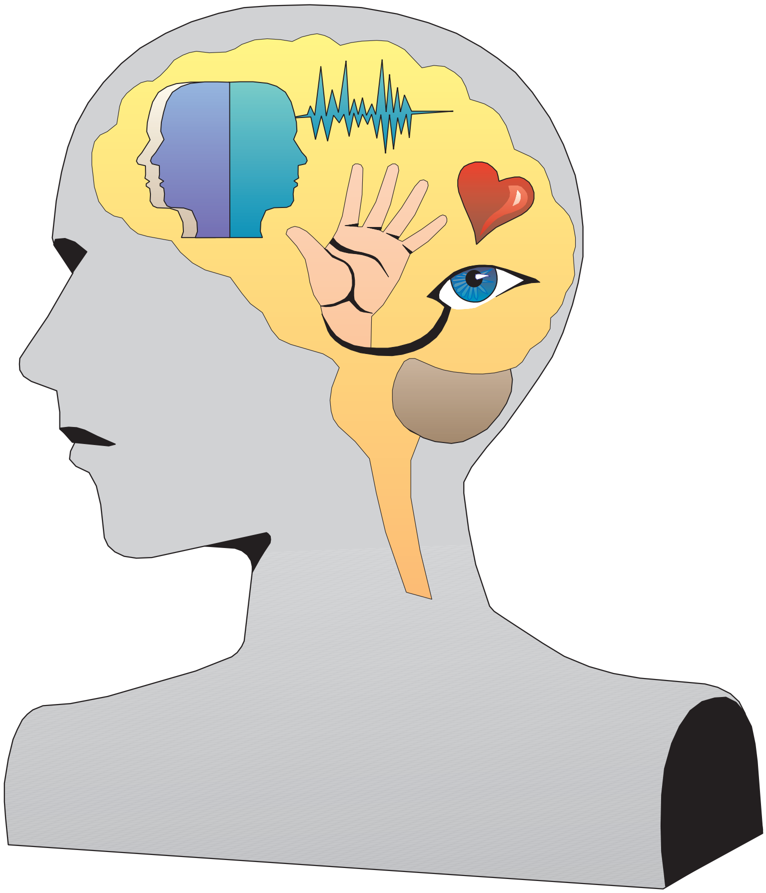
vision

Bulletin of the Applied Vision Association



GJB Travel award
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References on Vision

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AIM OF THE AVA: TO PROMOTE AND ADVANCE THE APPLICATION OF RESEARCH WORK IN ALL AREAS RELATED TO VISION

Noticeboard

AVA on the Internet

The Applied Vision Association now has its own world wide web pages at: *http://www.dmu.ac.uk/ava/*
The pages contain details of who is on the committee, contact emails, latest details on forthcoming AVA meetings and links to other vision related pages. There are also archives of abstracts from previous AVA meetings.
There is also an AVA anonymous ftp site at: *ftp://hc.les.dmu.ac.uk*
This site contains:
· a hyperspectral data set of natural scenes produced by Gavin Brelstaff (see http://www.crs4.it/~gjb/ftpJOSA.html).
· David Foster's bootstrap program for estimating the accuracy of a statistical estimate derived from a set of experimental data (see http://www.op.umist.ac.uk/bootstrap.html).
If there is anything else you think this archive should contain then let us know.

AVA and OPO Subscriptions

Membership for 2000/2001 will be as follows: ordinary members £18, student members £9. Those members who pay by standing order for the AVA and Ophthalmic and Physiological Optics please check that the correct amount is being paid to the AVA.

Editorial

The AVA Committee has decided after much discussion to change the frequency of publication of the AVA Bulletin. The Bulletin will now be published four times a year in late January, late April, late July and late November. This issue of the Bulletin contains abstracts of the AVA Christmas meeting held at the University of Surrey. We also include details of the AVA Annual Meeting and AGM to be held in March. If you have any comments on the Bulletin of the AVA then do contact me: mscase@dmu.ac.uk

Deadline for copy for the next Bulletin - 19th March 2001

Geoffrey J. Burton Memorial Fund

The fund was established in 1986 with the aim of providing financial assistance to students (postgraduates studying for a higher degree or first-year postdoctoral junior scientists) based in the UK travelling to any conferences or meetings at which they will be presenting a paper or poster. Donations to the fund can be directed to the AVA secretariat and cheques etc. should be made payable to "The Geoffrey J. Burton Memorial Fund".

