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**Greder**

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- (54) **DETECTION AND FEEDBACK OF INFORMATION ASSOCIATED WITH EXECUTIVE FUNCTION**
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- (56) **References Cited**  
**U.S. PATENT DOCUMENTS**  
5,519,522 A \* 5/1996 Ferguson ..... B2K 9/32  
219/147  
5,731,766 A \* 3/1998 Akamatsu ..... G01C 21/36  
340/905  
(Continued)

**OTHER PUBLICATIONS**

“International Application Serial No. PCT/US2011/062109, Search Report mailed Mar. 8, 2012”, 2 pgs.  
(Continued)

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(57) **ABSTRACT**

An example includes a neurosensing and feedback device to detect mental states and alert the wearer, such as in real-time. In an example, neural activity is detected by sensors that measure frequency, amplitude, synchrony, sequence and site of brain activity. These measurements can be compared to neural signatures and patterns shown to be correlated to neuropsychological conditions and disorders. When these measurements indicate an undesirable state the wearer is alerted via visual, audible or tactile means designed to be highly effective at alerting the wearer and allowing them to adjust their brain activity. Executive function, known to be crucial for school readiness, academic achievement and successful life outcomes, is the chief state to be detected, trained and supported. The device is designed to be used during primary activities, e.g. reading and listening, and to not require third party intervention during primary use.

**19 Claims, 9 Drawing Sheets**

