

音樂對腦波及心率變異性的影響

The Influence of Music on Electroencephalogram (EEG) and Heart Rate Variability (HRV)

中文摘要

近年來越來越多的人在推廣音樂用於放鬆及焦慮舒緩的應用，很多相關的研究也證實了音樂的效果能夠在焦慮量表及一些生理數據上反映出來，但目前為止，很少的研究利用腦波（EEG）和心率變異性（HRV）來驗證音樂對人類腦部活動造成的影響。本研究利用 EEG 和 HRV 來測量受試者在聽音樂過程的腦波變化，並試圖釐清音樂、腦波和心率變異性之間的關係。並有以下幾點的發現：

發現沒有聽音樂的情境下(baseline)有最大的 alpha power，再來為聽舒緩音樂（soft），而聽搖滾樂時的 alpha power 最小。

而在 gamma band，我們發現不管聽何種音樂，其 gamma power 都比沒聽音樂大，這點和過去的研究結果是雷同的。音樂對 gamma band 的影響是相當顯著的，不管是舒緩音樂或搖滾樂都使的受試者的 gamma power 上昇。根據相關的研究，感官刺激及選擇性注意力都能使的個體 gamma power 上昇，本實驗也驗證這樣的說法。同時也有可能音樂造成受試者情緒上的改變而造成 gamma power 上昇。

我們也發現音樂喜好的因素會影響受試者的 alpha power 的強度。我們發現不喜歡搖滾樂受試者在聽搖滾樂時所呈現的 alpha power 會較可接受搖滾樂的受試者弱($z = -2.209, p < .05$)。

我們同時也發現 alpha 波與心率變異性的數值之間有相關（LF/HF、LFnu 為負相關；HF(nu)與 SDRR 為負相關）。這點證實了這兩項測量的結果是一致的。雖然腦波和心率變異性的測量都可以推論個體的情緒狀態，但是這兩項測量之間的相關性是鮮少研究的。在本研究中同時做腦波和心率變異性的測量，結果證實這兩種的測量工具結果是有高度相關，也為這兩種測量工具提出了間接性的效度證明。

英文摘要

The use of music for relaxing and relieving anxiety has become increasingly popular in recent years; a lot of relevant research has shown that music has both a mental and physiological effect which is quantifiable. However, some research makes use of EEG to verify the influence that music has on human brain activity. This research measures the brain wave and heart rate variability (HRV) change during the course of experiments in listening to music. Furthermore, I have attempted to distinguish the relation between the music、EEG and HRV. The following points have been discovered:

We find that has the biggest alpha power under the situation not listening to the music (baseline), and then listening to relieved the music (soft) is in order, after that alpha power is minimum while listening to the rock music.

In gamma band, we find no matter which kind of music is listened to, gamma powers are greater than not to listen to the music .This point and research of the past are duplicated . The influence on gamma band of the music is quite apparent. Whatever the experimenters listen to the music , their gamma band powers are rising. According to relevant research, stimulus to the perception and selective attention caused individual's gamma power to rise. My experiment also verifies such a statement. Moreover, the music probably makes the change on experimenter's mood to cause gamma power to rise.

We also find that there are greater alpha power on the people who like rock music than people who don't like when listening to rock music.

Finally, positive and negative correlations were found between alpha power and heart rate variability. It was concluded that the result of EEG and HRV are identically.