The maximum award to any one individual is £400.

The AVA Committee has decided that from now on there will be a single award made once a year. The closing date for awards will be the last day in February each year and will be for conferences held from 1st March to the end of the following February (i.e. there will not be retrospective awards). Applicants do not have to be presenting at an AVA conference.

The next closing date for applications is:

28th February 2001

for conferences held between 1st March 2001 and 28th February 2002.

To apply for an award you need to complete an application form which is available from:

The AVA Secretariat,
College of Optometrists,
42 Craven Street,
London,
WC2N 5NG.

A PDF format version of the application form is available on the AVA web site at:
http://www.dmu.ac.uk/ava/

Applied Vision Association (UK)
5th Christmas Meeting

Wednesday 20th December 2000

University of Surrey
Guildford
Surrey
UK

Talks

Orientation Mechanisms: A model

Tim Atherton, **Seb Hinds**, & **John Agapiou**
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Models of frequency- and orientation-selective filtering in mammalian visual cortex adequately describe the first-stage of analysis in visual cortex. Models of processing beyond the “simple” cells, the second stage mechanisms, are less clear. For example, second stage energy mechanisms have been proposed that give the correct orientation for a sinusoidal grating image, but do this as a uniform field, failing completely to account for the percept of light and dark bars. The model proposed here estimates orientation accurately and places the “edges” and centres of light and dark bars of a grating in good agreement with the positions perceived by human subjects. The model explains the checkerboard appearance of two sinusoids at ± 45 degrees (additively superimposed to form a “plaid”), it provides mechanisms for orientation pop-out, and it reproduces the Mach band effect. The proposed model uses both the energy and the phase responses of the first stage filters (here we consider static, monochromatic, monocular processing at a single scale). The model goes beyond simple “edge” and “bar” features to detect and quantify the orientation of local patterns with higher-order rotational symmetries. The processing implied by the proposed model is biologically plausible, simple, robust, and unifies the processing of energy and phase mechanisms. The second-stage processing results in a family of feature maps that have implications for the understanding of later processing eg pop-out and texture segmentation, and the nature of the processing suggests “complex” cells with a variety of properties. The talk will be illustrated by numerous examples of the analysis of test and real-world images, with indications of the expected receptive fields of some of the second stage mechanisms.

What direction corresponds to 'depth' for stereoscopic vision?

A Glennerster and **M D Birch**
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Binocular disparities provide information about depth differences, but the axis along which the visual system measures depth has not been determined. Here, we present evidence suggesting that the stereoscopic visual system varies the direction defined as the 'depth axis' depending on the surface being viewed.

Subjects judged whether the central column of a 7 by 7 grid of bright dots (6 degrees square, 2 arcmin dots) was in front of or behind the plane of the grid. The grid was slanted about a vertical axis (disparity gradient +/- 0.1, constant within one run). Three conditions were randomly interleaved: the central column of dots was displaced (i) only in the right eye, (ii) only in the left eye or (iii) by an equal and opposite amount in each eye. Stereoacuity thresholds were determined from at least 1400 trials per condition.

Thresholds varied systematically with the slant of the grid. In condition (i), thresholds were lower when the right hand edge of the grid had a crossed disparity than for the opposite slant. The reverse was true for condition (ii). Thresholds in condition (iii) were intermediate between (i) and (ii).

The results are consistent with the possibility that the stereoscopic visual system is primarily sensitive to displacements perpendicular to the plane of a local surface, not to displacement along an axis relative to the head. A surface-based representation of depth such as this would be relatively unaffected by translations or rotations of the head.

