THE MORE BRAIN PARTS ARE INVOLVED THE BETTER IS LEARNED AND PERFORMED

ÖĞRENME VE PERFORMANS, DEĞİŞİK BEYİN BÖLÜMLERİNİN KATİLİMI ORANDA ARTAR

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1. Introduction

Everybody is familiar to the fact that some learned materials are easily forgettable. Some others by some effort are recoverable. But some others instead are never forgotten.

It looks that the crucial point stands in the ability of connecting, tying, associating the learning materials through multiple receptors, to multiple brain structures.

In fact; there is no need of scientific reference to proof that swimming, driving, cycling, once learned are never forgotten. For any mature adult know perfectly this fact by his/her daily life. If they are not performed for some years, it’s true that they can fade out, but are never erased; these skills after some training effort can easily be recovered.

We do not forget the cultural milieu where we lived our babyhood, childhood and youth: The accents, smells, tastes, sounds, views, weaved and embedded in each other’s context, which in turn form what we call in general manner, ritual, tradition etc., once printed in mind, are never forgotten. Even after being away for years from our homeland, just by a single clue, we can be precipitated by our lovely memories in details.

Experts in any profession can more easily memorize novelties concerning the area of their expertise than laymen or novices. The cognitive load plays a substantial role in facilitating performance (Sweller 1988).

Mnemonics generally develop strategies to memorize, by giving meaningless items a meaningful context (Purves, D. at al. 2001). For this purpose, they use visual imagery (Lewinsohn, P. M., Danaher, B. G., & Kikel, S. 1977) make associations (Purves, D. at al. 2001) and exercise (Ericsson, K. A. 2003). In these ways they facilitate their

Abstract

In this article, has been discussed the characteristics that make knowledge unforgettable. The attention has been attracted to the role of the involvement of multiple brain layers, locations and connections, in learning and performing process. It is sustained that “learning and performing are systemic issues” and proposed that “a successful learning and performance is directly proportional to the sum of created appropriate personal ties – created personal functional connectomes - in the entirety of the central nervous system” and the “strength or weakness of a learned material is directly proportional to the quantity, quality and intensity of the ties made within the entire Central Nervous System Network”. In other terms; the more brain parts are involved the better is learned and performed. And, it has been outlined that “the same fact is the explanation of why in different subjects, the memory storages are relatively in different localities, and in vague concentrations.”

Keywords: Learning and performing, functional connectomes, attitudes-habits, dissonance, phobias, biases and prejudice.

Özet


Anahtar Kelimeler: Öğrenme ve performans, fonksiyonel konnektom, tutum-adet, dissonans, fobi, önyargılar

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learning and remembering.

The positive effects on learning and performance of motivation (Leeper, R. 1935; Pintrich, P. R. and Schunk, D. H. 2002), will power or self-regulatory strategies (Zusho, A. et al., 2003), attitudes (Gardner, R. C. 1985), interests (Krapp, A. 1999), contextualization, personalization, and choice (Cordova, D. I. and Lepper, M. R. 1996), are well documented facts.

During military services, trainings are done in groups interactively. Along with their verbal orders, they count loudly their steps and they act or perform or sing songs, marches etc. All these are, effective factors facilitating the learning and performance.

The underlying assumption of polygraphs is that, any question/word/phrase which we pose to the participant, if for him is of emotionally critical value, will evoke autonomic reactions (Bashore, T. R. and Rapp, P. E. 1993). It can be true that a lie cannot produce any "specific" psychophysiological reaction. It can be true that "especially trained" participants can cheat the polygraph. But those are facets that do not interest our argument. What interests instead, is, that there are findings by fMRIs, suggesting the involvement of frontal cortical regions during lying and that, "the neural substrates responsible for cognitive control of behavior may also be engaged during deception" (Phan, K.L. et al. 2005). Other studies also suggest that measures of the brain electrical activity, can be used to infer the possession of information in persons attempting to conceal it (Bashore, T. R. and Rapp, P. E. 1993). Thus, in any case we can conclude that critical information and their processes have multidirectional implications. Almost nothing is limited to specific locations only.

The purpose of the inpatient, substance abuse treatment-rehabilitation centers, which are generally in isolated locations, are primarily based on the principle of loosening and cutting the ties which are triggering the abusers' habits. Because it is well known that if the abuser, undergoes an outpatient treatment, as long as he/she conducts his/her daily life in his/her usual environment, will eventually be facing the risk of being attracted by some of those countless clues, leading him/her to his/her old habits. So their treatment is based on the acceptance that abusing is strongly associated to a myriad of stimuli and, at any time, any of them, can be able to recall the habit.

As in the above mentioned examples, there are many other cases which are confirming that learned materials are never isolated and independent, but strongly interwove.

Aside those examples, important information undoubtedly is that since 1920, thanks to the series of ingenious experimental researches conducted by Karl Spencer Lashley, we understood that in our brain, our specific memories do not reside in specific locations.

It is clear that visual memories are related to occipital or sensory memories to sensory cortex, but they are only loosely concentrated. We do not have in our brain, specific locations, confined with marked borders, to store specific memories or abilities, as phrenologists in the past thought. It looks that "the memory storage is deployed in many locations and recalled in a holistic way."

