[0014] This research was further reinforced by Melton and Scharff [1998] in a series of experiments in which a search task consisting of locating an intermediate-sized target amongst large and small distractors tested the serial nature of the search whereby the target was embedded in the same plane as the distractors and the preattentive nature of the search whereby the target was placed in a separate depth plane to the distractors.

[0015] The relative influence of the total number of distractors present (regardless of their depth) verses the number of distractors present solely in the depth plane of the target was also investigated. The results showed a number of interesting features including the significant modification of the response time resulting from the target presence or absence. In the target absence trials, the reaction times of all the subjects displayed a direct correspondence to the number of distractors whilst the target present trials did not display any such dependency. Furthermore, it was found that the reaction times in instances where distractors were spread across multiple depths were faster than for distractors located in a single depth plane.

[0016] Consequently, the use of a plurality of depth/focal planes as a means of displaying information can enhance preattentive processing with enhanced reaction/assimilation times.

[0017] Known three-dimensional displays seek to provide binocular depth cues to the viewer via a variety of techniques including separate head-mounted displays located directly in front of each eye, lenticular displays and holography. Unfortunately, each of these possesses certain limitations. Head-mounted displays add ergonomic inconvenience, reduce the viewer's peripheral awareness and are often cumbersome and can cause nausea, headaches and/or disorientation. Lenticular displays are only really effective at oblique viewing angles and holography is currently limited to displaying static images.

[0018] A further implementation of a three-dimensional display is referred to herein as a 'combination display' is configured with two displays of known type located at differing distances from a half-silvered mirror. The orientation of the displays is such that one display is visible along a ray axis passing directly through the half-silvered mirror, whilst the other display is visible along a ray axis reflected from the mirror's surface.

[0019] A composite image may be formed therefore from the respective images shown on both displays. The differing distances of the displays from the half-silvered mirror leads to the perception that the images are located at different depths within the composite image scene viewed. Such systems are unavoidably bulky and cumbersome in comparison to conventional single screen displays in order to house the two separate displays without any physical overlap.

[0020] Furthermore, the luminance of the image transmitted to the viewer is attenuated by the intrinsic transmissive qualities of the half silvered mirror, requiring the use of a more intense back-light (or similar illumination means) in each display.

[0021] Additional difficulties arise from the generation of a parallax error proportional to the distance between the image planes, which is exacerbated by increasing the display separation to increase the 'depth' of the scene perceived by the viewer. Conversely, if the displays are brought into close proximity, moire interference effects mar the resultant image.

[0022] Displays such as those described above create a three dimensional effect by displaying images on a number of optically overlapping, essentially planar image or boundary planes. Whilst this offers an enhancement to the depth cues afforded by a conventional display, it would be desirable to display an image at any desired depth within the display, rather than being restricted to the physical display image planes.

[0023] This problem has been partially addressed by applying a technique commonly referred to as 'depth fusion' to the above described 'combination display' i.e., a configuration of two separate displays and half-silvered mirror. Depth fusion involves displaying two identical images on separate overlapping image planes such that the alignment and magnification of the two-layer image are perceived as coterminous when viewed along the viewer's fixation axis, i.e., a line from the viewed image extending equidistantly to the fovea of each retina to the mid-point between the viewer's eyes. In a combination display, the overlapping coterminous images are discerned through the half-silvered mirror.

[0024] Contrary to an intuitive analysis, it has been found that varying the relative luminance distributions between the two overlapped images causes the perceived location of the resultant image to be at a point between the two image planes.

[0025] Whilst this clearly provides a beneficial effect, the above-described shortcomings of combination displays using a half-silvered mirror, i.e., parallax distortion, excessive bulk and luminance attenuation are still present.

[0026] Consequently, there is a need to provide the ability to display images at a variable depth without the physical constraints imposed by the above described prior art.

[0027] All references, including any patents or patent applications, cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. The discussion of the reference states what their authors assert, and the applicants reserve the right to challenge the accuracy and pertinency of the cited documents. It will be clearly understood that, although a number of prior art publications are referred to herein, this reference does not constitute an admission that any of these documents forms parts of the common general knowledge in the art in any country.

[0028] It is an object of the present invention to address the foregoing problems.

[0029] Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.