Motion Segmentation and Transparency: A Computational Analysis and Some Observations

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When multiple motion directions are present within the same region of the visual field, the phenomenon of motion transparency can be observed. This can be regarded as an intermediate state between the breakdown of scene segmentation and the complete absence of meaningful motion information (noise) - and therefore is of high theoretical and biological significance. In dense dot Random Dot Kinematograms (RDKs) the broad distributions of the directions of motion detector responses can account for the transition from segmentation of motion-defined stripes to transparency, and from transparency to the perception of uncorrelated noise. In sparse dot RDKs with randomly interleaved motion directions the angular separation between visible motion directions limits the number of directions that we should be able to perceive simultaneously. A computational analysis is combined with psychophysical experiments to find out, where theoretical predictions agree with experimental results, and where we have to explain discrepancies. Computer simulations demonstrate that even an unsophisticated motion detector network would be appropriate to represent a considerable number of motion directions within the same region, but human observers fail to pick them up, being restricted to 2 or 3 directions if other cues are excluded. This raises the question why human observers should make no use of information that easily could be extracted from the representation of motion signals at the early stages of the visual system.

It takes time to bind: visual features are poorly localised in brief Exposures

Joshua A. Solomon and **Michael J. Morgan**
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Signal Detection Theory (SDT) asserts that sensory analysis is limited onlyby noise, and not by the number of stimuli analysed. To test this claim, we measured the accuracy of visual search for a single tilted element (the target) amongst seven horizontal elements (distractors) using several different exposure durations, each terminated by a random noise mask. In the uncued condition each element was a potential target. In the cued condition only two were. SDT predicts that location errors should be evenly distributed amongst all distractors. For long (e.g. 5.0 s) exposures, this prediction was confirmed and SDT could simultaneously fit uncued and

cued accuracies. For short (e.g. 0.1 s) exposures, errors were concentrated amongst distractors adjacent to the target and, unless modified to account for this, SDT underestimated the difference between uncued and cued accuracies. Therefore when the time available for search is brief, features such as orientation can be seen, but their positions can only be roughly estimated. That is, it takes time to bind features to their positions.

The ghosts of a Christmas target, present, future and past

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Todd S. Horowitz
Brigham & Women's Hospital and Harvard Medical School, Boston, USA

How does immediate context effect search for a specific target? We used a simple visuomotor task to explore this question. Observers sequentially clicked through a series of targets (e.g., letters A-J) while we manipulated the availability of information ahead or behind of the current target. To manipulate retrospective information, targets could remain once clicked or they could vanish. To manipulate prospective information, the whole sequence could be shown or we could shuffle or mask targets ahead in the sequence. Our findings indicate that both "where you've been" and "where you're going" have a large impact on the efficiency of finding a particular target in this task. Interestingly, retrospective and prospective aspects of search appear to interact, so that search performance is poorest when old targets are still present and new targets are not available for response planning.

Selective use of visual information for action

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We generally have the impression that the mechanisms that guide our actions instantaneously consider all the information that is available to our senses. However, our research on hitting moving targets suggests that this is not true. We found that there are many conditions in which subjects do not use the information that we would expect them to use. The clearest example is that subjects often failed to use the perceived velocity to anticipate where they will hit the target. This was so despite their having access to the information: the acceleration of the hand did depend on target velocity. Neither did subjects choose a position and adjust the acceleration of the hand so that they would reach that position at the same time as the target. They clearly relied on continuously adjusting their action. I will argue that this is a good strategy. In many cases it is more important to react quickly, than to react perfectly appropriately. Consequently our nervous system processes different aspects of information about our surrounding as simply (i.e. separately) as possible. Unfortunately, we are not yet able to quantify "simplicity" in this context, so we cannot directly predict what information should be used. What I intend to show is that there are cases in which potentially useful information is not used.

Set-size effects for spatial frequency change discrimination in multiple targets.

Michael Wright, **Louise Alston**, **Ariella Popple**
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Previous research has shown a substantial "set size effect" for spatial frequency change detection thresholds, suggesting a low-level explanation for "change blindness" (Wright et al 2000). Our stimuli consisted of two 150 msec frames, each containing 4 Gabor targets, and separated by a 250msec ISI. We measured spatial frequency discrimination of corresponding targets across the two frames. The set size was varied by pre-cueing 1, 2, 3 or 4 of the Gabors, and response competition was eliminated by post-cueing only one of the four stimuli. The spatial frequency of all stimuli was randomised, such that the task could not be solved by visual search in a single frame but required a comparison of two frames. In the first condition, all targets changed at random on any trial, but only the post-cued change was relevant to the discrimination. In a second condition, only one of the four targets changed on any trial, and the changing target was either post-cued or uncued. The log-log slope of Weber fraction with set size was 3-6 times steeper than reported for visual search. The similarity of results for "one change" and "all change" conditions suggests, in a signal detection analysis, that noise due to the changing stimuli is small in relation to internal noise, and averaging of the stimuli is not a factor.

