In contrast, the second cluster displayed sustained activity following each word in word lists, suggesting an influence of predictive mechanisms on word processing within the context of sentences. This finding indicated that this network was associated with the prediction and integration of individual word meanings into the evolving sentence structure.

In conclusion, the study's methods and compelling findings have deepened our understanding of how the human brain processes sentence structure and semantics. By using recordings of the brain responses and advanced statistical modeling, researchers have uncovered the intricate dynamics of frontotemporal networks engaged in sentence comprehension. This research not only advances our knowledge of language processing but also opens new avenues for exploring the neural substrates of higher cognitive functions. As we unlock more of the brain's secrets, we move one step closer to better understanding cognition.

References:

https://www.pnas.org/doi/10.1073/pnas.2300252120

Memory Overlay during NVT Training

In this newsletter we regularly talk about the 3 pillars of NeuroVisual Training (NVT). One of the pillars of NVT is a brain processing. Many of our NVT training activities have athletes performing exercises such as pitch and catch as a primary activity and we often encourage progressing primary activities with a secondary activity overlay. In this how to article we're going be talking about adding a memory overlay to the entire NVT session.

One way we do a memory overlay is at the beginning of a session we give our client or athlete or patient 10 words to memorize. The words that are given to the client can be in a theme or random. They can be a paper list or flashcards. The athlete is instructed to hang on to the cards and memorize them throughout the session. There's often downtime between activities sometimes even during activities where the athlete can pull out the cards and memorize them. The athlete can also have the instructor, the NVT coach, call out the words at various times during the training session. The goal is that this secondary activity or overlay activity is to assist the athlete in remembering things, remembering words, remembering events, while doing physical activity. Remembering the events during physical activity is often highly relevant to their craft. Such recall is often relevant because they may need to remember the events during play or competition to be better competitors. Thus, we are training them.

to remember things while doing things.

To remember 10 words during a 1-hour NVT session is analogous to remembering events during a game. We encourage the athlete to use whatever strategy or strategies they can to remember these 10 words.

They are strongly discouraged from trying to take time out from the NVT session to do the memorization. They need to develop their own strategies to go through the words either quickly or slowly and recall the words using their own memorization methods.

At the end of a training session the athlete is instructed to call out and list all 10 words that they've been memorizing. They often do not remember all 10, which is very common, but we will ask them and give them hints to recall the words. We don't want to make it too easy for the athlete we want them to be thinking of the words trying to recall the words and if we give them hints, they shouldn't be guessing. We strongly discourage guessing and want them to be relatively sure of the words that they're trying to recall.

The goal of the recall at the end is to get all 10 words, yes, but also to train the athlete to scan their memory and 'loop' memory tasks to aid in the recall. Again, discouraging guessing if they say a word and it sounds like they're not sure even if it's correct we ask them if they're sure how sure are they. If we give a hint and they call out a word, we want to ensure that they are relatively sure that the word they call out is part of the list.

This so-called looping of memory to recall specific memories is a very beneficial activity after a training session because it is thought that such loops reinforce neuroplasticity in the brain.

Regarding brain looping and neuroplasticity this comes in with the phrase "fire together wire together." When we practice trying to recall events or words especially when doing a physical activity to relate it to the athlete's craft these loops and firing together help the brain 'wire together' which is de facto neuroplasticity, helping generate and reinforce the neuroplasticity. This comes with concomitant benefits to the NVT training. Doing an activity or activities at or near the end of an NVT session that encourages neuroplasticity aids in the benefits of NVT.

As an NVT trainer or coach it's very easy to come up with a 10-word list, choosing 10 Flash Cards, or 10 words on a piece of paper to give it to the athlete with instructions for the memorization. This memory overlay is extremely simple and quite beneficial for pillar 3 of NVT training and helps progress the athlete in gaining benefits in recall and neuroplasticity from their NVT training.

Announcements

Check out this article regarding neuroplasticity, https://flip.it/EFTV6K. A simple dive into brain training and NVT.

Check out our store, http://www.inneuractive.com/shop ! We regularly add new products and are excited for the upcoming launch of our NVT warmup panels.

We encourage our Friends of NeuroVisual Training community to engage with these enriching resources. Your commitment to staying updated fuels the advancement of our field, and for that, we are sincerely appreciative.