

# 動態資訊呈現設計對 TFT-LCD 使用者閱讀績效及主觀偏好的影響

方家正、王安祥

E-mail: 9901388@mail.dyu.edu.tw

## 摘要

本研究旨在探討不同中文動態資訊的呈現設計對使用者在TFT-LCD螢幕上之閱讀理解度及主觀偏好的影響。本研究共包含三個實驗，實驗一探討配速、跳動距離、資訊欄位長度、極性以及字體大小對前導式動態資訊使用者閱讀理解度及主觀偏好的影響。該實驗之結果顯示，當前導式動態資訊的配速為較高的水準300wpm時，跳度距離1公分的理解績效會較1.5公分佳。且當訊息外框長度為最長的20公分時，受試者在配速200wpm的理解績效會顯著較250和300wpm好。而在主觀偏好方面，跳動距離1公分会較1.5公分好，且訊息外框長度20公分較10及15公分佳。此外，受試者對最大的字體大小(14pt)亦產生了最高的主觀偏好，其次為12pt，10pt則最差。而兩種極性(白底黑字以及黑底白字)則並未對理解績效和主觀偏好產生顯著的影響。實驗二探討配速、跳動距離、文字/背景色彩組合以及極性對前導式動態資訊使用者閱讀理解度及主觀偏好的影響。此實驗之結果指出前導式動態資訊之配速並未對受試者之理解績效和主觀偏好產生顯著的影響。而跳動距離則是以0.35以及0.7公分的水準會較1.05公分佳，且在主觀偏好方面亦以0.35公分最佳。而本實驗的理解績效隨色差增加而提升，但若考慮受試者的主觀偏好則應避免使用對比色彩-藍/紅，此外，在本實驗中，極性是以亮底暗字的呈現方式會有較佳的理解績效以及主觀偏好。而在文字/背景色彩組合方面，除了藍/紅的色彩組合之外，受試者的理解績效以及主觀偏好皆是隨色差增大而產生較佳的績效。實驗三則針對閃現式動態資訊之配速、字型、文字/背景色彩組合和極性對使用者閱讀理解度及主觀偏好的影響加以探討。此實驗指出配速雖然未對受試者的理解績效產生顯著的影響，但在主觀偏好方面則不然，受試者偏好中等之配速水準(200和250wpm)，而在字型方面，該因子同樣未對理解績效產生顯著的影響，但在主觀偏好方面則是以比劃最寬的粗黑體會有最高的評比。此外，極性和文字背景色彩組合對受試者之理解績效和主觀偏好產生顯著的影響。在極性方面，除了黑/白和色對藍/紅之外，其他色彩皆是以亮底暗字會有較佳的理解績效和主觀偏好。且本實驗的結果與實驗二相同，理解績效和主觀偏好皆隨色差增加而提高，但若考慮受試者的主觀偏好，則應避免較高色差的對比色彩-藍/紅。而本研究之結果將可作為網頁設計者規劃動態資訊的參考依據。

關鍵詞：動態資訊；前導式動態資訊；閃現式動態資訊；閱讀理解度；主觀偏好

## 目錄

封面內頁 簽名頁 博碩士論文電子檔案上網授權書.....	iii
中文摘要.....	v
Abstract.....	vii
誌謝.....	x
Contents.....	xi
List of Figures.....	vii
List of Tables.....	ix
Chapter 1. Introduction.....	1
Chapter 2. Experiment 1: Comprehension and preference on leading display (1).....	10
2.1 Method.....	10
2.1.1 Subjects.....	10
2.1.2 Apparatus.....	10
2.1.3 VDT workplace condition.....	11
2.1.4 Experimental design.....	11
2.1.5 Task and procedure.....	12
2.1.6 Data collection and analysis.....	15
2.2 Results.....	16
2.2.1 Comprehension.....	16
2.2.1.1 Effect of speed on comprehension.....	19
2.2.1.2 Effect of jump length on comprehension.....	19
2.2.1.3 Effect of line length on comprehension.....	19
2.2.1.4 Effect of polarity on comprehension.....	20
2.2.1.5 Effect of character size on comprehension.....	20
2.2.1.6 Effect of all factor interactions on comprehension.....	20
2.2.2 Subjective preference.....	22
2.2.2.1 Effect of speed on subjective preference.....	25
2.2.2.2 Effect of jump length on subjective preference.....	25
2.2.2.3 Effect of line length on subjective preference.....	25
2.2.2.4 Effect of polarity on subjective preference.....	26
2.2.2.5 Effect of character size on subjective preference.....	26
2.2.2.6 Effect of all factor interactions on subjects' preference evaluating.....	27
2.3 Discussion.....	27
Chapter 3. Experiment 2: Comprehension and preference on leading display (2).....	33
3.1 Method.....	33
3.1.1 Subjects.....	33
3.1.2 Apparatus.....	33
3.1.3 VDT workplace condition.....	34
3.1.4 Experimental design.....	34
3.1.5 Task and procedure.....	36
3.1.6 Data collection and analysis.....	40
3.2 Results.....	41
3.2.1 Comprehension.....	41
3.2.1.1 Effect of speed on comprehension.....	43
3.2.1.2 Effect of jump length on comprehension.....	44
3.2.1.3 Effect of color combination on comprehension.....	44
3.2.1.4 Effect of polarity on comprehension.....	45
3.2.1.5 Effect of all factor interactions on comprehension.....	45
3.2.2 Subjective preference.....	45
3.2.2.1 Effect of speed on subjective	

