行政院國家科學委員會專題研究計畫 成果報告

選擇性注意力研究取向：人如何處理多資訊成分的訊息
研究成果報告(精簡版)

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報 告 附 件 ：出席國際會議研究心得報告及發表論文

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Processing complex information on the Web: The perceptual load approach

A key issue in the study of the Web as an information medium is the psychological mechanism explaining how different information components on a web page obtain the user's attention. Of particular interest is how the human visual system selectively processes target information (such as content) and distractor information (such as banner advertisements) contained on a typical web page with or without specific goals in mind. For instance, when searching for information related to the "Grammy Awards" through the Yahoo or Google search engines, users are bombarded not only with search results (target information) but also with a variety of online advertisements and hyperlinks (distractor information). In this common scenario, a question arises as to what extent distractors can be processed when simultaneously competing with target information and suppressed by specific goals. This question draws both academic and commercial concern, but empirical research on how Internet users process multiple information components has been surprisingly scarce.

Literature review

Recent advances in visual selective attention reveal that the degree to which irrelevant distractors are processed depends on the interaction between the *perceptual load* imposed by relevant stimuli and the *cognitive control load* exercised by the individual (de Fockert, Rees, Frith, & Lavie, 2001; Lavie, 1995, 2001, 2005; Lavie, Hirst, de Fockert, & Viding, 2004; Lavie & Tsal, 1994).

Perceptual load

Lavie and Tsal (1994) argue that attentional demand on human perceptions determines distractor processing and the capacity limit of human perceptions influences where selective attention occurs, which in turn results in rejection or intrusion of irrelevant distractors. In situations of high perceptual load, early selection (selective perception) occurs (Broadbent, 1958) and irrelevant distractors are not fully perceived because relevant stimuli exhaust perceptual capacity. Distractor processing is excluded after physical features are analyzed. In situations of low perceptual load, late selection (selective response) occurs (Deutsch & Deutsch, 1963; Duncan, 1980) and irrelevant distractors are perceived because spare perceptual capacity spreads out into the processing of irrelevant distractors. Therefore,

H1: When reading online news story, increases in information complexity will result in high perceptual load, which in turn reduces the possibility of processing irrelevant ads.

Cognitive control load

de Fockert et al. (2001) propose that the availability of working memory affects attentional control, because working memory mediated by the frontal cortex (Cohen et al., 1997, April 10; Courtney, Ungerleider, Keil, & Haxby, 1997, April 10; Smith & Jonides, 1997) is responsible for short-term storage and executive processes (Smith & Jonides, 1999), such as stimulus prioritization during visual search (de Fockert et al., 2001; Kane & Engle, 2003). Insufficient working memory capacity fails to prioritize different stimuli and thus leads to

increased distractor processing. As a result, under conditions of low perceptual load, high working memory capacity shows less distractor interference than does low working memory capacity. Under conditions of high perceptual load, irrelevant distractors are prevented from early perceptual processing and working memory capacity has no impact on distractor interference. Hence, when reading online news story,

H2a: If information complexity is low, increases in the number of in-text hyperlinks will lead to high cognitive control load, which in turn augments the possibility of processing irrelevant ads.

H2b: If information complexity is high, the number of in-text hyperlinks will not influence the possibility of processing irrelevant ads.

Methods

Design. The design of the experiment was a 2 (Information Complexity) x 2 (Cognitive Control Load) × 10 (Trial) within-subjects factorial design. The first factor, Information Complexity, was defined in terms of the length of online news story. The second factor, Cognitive Control Load is manipulated by varying the number of in-text hyperlinks in online news story. The third factor, Trial, was a repetition factor and represented the ten trials in each category.

Stimulus material. The stimuli for this experiment were 40 different 800 × 600 online news stories, which were created using Yahoo!.

Dependent variables. The processing of irrelevant ads is measured by eye movements, especially the number of fixation and fixation duration per area of interest. Eye movement data were recorded using the Eyegaze Analysis System (Fairfax, Virginia).

Participants. A total of 40 undergraduate students enrolled in communications courses at National Chiao Tung University, Taiwan participated in the study and received extra credit for their participation.

Procedure. There were 60 experimental trials. The order of 60 experimental trials was randomized. Each trial contained the following sequence. Participants were instructed to read each online news story, maintain relevant in-text hyperlinks in memory for later recall, and click the "Continue" button at the right bottom of the page after they finish reading online news stories. Participants was instructed to ignore irrelevant ads on the right side of webpages.

Results

The preliminary findings reveal that participants do not process irrelevant ads when information complexity is high. Hypothesis 1 is supported. That is, increases in information complexity exhaust perceptual load and the processing of irrelevant ads if inhibited.

For hypothesis 2, the results are mixed. It shows the expected tendency but is not statistically significant.