Attentional modulation of visual adaptation: its spatial spread and similarity to changes of signal strength

JP Harris, **MS Georgiades**
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We investigated the effects of diverting attention on the movement aftereffects (MAEs) produced by drifting gratings. MAEs were measured throughout their lifetimes, by matching their apparent velocity with a physically moving grating. When subjects named the sequence of rapidly changing digits at the fixation point, peak MAE velocity, as well as duration, was reduced. The reduction was greatest when the inner edge of the adapting grating was close to the fixation point, but was still large at a distance of 3 degrees. As found by others, MAEs decayed exponentially with time after adaptation. The effects of diversion were to reduce initial velocity and increase the rate of decay. This effect is more like that of a decrease in adapting duration than that of a decrease of adapting contrast or velocity, and sets constraints on theories which compare attention to a variation of 'signal strength'.

It used to move but now it's stuck: head centred motion perception in theageing visual system

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Stationary objects appear to move opposite to a pursuit eye movement (Filehne illusion) and moving objects appear slower when pursued (Aubert-Fleischl phenomenon). Both illusions imply that extra-retinal, eye-velocity signals lead to slower estimates of speed than corresponding retinal motion signals. Intriguingly, the Filehne illusion has been shown to reverse at short but not long durations in older observers (Wertheim & Bekkering (1992) Vision Research, 32, 2379-2384). This suggests an interaction between age, duration and signal size. To test the signal-size hypothesis, we compared the strength of Filehne illusion and Aubert-Fleischl phenomenon in young (c. 20 years) and old (c. 70 years) observers and at short (200 ms) and long (700 ms) display durations. At long durations there was no evidence that the size of the Filehne illusion depended on age whereas at short durations there was. The age-dependent change was not quite as pronounced as that reported by Wertheim & Bekkering

- instead of reversing in older observers the Filehne illusion disappeared on average - but the trend was in the reported direction. More remarkable was the fact that all observers showed similar Aubert-Fleischl phenomena regardless of age or duration. The differences between the two illusions could not be reconciled on the basis of actual eye movements made. Our findings therefore cast doubt on the signal-size hypothesis.

Effects of retinal image degradation and perceptual learning on preattentive visual search efficiency for flicker, movement and orientation stimuli.

Dr Peter Davison and **Mr James Loughman**
Optometry Section, School of Physics Dublin Institute of Technology, Kevin Street, Dublin 8, Ireland.

INTRODUTION We are currently investigating the use of preattentive visual search (PAVS) as an investigative technique for detection of early glaucoma and other optic neuropathies. Previous research has shown that glaucoma causes increased PAVS times, implying reduced parallel search capabilities (Flitcroft et al.). The present report examines the resistance of PAVS to dioptric blur and the effect of perceptual learning on repeated performance, both factors being of potential importance to the clinical application of PAVS.

METHOD Computer generated flicker, oscillation and orientation targets were used to assess PAVS efficiency. The subject's task was to locate the target as quickly as possible (embedded in a field of 119 distractors) on either left or right hand side of a computer monitor. Average PAVS response times were calculated for 40 presentations of each target type presented randomly in any one of 120 positions within +/- 15 degrees of fixation. Subjects performed the test using their distance spectacles, then 3 tests using 'blurring' lenses between +2D and +5D, and finally using distance spectacles again.

RESULTS & CONCLUSIONS Blur of up to 3 dioptres had no statistically significant effect on response times to flicker and oscillation targets ($p>0.05$). The orientation target however became significantly more difficult to locate, response times becoming progressively slower with increasing levels of blur ($p<0.05$). Following an initial practice session of 240 trials, no significant further practice effect occurs ($p>0.05$). We conclude that this PAVS paradigm is sufficiently robust to be suitable for clinical assessment of visual function in glaucoma.