On the other hand, there are experiments done by neuroimaging techniques and/or EEG, trying to localize positive and negative emotions. Accordingly it is observed "relative left-hemispheric activation for positive emotions, and, relative right-hemispheric activation for negative emotions (Ahern, G. L. and Schwartz, G. E., 1985)". Similar researches have been done also under hypnosis, and have been found that stronger activity for anxiety, was located, more right then relaxation, and, relaxation located more left then anxiety (Isotani,T, 2001). On the other hand, even if we locate those sub-cortical emotional modulators, we are not able to exactly identify, how those emotional centers are associated in different individuals. For they are always differently associated; take the example of the phobic reaction evoked in one person by a dog, in another one, by a spider. Thus, it is obvious that although both are using a common emotional center, their functional connectomes are different.

Finally, whatever is the material we are learning and associating, in neurophysiological terms we are dealing with an electrical-chemical-electrical conductivity between our neurons. And neurophysiological conductivity works by well-known and defined principles.

2. Discussion

Therefore it looks that we have good reasons to think that;

Probably cycling, driving, swimming all need the involvement of most of the proprioceptive, interoceptive and exteroceptive receptors and their reciprocal interaction, either during learning or performance. All the extremities as well, (in short the entire body), even the "apparently unrelated" (like any sensation perceived during the activity) parts, are all participating-contributing to their learning and performance.

Probably living for a long time in homeland, especially during our developmental ages, gives us the possibility of tying almost any type of experiences, through our exteroceptive, proprioceptive and interoceptive receptors and their reciprocal interactions, to our surrounding cultural environment.

Probably expert professionals have had the possibility and time of associating and connecting almost every possible situation in which they live, to their job. In this way their professional activity, as is highly associated to their interoceptive, proprioceptive and exteroceptive experiences, they have acquired the ability of remembering and performing their profession at the presence of any of them. Thus, any new knowledge concerning their profession, can inevitably and easily find a connection and meaning, among the accumulated old ones. And the newly arrived knowledge also, quickly goes tied to the old repertoires. And, as a natural consequence, facilitates its acceptance. (A novice instead doesn't even know to which hook he/she can hang the completely new knowledge; and gets confused, hesitates and becomes unfruitful.)

Eventually mnemonics, while learning even totally
meaningless materials, by giving them meanings or, associating them to visual imageries, are tying the new material to previously well-known ones.

Motivation, will power, self-regulation, attitudes, contextualization, interest, personalization, vigilance are all, in close relation with our previously learned deeper materials and/or sub-cortical areas. Eventually the arousal of the deep-old materials, are actively contributing to the participation and intervention of tying and gluing the new ones, to the old ones.

Everything aside, “operant and classical conditioning themselves, are almost purely associative procedures.”

In military training, learning and performance, is enjoying all the facilitating effects of learning in groups. As already documented since years, in class one psychology undergrad lessons, learning in groups is a facilitating agent.

Independently from discussions on polygraphs, whether they can be used or not as a lie detector, nobody is refusing the fact that critical learning and performance have multiple ligaments between mesencephalon and cortical areas.

Attempting to treat substance abusers far from their daily life, is mainly to prevent the remembrance of the substance by the multitude of eventual clues, that neither the patient nor the therapist, are aware of.

It is beyond doubt that every researcher is accepting the complex multidirectional relation of the newly learned materials, with the previously learned ones. In fact “Different regions of the brain must communicate with each other to provide the basis for the integration of sensory information, sensory-motor coordination and many other functions that are critical for learning, memory, information processing, perception and the behavior of organisms” (Miltner, W. H. et al., 1999).

By combining the above discussed facts, with the findings of Lashley, it seems to be clear that even the simplest learning and performing behaviors, have associations with the entire Central Nervous System Network. Thus it seems to be obvious that learning and performing are absolutely a “systemic issue”. But these ties hypothetically, will be varying in “quality, quantity and intensity”, and, will be vaguely localized, because “in learning and performing, we are not dealing with neuroanatomical but with functional connectomes.”

The functional connectomes while in action, reveal themselves in form of electrical activities, they can perfectly be detected by EEG/qEEG or by more sophisticated neuroimaging techniques.

The problem stands simply in formulating the above assumption in an adequately measurable way.

3. Conclusion

As a natural consequence, “the above mentioned statements explain perfectly why the old habits are difficult to forget or change; because any habit or old belief or knowledge or phobia or bias or attitudes, are all deeply embedded and deployed into every aspect of our daily life, experience and repetitively strengthened by reinforcements, almost every instant. Thus, any attempt to make forget or change them, encounters a serious resistance, because discords and dissonates with the rest of the entire CNS Network”.

Therefore, it is time to deduct that probably “in learning and performing processes, the more brain parts the person involves, either through exteroceptors, proprioceptors and interceptors, the better the material is learned and performed.” In other words, “success in learning and performing is directly proportional to the quantity, quality and intensity of the ties made with the entire CNS Network “. And the strength or weakness of a learned material will reveal itself in form of functional connectomes detectable through qEEGs and/or newly developed neuroimaging techniques.

References


