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• 中文摘要

近幾年中，越來越多研究在探討音樂在生理上之影響。腦波是過去被廣泛應用在測量腦部活動上之生理訊號。本研究中，我們嘗試運用頻譜分析和獨立元件分析法來分析受測者對不同類型音樂刺激下之腦波反應。本研究擷取三十二位受測者於接受不同音樂訊號刺激下之腦波，音樂訊號刺激分別爲重金屬樂(Metal)、鋼琴奏鳴曲(Sonata)、受測者自選音樂(Favorite)和無音樂狀態(No Music)。將腦波訊號依頻率不同濾波成 Alpha、Beta、Theta 與 Gamma 波，並計算各波中各導程之能量值，並依此值作爲特徵求出各導程間不同音樂刺激與不同受測者間之相關係數。 結果顯示，在 Metal 狀態下，有最小的 Alpha 能量。而在 No Music 狀態下，Gamma 能量呈現較小的情況。顯示聆聽音樂時會出現 Gamma 波，而聽 Metal 時會降低 Alpha 波。而在個體間之差異情形探討上，發現聆聽 Metal 時，不同個體間腦波特徵相似度高，而聆聽 Favorite 時，相似度最小。顯示聆聽 Metal 可引起較爲相似之腦波。此外本研究發現，前顱左半區域於三情境下(Metal、Sonata、Favorite)腦波相似度差異較大，代表此區對腦部音樂感知較爲敏感，也就是不同音樂類型會引起相似度較小之腦波。此外，本研究發覺個體間的腦波差異大於音樂所引起之腦波差異，故腦波研究上如何排除降低因個體不同所造成研究資料之差異，將可對研究目的降低變數達到更準確之分析。

• 英文摘要

In recent years, many researches have focused on the physiological effects of music. The electroencephalographic (EEG) is often used to verify the influences of music on human brain activity. In this study, we attempted to apply the spectral analysis and the independent component analysis (ICA) to analyze and to discover the EEG responses of subjects with different musical signal stimuli. It is expected that some features on EEG can be demonstrated to reflect the different musical signal stimuli. The EEGs of thirty-two healthy volunteers listening to different music was acquired. Musical signal stimuli are categorized into metal music, sonata music, no music and the favorite music selected by subjects. Spectral analysis wase applied to obtain the Alpha, Beta, Theta and

Gamma band power of EEG signal under different music stimuli. The power at each band of each channel was used as the features of EEG. The correlation of the features between different situations and subjects was used to show which channel displays the difference of EEG signals. The results show that minimum alpha power was recorded in listening to metal music and the power of gamma band is lower when listening to no music, which imply that gamma band appears during music listening process, and reduction of alpha band occurs when listening to metal music. Regarding the difference between each individual, we found that the similarity between individuals is high when listening to metal music, and it is low when listening to favorite music. Besides, the similarity between each individual is high in the channel at the left of anterior cranial is highly different. When listening to metal music, sonata music and favorite music, which implies that this section may be sensitive to musical signal stimuli. Besides, the study discovers that the difference between individual is greater than the difference between musical signal stimuli. So how to eliminate the difference of EEG data caused by the difference of individual is important to obtain the accurate analysis results. In the study of independent component analysis, we discovered that some independent components of EEG can display the difference of spectral power in listening different music. But not every subject showed this phenomenon.