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Figure 1. Prediction of Hypothesis 1

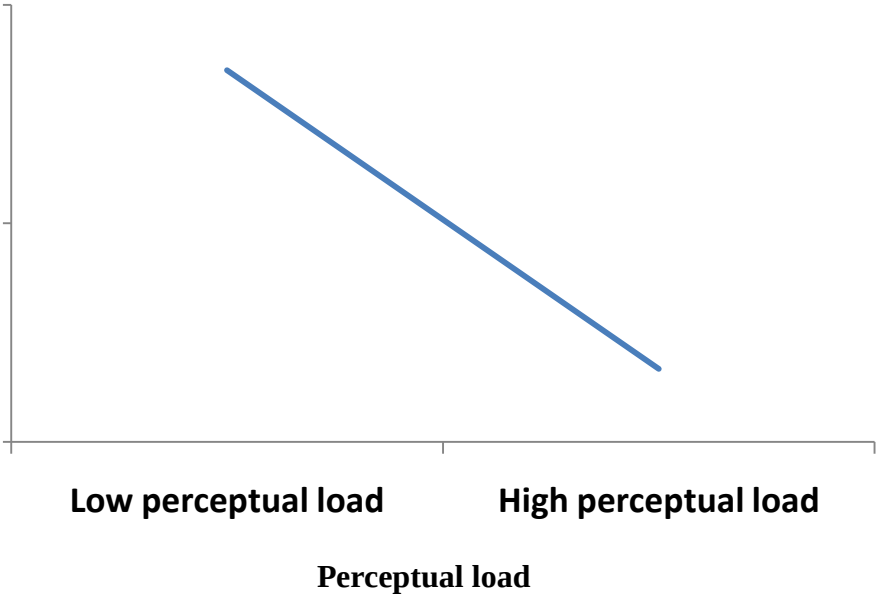
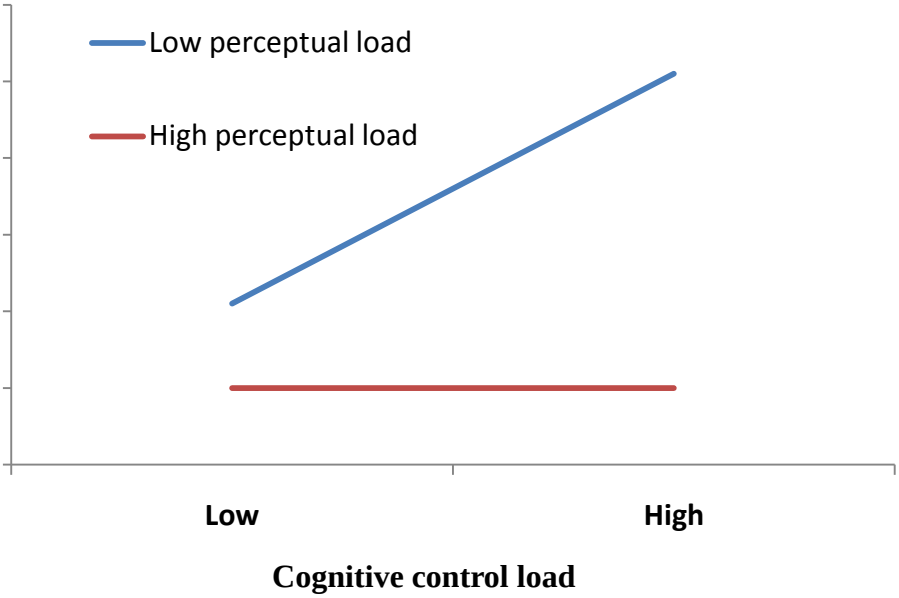


Figure 2. Prediction of Hypothesis 2



出席國際學術會議心得報告

計畫編號	97-2628-H-009-001-
計畫名稱	選擇性注意力研究取向：人如何處理多資訊成分的訊息
出國人員姓名 服務機關及職稱	國立交通大學傳播與科技學系助理教授陶振超
會議時間地點	民國 98 年 5 月 21-25 日於美國芝加哥
會議名稱	ICA 年會
發表論文題目	Processing complex information on the Web: The perceptual load approach

一、目的

此行之目的是參加 International Communication Association（ICA）於美國芝加哥舉辦的第五十九屆年會，並發表路論文。在傳播研究的領域，ICA 年會是最頂尖、最具國際性的研討會。

二、參加會議經過

本次 ICA 的主題是「傳播領域的關鍵字」（Keywords in Communication），也就是傳播領域過去現在未來皆可能持續關心的核心概念。我個人所參加的場次，是針對「資訊處理」這項跨領域、恆久吸引學者焦點的人類重要功能，採取新研究方法與工具的論文。如我採用眼動(eye tracking)，有我母校 Indian University 的師生採用功能性核磁共振造影（fMRI）、生理儀器，也有歐洲來的師生採用反應時間。採用新的研究工具，對與檢驗理論架構與模式，帶來哪些突破，及實驗設計與執行上需注意的事項，簡報完後皆有熱烈的討論。

三、與會心得

我的指導老師 Annie Lang 博士於今年年會中獲頒 2009 Steven H. Chaffee Career Productivity Award，以表彰她在認知取徑傳播研究將近 20 年的持續努力，不僅為傳播領域開拓了一個新的理論與方法，更針對傳播過程與效果這項古老的議題，提供了全新不同的視野。舉例來說，她所提出的「有限容量模式」（limited capacity model），對於長久困擾傳播領域，媒體是否有直接效果存在的議題，她的理論與實驗具體證實直接效果的存在。更進一步，她也結合生理心理學與認知心理學，將傳播研究朝向科學的方向發展。由於 Steven H. Chaffee 是 Annie 很敬重的一位老師，她對獲獎相當高興。

另外，今年年會的主題，不僅針對研究的發展，同時也回應傳播領域到底應該教什麼、是專業領域還是科學領域、與社會關連等目前在傳播學者間常常討論的重要議題。我個人認為從「關鍵字」、即核心概念的方向討論，很值得國內學者借鏡。ICA 今年也公佈了過

去十年，世界各國出席 ICA 年會的統計。台灣在過去十年平均每年有 8 位出席發表論文，值得鼓勵更多師生參與。