A Comparative Study of Potential of Generic and Custom-devised Image Enhancement Filters for Improving the Visibility of Images for People with Low Vision.

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Andrew Kennedy
Imaging Research Inc., Brock University, Canada
Ed Jernigan
Department of Systems Design Engineering, University of Waterloo, Canada

Introduction: Early studies have indicated that image enhancement holds potential for increasing the visibility of images for people with low vision. This study is new in comparing the effectiveness of a range of generic and custom-devised filters. Methods: The following filters were included : histogram equalisation, edge detector (Sobel), contrast stretch, difference of Gaussian, unsharp masking, Peli's adaptive thresholding and enhancement, anda custom multiplicative filter based on the subject's contrast sensitivity loss. Most of these filters may be applied with variable parameters. Within-filter comparison was by subject ranking and between-filter comparison was by subject rating. Twenty-eight subjects took part, aged 40-80 years, with low vision due to a variety of disorders. Visual characteristics (visual acuity, visual field loss, contrast sensitivity, and visual disorder) were studied for ability to predict filter preference. Results: The within-filter ranking showed that filters with high gains and exaggerated enhancements were not preferred by subjects and they were eliminated from further study. The between-filter ratings showed that the most frequently preferred filters overall were Peli's adaptive enhancement, unsharp masking and the contrast stretch. Peli's adaptive thresholding and the custom multiplicative filter produced a detrimental effect for most subjects. The only visual characteristic which was associated with filter preference was visual disorder. Conclusion : This study identified a group of generic filters which are useful for low vision observers and which were better than our custom-devised filters. More study is required on custom-devised filters, which in theory should more accurately compensate for contrast sensitivity loss.

Time Delays in Head-Mounted Displays

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Defence Evaluation and Research Agency, Farnborough

The Variable Latency Asynchronous Display (VLAD) is a special-purpose experimental device that has been designed and built to study aspects of delay such as are encountered in visually-coupled systems (VCSs). It is a system consisting of cameras and a binocular display mounted on a helmet, together with a video delay unit, and it allows captured images to be presented at 120 Hz, with an intrinsic delay of less than 10 ms to which a further delay of up to 155 ms can be added in 5 ms increments. It has been used to examine the effect of delay on various aspects of visually-guided movements. In a first experiment it was used to demonstrate the consequence of these delays in a pursuit tracking task. In a second experiment, it was used to introduce delay into an experiment on displaced vision, but no adaptation to a lateral displacement of 11*f* could be demonstrated for added delays of 0, 45 or 95 ms. It is thought that problems common to head-mounted systems, including helmet slippage, might have countered the adaptation effect. This has led to a re-examination of the accepted evidence concerning prism adaptation in more impoverished conditions and its abolition by delay. VLAD has permitted other informal observations related to time delays and is currently being used in an experiment on stereopsis.

This work was funded by Technology Group 5 of the UK MoD’s Corporate Research Programme.

Visual adaptation: Enhancements in signal discrimination, while fixing signal to noise ratio.

Keith Langley
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Visual adaptation is a fundamental sensory process that describes the decrease in response of a sensory system to a sustained input signal. Current theories posit that visual adaptation allows visual neurons to respond with high sensitivity to a wide range of visual inputs in order to compensate for the limited dynamic range that is attributed to individual neuron transfer functions. Here, a further constraint is proposed to help explain properties of adaptation. It is suggested, that adaptation fixes the signal to noise ratio of neuron responses with the added benefit of enhancing signal discrimination. Drawing upon existing Psychophysical data that has studied effects of adaptation upon both contrast and speed perception, it is posited that at least two independent effects of adaptation can be identified. One, which is fast, divisive and isotropic in the spatial domain can be explained by adjustments in the temporal bandwidth of simple cell transfer functions. The mechanism increases temporal bandwidth as a function of increasing image contrast while keeping signal to noise constant. This type of adaptation predicts that signal discrimination may be enhanced by an amplification of any high temporal frequency components present in the image signal. The second is proposed to be slow, subtractive and direction/orientation tuned. It is posited that this latter mechanism shifts the transfer function of simple cells where the slope of contrast response function is maximum towards the contrast of the adapting signal. The subtractive adaptation is proposed to enhance discrimination by fixing the signal to noise ratio of quantization noise about the contrast of the adapting signal at a maximal value. To illustrate these ideas, a computational model of motion perception is proposed. The contrast response of the motion model is shown capable of explaining the temporal properties of spatial contrast vision (fast adaptation) as reported by Georgeson (Vision Research, 765-780, 1987) . The speed transfer function of the model is shown capable of explaining the effects of the mentioned adaptive processes on motion perception (both perceptual increases and decreases in speed) to explain effects of motion adaptation on motion perception (both fast and slow adaptation) as reported by Smith and Edgar (Vision Research, 253-265, 1994).