preference.....	47	3.2.2.2 Effect of jump length on subjective preference.....	47	3.2.2.3 Effect of text/background color combination on subjective preference.....	48	3.2.2.4 Effect of polarity on subjective preference.....	49	3.2.2.5 Effect of all factor interactions on subjective preference.....	49	3.3 Discussion.....	50	Chapter 4.	
Experiment 3: Comprehension and preference on flashing display.....	56	4.1											
Method.....	56	4.1.1 Subjects.....	56	4.1.2 Apparatus.....	56	4.1.3 VDT workplace condition.....	57	4.1.4 Experimental design.....	57	4.1.5 Task and procedure.....	59	4.1.6 Data collection and analysis.....	62
Results.....	63	4.2.1 Comprehension.....	64	4.2.1.1 Effect of speed on comprehension.....	65	4.2.1.2 Effect of typographic on comprehension.....	65	4.2.1.3 Effect of text/background color combination on comprehension.....	66	4.2.1.4 Effect of polarity on comprehension.....	66	4.2.1.5 Effect of all factor interactions on comprehension.....	67
Discussion.....	72	4.2.2 Subjective preference .....	67	4.2.2.1 Effect of speed on subjective preference.....	69	4.2.2.2 Effect of typographic on subjective preference.....	70	4.2.2.3 Effect of text/background color combination on subjective preference.....	70	4.2.2.4 Effect of polarity on subjective preference.....	71	4.2.2.5 Effect of all factor interactions on subjective preference.....	71
References.....	79	Chapter 5. Conclusion.....	77										

## 參考文獻

- [1]Chen, H.C., Chan, K.T., Tsoi, K.C. and Chan, K.T., 1988. Reading self-paced moving text on a computer display. *Human Factors*, 30(3), 285-291.
- [2]Chen, H.C., and Tsoi, K.C., 1988. Factors affecting the readability of moving text on a computer display. *Human Factors*, 30(1), 25-33.
- [3]Cushman, W. H., 1986. Reading from microfiche, a VDT, and the printed page: subjective fatigue and performance. *Human Factors*, 28, 63-73.
- [4]Granaas, M. M., McKay, T. D., Laham, R. D., Hurt L. D. and Juola, J. F., 1984. Reading moving text on a CRT screen. *Human Factors*, 26, 97-104.
- [5]Juola, J.F., 1995. Reading text presented on a small display. *Applied Ergonomics*, 26, 227-229.
- [6]Lippert, Thomas M., 1986. Color-difference prediction of legibility performance for CRT raster imagery. *SID Digest of Technical Papers*, XVI, 86-89.
- [7]Saito, S., Taptagaporn, S., and Salvendy, G., 1993. Visual comfort in using different VDT screens. *International Journal of Human-Computer Interaction*, 5(4), 313-323.
- [8]Sanders, Mark S. and McCormick Ernest J. (1993). *Human Factors in Engineering and Design*. McGraw-Hill, Singapore.
- [9]Shieh, K. K. and Chen, M. T., 1997. Effects of screen color combination, work-break schedule, and workspace on VDT viewing distance. *International Journal of Industrial Ergonomics*, 20, 11-18.
- [10]Shieh, K. K. and Lin, C. C., 2000. Effects of screen type, ambient illumination, and color combination on VDT visual performance and subjective performance. *International Journal of Industrial Ergonomics*, 26, 527-536.
- [11]Snyder, H. L., Image quality, In: M. Helander (Ed.), 1988. *Handbook of human-computer interaction*. Elsevier science publishers, Amsterdam.
- [12]Wang, A. H. and M. T. Chen, 2000. " Effects of Polarity and Luminance Contrast on Visual Performance and VDT Display Quality " , *International Journal of Industrial Ergonomics*, 25(4), 415-421.
- [13]Wang A. H., Chen, C. H., and Chen, M. T., 2002. Effect of leading display design of dynamic information on users ' visual performance and visual fatigue. *Journal of the Chinese Institute of Industrial Engineering*, 19(2), 69-78.
- [14]Wang A. H. and Chen, C. H., 2002. Effects of screen type, Chinese typography, text/background color combination, speed, and jump length for VDT leading display on users' reading performance. Submitted to the *International Journal of Industrial Ergonomics*, 1st revision.
- [15]Wang, T. C. and Hou, T. H., 1996. A Study of Effects of Chinese Fonts of Type and Character Size on Reading and Searching Performance. *Journal of Kaohsiung Polytechnic Institute*, 3, 1-15.