

## INFORMATION DISPLAY

### TECHNICAL FIELD

[0001] The present invention relates generally to an information display and more specifically to multi focal plane information displays and a method of enhancing information extraction from same.

### BACKGROUND ART

[0002] Any potential improvements in the input speed, comprehension and/or retention of information gained via reading would be clearly beneficial to a wide spectrum of users in many diverse applications.

[0003] It is believed that use may be made of the readers subconscious to enhance the recognised conscious reading mechanisms typically employed during the reading of books, computer screens, visual displays and so forth. Current means of increasing the quantity of information available to the reader have largely involved decreasing the font size to provide a greater quantity of text surface area. However, this technique fails to overcome the inherent limitations of the human eye, i.e. reducing the text font size below a certain level causes a significant reduction in readability.

[0004] Menus, layering, pop-up windows and so forth have been used single focal plane prior art displays as alternative means of enhancing the quantity of information available to the reader without making the display overly cluttered.

[0005] Although the use of menus and similar hierarchical display methods do enable the user to access the required information without the need for large display surfaces or undue display clutter, they reduce the viewer's situational awareness. Moreover, they require positive interaction by the user, which is not always practical or desirable and are unavoidably slower to use than continuously displayed information.

[0006] Multi-layer or multi-focal plane displays have been utilised to address the above difficulties whereby two or more display screens at least partially overlap, displaying information in two or more distinct focal planes. The viewer may thus focus on the individual screens to view the information displayed thereon without accessing a menu or needing to make significant head/eye movements to scan large display surfaces.

[0007] Research such as the *Transparent Layered User Interfaces: An Evaluation of a Display Design to Enhance Focused and Divided Attention*, Harrison et al, *CHI 95 Conference* (1995) examined the link of transparent displays on focused and/or divided attention.

[0008] Examples of focused attention include a computer software dialog box or warning message interrupting a user concentrating on a document, or part of a display screen being temporarily obscured by a drop-down menu.

[0009] Divided attention examples provided by Harrison et al include using a video display showing a colleague during collaborative work, where the participant's attention is shared between the colleague and the work in progress, e.g., a drawing or document.

[0010] Harrison et al considered cases of individuals needing to time-share two information items or 'tasks' (divided attention), and cases where individuals selectively attend to one task excluding the other (focused attention). However, no specific exploration is made of the potential benefit of the unfocused information item on an individual focusing on another information item/task.

[0011] Various means of simultaneously displaying and analysing large literary text is disclosed at the TextArc™ website <http://textarc.org> (15 Apr. 2002). The display techniques employed are highly unusual and innovative. In one embodiment, the entire text of a novel for example, is arranged in concentric spirals. Each successive line of the novel is written in miniature around the outside of the spiral, with frequently occurring words also being displayed in a larger font within the spiral arc. The frequency of occurrence within the document is denoted by the word's intensity or luminance, while its location is determined by the mean geometrical position between occurrences about the outer spiral. Additional displays of the text in a conventional form may be overlaid on the spiral arc representation, enhancing the pre-attentive possibilities for the viewer. As the viewer scrolls through the conventional text, the high frequency words are illuminated within the spiral, together with radial lines extending to each point in the spiral containing the word.

[0012] A viewer may thus see a measure of a word's significance, its interconnection to other words and its effective location within a document. The viewer is thus presented with exposure to the bottom up structure of the entire document and to a variety of interrelationships between the contents.

[0013] However, the combined/overlapping display obscures a portion of the text spiral arrangement. Furthermore, the sheer wealth of visual input in one focal plane may be distracting and hinder preattentive intake by the viewer.

[0014] Further prior art work by Ishii H et al, "Iterative Design of Seamless Collaboration Media", *Communications of the ACM (CACM)*, ACM, Vol 37, No. 8, August 1994, and the work described at the web sites <http://web.media.mit.edu/~ishii/TWS.html>, and <http://web.media.mit.edu/~ishii/CB.html> by the same authors discusses combination computer display/whiteboard-type transparent displays. The issue addressed by Ishii et al is creating a usable work space environment combining the benefits of a computer screen interface, a physical desktop and a dual sided transparent glass-board. The resultant system provides a display surface on which the images of collaborative workers appear to face the user whilst any text/drawing written by any of the collaborators/users automatically appears with the correct orientation on the combined display. This overcomes the problem of inversion caused by collaborating users writing on opposing sides of a common transparent panel. The meaning of facial gestures and body language nuances of the collaborators regarding particular items in the workspace screen may be easily discerned. However, again the display surface is essentially a single focal plane and thus does not take full advantage of the preattentive depth-related capabilities of the user, as described below.

[0015] The benefits of multi-layered viewing screens, in particular those utilising the technology described in the co-pending Patent Application Nos. NZ314566, NZ328074,