Posters

Visual attention is allocated within a retinotopic framework in response to feature based, endogenous primes.

Doug. J.K. Barrett, **Mark F. Bradshaw** & **David Rose**
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At ECVP we reported that exogenous shifts of visual attention were made to locations encoded within a retinotopic framework (Barrett et al., 2000).

Here we investigate whether a similar pattern emerges if attention is allocated endogenously to an object's colour or shape rather than to its location. In two experiments, one of three peripherally presented objects was primed. The primed object was specified by the colour or shape of a cue presented at fixation. In four conditions, the primed object predicted the location of a target 'T' in either a retinotopic or an object-based framework. Target and distractor T's were presented within each of the objects and subjects had to discriminate the target's orientation. Distractor T's were either upright (0°) or inverted and targets T's were either ±90°. A significant reduction in RT was found targets presented within primed objects whose retinal location remained unchanged. In conditions in which the retinal location of the primed object changed although its object-centred coordinates remained the same, however, no facilitation was observed. This suggests that voluntary shifts of attention in response to endogenous primes are directed to the retinal location occupied by the primed object rather than to the primed object object per se.

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Patricia M. Riddell
University of Reading, Whiteknights, Reading RG6 6AL, UK.

Binocular disparity is often considered paramount in the control of natural prehension movements (e.g. Servos et al., 1992; Watt and Bradshaw, 2000). Despite this little is known about how children use this information in the control of the reach and the grasp nor how the ability to exploit such information improves through middle childhood. Here we examine the ability of two groups of 10 children (5-6 and 10-11 yrs) to reach for objects of different sizes placed at different distances under binocular and monocular viewing conditions. Children reached for and lifted solid rectangular objects placed along the midline in normal lighting conditions. They wore LCD goggles which controlled the stimulus presentation and viewing condition. A MacReflex Motion Analysis system was used to record the movements and a full range of kinematic and timing indices were determined off-line. It was found that for both age-groups, peak velocity was a linear function of an object's distance under both monocular and

binocular conditions. There was no apparent difference between monocular and binocular conditions. Maximum grip aperture increased as object size increased, although the magnitude of this scaling was less under monocular conditions. In conclusion the elimination of binocular cues appears to affect the grip formation while leaving the transport component relatively unaffected. This was true for both age groups.

Binocular cues do not provide accurate depth information for the control of prehension.

Paul B. Hibbard & **Mark F. Bradshaw**.
Department of Psychology, University of Surrey, Guildford GU2 7XH UK

To reach out and pick up an object, one needs to know its location, shape and size. This information is potentially available from binocular visual cues. However, the perception of three-dimensional space on the basis of this information is known to be distorted systematically (e.g. Johnston, 1991). Here we investigate whether these distortions are also apparent when we reach for disparity defined objects. Prehensile movements to both real and virtual objects, of three different sizes, placed at two different distances along a tabletop, were recorded using a Macreflex motion analysis system. For both real and disparity defined, virtual objects, peak grip aperture scaled with object size and peak wrist velocity scaled with object distance. When reaching for disparity defined objects, subjects progressively underreached as the object distance increased. Grip apertures for the virtual objects placed at the nearer distance were consistent with an overestimation of object size. These results suggest that the representation of three-dimensional space derived from binocular information in the control of prehension is subject to similar distortions to those revealed using psyhophysical paradigms.

Biases in stereoscopic shape constancy.

