

examples of appropriately sized material for children with varying levels of VA is valued.

Conclusions: The availability of free downloadable examples of appropriately sized images provides a useful tool for those working with the visually impaired, particularly where communication is problematic.

Visual short-term memory for unfamiliar visual stimuli

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Purpose: Visual short-term memory (VSTM) for briefly presented visual stimuli has been estimated at 4–6 items for real-world objects (Luck and Vogel, 1997). To measure the fundamental capacity of VSTM the use of real-world objects is undesirable, since estimates are confounded by verbal descriptors and/or long-term memory support (Olsson and Poom, 2005). The purpose of this study is to measure the accuracy and capacity of VSTM for unfamiliar, non-categorical visual stimuli.

Method: Stimuli were random grayscale noise patterns subtending 2° × 2, displayed at a distance of 57 cm. A series of reference stimuli were presented sequentially at the centre of a computer display for 500 ms each. Following this, a blank interval of 500 ms, and then a test stimulus were displayed. Signal present test stimuli originated from a random index in the study series. The probability of a signal present trial was 50%. Observers were instructed to indicate, via a numeric keypad, if the test stimulus was present in the study series (yes/no). Series length was increased from 1 to 5 across blocks of trials. The number of blocks completed for each series length, *S*, was 2*S*, where each block comprised 100 trials (i.e. 3000 trials per observer were completed). Four normal/corrected-to-normal observers participated in the study. The number of objects encoded in VSTM was calculated using Cowan's formula (Cowan, 2001).

Results: Across series lengths 1–5, average performance rate (pooled across observers) decreased exponentially from 95% for series length 1, to 60% for series length 5. The number of stimuli encoded in VSTM, determined using Cowan's formula, was found to be 1.52, achieved for series length 3. Beyond series length 3, the number of items encoded was found to decrease, at 0.92, 1.30, 1.52, 1.35 and 1.40 for series lengths 1–5, respectively. For series lengths > 1, large recency effects were found by analysis of the reference indices of correctly identified signal present test stimuli.

Conclusions: We find that the capacity of VSTM for serially presented non-categorical visual stimuli is limited to 1.5 items, in line with VSTM capacity estimates of Olsson and Poom (2005), rather than the more commonly cited 4–6 items (Cowan, 2001; Luck and Vogel, 1997), and is seen to decrease exponentially with increases in series length or decreases in recency. A suite of related experiments are underway to construct a memory performance model under varying stimulus presentation scenarios, including parallel display and variable location.

References

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Focusing Children in Focus Groups

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Purpose: Focus groups are one of the widely used qualitative research methods. It is defined as a carefully planned discussion with a small group of people designed to obtain perception on a defined area of research interests in a permissive and non-threatening environment. This technique is widely used in social sciences and marketing with adult participants but rarely used with children. We tried to assess how effective this technique could be to find out the daily living activities of children with and without low vision.

Methods: A well-structured script and a question route having questions on daily living activities were developed in best possible child friendly language. The children were approached through teachers. The children of a given age group were given information sheets and consent forms a week prior to focus groups. The teachers were asked to select 4–8 children randomly among those children who had parental consents. The focus groups were conducted in a quiet room by two moderators. The group discussions were audio recorded and the non verbal responses during the discussion of the children were noted down.

Results: There were 81 participants (boys 57% and girls 43%) from seven schools, a centre for the visually-impaired, and a leisure centre in Wales. The age range was between 5 to 17 years with mean age of 11 years. In total 13 focus groups were conducted, seven with visually impaired children and six with normally sighted children. The focus groups resulted in 15 h of recorded discussions demonstrating how readily the children talked. All the children actively participated and readily responded to all structured questions and openly discussed issues. In the groups with a wider age range, the older children tended to dominate. There was no difference between mixed gender and single gender groups in discussion. Younger children tired and lost interest after half-an-hour whereas older children were still participating up to 1 h. There was no obvious difference in quality of discussion between children with and without visual impairment. The children were found to be more comfortable to talk with friends than with strangers.

Conclusion: A careful selection of the structured questions and a skilled moderator could make focus groups with children a very effective tool of qualitative data collection.

Accommodation-presbyopia: mechanism etiology

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The purpose of the presentation is to elucidate the mechanism of accommodation and etiology of the age-related decline in accommodative amplitude that results in presbyopia in the fifth decade of life. Multiple physical, mathematical, clinical, *in vitro*, and *in vivo* experiments demonstrate that the human crystalline lens develops an unusual shape during accommodation. Central lens thickness increases; the curvatures of the central surfaces of the lens steepen; while the peripheral surfaces of the lens flatten. This 'steep profile' also occurs in other biconvex objects that have an aspect ratio ≤ 0.6 (minor axis to major axis ratio) in response to a small equatorial displacement when the volume of the object only minimally changes. The 'steep profile' even occurs when the major axis of an ellipse with an aspect ratio ≤ 0.6 is increased and the area enclosed by the ellipse is held constant or permitted to decrease by 2%. The universality of the occurrence of a 'steep profile' implies that the lens is under increased tension during accommodation. This hypothesis was confirmed by using high-resolution anterior segment optical coherence tomography (OCT) to measure the change of stress on the anterior lens capsule in patients who had undergone a phakic refractive intraocular lens (PRL)