The Direction-Control Application Based on Brainwave Recognition

洪家俊、高富建

E-mail: 381812@mail.dyu.edu.tw

ABSTRACT

This research discusses about direction recognition by characteristic frequency bands of brainwave. This experiences proceeded by catching brain wave signals of human vision while sensing the test interfaces of arrows representing direction by brain wave sensor. To compile the related samples of energies from brainwave frequency band, then establish the directions which stand for forward and backward of brainwave characteristics frequency band. The experiments catch and analyze brain wave signals from by brain-wave sensor, and then calculate the attention value of direction recognition to control the movement of direction. This research not only analyzed and discussed every kind of brain wave frequency band characteristics while subjects recognize the directions, but also proposed the formula to calculate the value of attention controlling the movement of direction in the view of Cognitive Neuroscience.

Keywords : Cognitive Neuroscience、Brainwave Characteristic Frequency Bands、Direction Recognition

Table of Contents

REFERENCES

[1]科學人雜誌 – 何謂腦波? http://sa.ylib.com/MagCont.aspx?Unit=easylearn&id=1820.

[2]Gazzaniga, M. S., Ivry, R. B. & Mangun, G. R. (2002). Cognitive Neuroscience: The biology of the mind (2nd ed.). New York: W.W.Norton.

[3]Gazzaniga, M. S., The Cognitive Neurosciences III, (2004), The MIT Press, ISBN 0-262-07254-8.

[4]Atkinson, R. C. & Shffirn, R. M., Human memory: A propowed system and its control processes, In K. W. Spence & J. T. Spence (Eds), Advances in the psychology of learning and motivation research and theory (Vol.2), New York: Academic Press, 1968.

[5]Gagne, R. M., The condition of learning (4th ed.), New York: Holt Rinehart & Winston, 1985.

[6] http://en.wikipedia.org/wiki/User:Neurogeek/Brain.

[7]Larry R. Squire & Eric R. Landel,“ Cognitive Neurosicence and the Study of Memory ”, Neuron, Vol. 20,445-468, 1998.

[8]Tortora, Gerard J., Grabowski, Sandra Reynolds, Human physiology; Human anatomy; Anatomy; Physiology, QP34.5 .T67 1996.

[9]Mark H. Johnson,“ Developmental Cognitive Neuroscience ”.

[10]Tomas, P., Alex, Z., Keith, W., Louis, C., & Evans, A.,“ Structural maturation of neural pathways in children and adolescents: in Vivo study ”, Science, 283, 1908-1911, 1999.

[11]Jensen, E. P.,“ Brain-based learning: The new paradigm of teaching ”, Thousand Oaks, CA: Corwin Press, 2008.

[12]J. G. Webster,“ Electroencephalography: Brain electrical activity ”, Encyclopedia of medical devices and instrumentation, Vol.2, pp. 1084-1107, 1988.

[13]胡慕美，“ Ganong 生理學 ”，合計圖書出版社，200-204頁， 民國80年。

[14]American Electroencephalographic Society. Guidelines for standard electrode position nomenclature. Journal of clinical neurophysiology, 8, 200-202, 1991.

[15]C. Guger,A. Schlogl, C. Neuper, D. Walterspacher, T. Strein, and G. Pfurtscheller,“ Rapid prototyping of an EEG-based brain-computer interface(BCI), ” IEEE Trans. Neural Syst. Rehab. Eng., vol9, pp. 49-58 Mar. 2001.

[16]J. Wolpaw, N. Birbaumer, D. McFarland, G. Pfurtscheller, T. Vaughan,“ Brain-computer interfaces for communication and control ” Clinical Neurophysiology, vol.113, pp.767-791, 2002.

[17]Eleanor A. Curran, Maria J. Stokes,“ Learning to control brain activity: A review of the production and control of EEG components for

driving brain-computer interface (BCI) systems ” Brain and Cognition, vol.51, pp. 326-336, 2003.
[18]Niels Birbaumer; Thilo Hinterberger; Andrea Kubler; Nicola Neumann, “ The Thought-Translation Device (TTD): Neurobehavioral Mechanisms and Cliniacl Outcome ” IEEE Trans. Neural Syst. Rehab. Eng., vol. 11, No. 2, pp.120-123,June, 2003.
[19]T. Hinterberger, A. Kubler, J. Kaiser, N. Neumann, N. Birbaumer, “ A brain-computer interface (BCI) for the lock-in: comparison of different EEG classifications for the thought translation device ” Clinical Neurophysiology, vol. 114, pp. 416-426, 2003.
[20]美國Wadsworth實驗室／Albany Medical College的研究團隊針對1993年id software的經典作品「毀滅戰士」的作品。
[21]王智弘，“ The Program Design of EEG Analysis for e.Learning ”，私立大葉大學碩士論文，中華民國100年1月。
[22]User guide and specifications NI USB-6008/6009.
[23]杜俊逸，“ The Brain Wave Study of Direction Recognition ”，私立大葉大學碩士論文，中華民國100年12月。
[24]王翔儒，“ The Design of Grid-based Learning System with LEI Analysis ”，私立大葉大學碩士論文，中華民國101年1月。
[25]Cooley J.，“ What is the fast Fourier transform? ”, Audio and Electroacoustics, IEEE Transactions on, 1967.
[26]N. Schaul, “ The Fundamental Neural Mechanisms of Electroencephalography ”, Electroencephalography and clinical. Neurophysiology, Vol. 106, pp. 101-107, 1998