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Binocularly viewing a stationary object generates horizontal disparities compatible with a one-parameter family of possible 3-D shapes. The correct shape is easier to identify under rich viewing conditions when different

perspective projections reach each eye. This study examined whether shape was perceived more accurately when a) the distance specified by vertical disparities was enhanced by increasing display size from 8° (‘S’) to 33° (‘L’) and b) textural shape information was improved by replacing random dots (‘D’) with appropriately compressed circles (‘C’). Vertically-hinged (open-book) stereograms with dihedral angles between 35° and 169° were simulated by vergence and differential perspective to lie at distances from 30cm to 300cm. Subjects monocularly adjusted the relative orientation of two lines to match perceived dihedral angle. They also set the height of a vertical line to the size of a real, hand-held tennis ball. Settings were made and stimuli presented on monitors positioned at physical distances of 34cm. Spearman rank correlations between set and simulated dihedral angles decreased in the order LC(0.95)>SC(0.90)>LD(0.83)>SD(0.79). When disparity depicted the same shape, subjects perceived less depth at larger distances. Size settings suggested that subjects underestimated larger simulated distances. Appropriate texture improved dihedral angle settings more than size settings. Increasing the display size improved size settings more than dihedral angle settings. The biases in perceived shape were comparable to those reported by Hogervorst and Eagle (2000) when subjects judged identical shapes defined by monocular motion. Errors were not abolished when the physical distance to the monitors was increased to 89cm.

Working memory and the control of natural prehension movements.

Natasha Merat, **John A. Groeger**, **Mark F. Bradshaw**, **Simon J. Watt** and **Paul B. Hibbard**.
Departmentt. of Psychology, University of Surrey, Guildford GU2 7XH UK.

An often overlooked aspect of natural prehension is the importance of working memory processes which are responsible for the selection and maintenance of goal directed behaviours. Working memory is subdivided into a central executive and two slave systems: the phonological loop and visuo-spatial scratchpad. The latter system is further subdivided into visual and spatial component, which may, in principle, encode extrinsic and intrinsic properties of objects in the world (see Baddeley & Logie, 1999).

This division of object properties has been been linked with the control of the transport and grasp components of a natural prehension movement. To determine whether these memory systems are involved in the control of prehension we developed two related distraction tasks designed to interfere with one or other memory subsystem independently. The visual properties of the interference tasks were identical and comprised of an array of 2 or 4 coloured squares (60 min arc) presented for 1.2 sec within a square window of 12 degrees. Following a delay, the subject had to identify whether (i) the colour or (ii) the location of one of the elements in the display had changed. Extensive pre-tests confirmed that the level of difficulty (defined as 80% correct) was equivalent in both tasks. Pilots experiments suggest that these interference tasks may interfere with different aspects of the natural prehension tasks independently.

Visual factors in the prevalence of left neglect

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Hemi-spatial neglect is a disorder of attention following cortical damage. Neglect of the left visual hemifield is more common than right visual neglect. Left neglect is usually the result of lesions in the right (contralateral) parietal and occipital regions of the brain. Right neglect can be the result of damage to either the contralateral or the ipsilateral hemisphere. Marshall and Halligan (Cortex, 1994) emphasised that models of visual neglect should draw upon intact brain functions. The predominant model is that the right hemisphere dominates attention as a result of bilateral parietal receptive fields (e.g. Heilman et al., Neurology, 1980). This model received mixed support for its prediction that left neglect after parietal damage should be associated with global inattention in both hemifields (Gianotti et al., Neurol. Neurosurg. Psychiatry, 1990; Mosidze et al., Behav. Brain Res., 1994). However, recent fMRI studies highlight activity in the right parietal lobules of normal observers when attention is deployed (Perry & Zeki, Brain, 2000; Nakumara et al., J. Neurol. Sci., 2000). We sought to explore the possibility that asymmetries in the distribution of attention between the two hemifields might contribute to the prevalence of left neglect. We used a visual search task, and measured reaction times. We added noise masks selectively to stimuli in the left or right hemifield to simulate the effects of inattention. Four of nine observers had significant asymmetries in the effects of noise, for three of them the asymmetry was such that noise in the left hemifield selectively masked targets in this hemifield. Most of the remaining observers showed a trend in the same direction, making this asymmetry significant overall. Only one observer had a significant asymmetry in the opposite direction. Asymmetries in the distribution of attention might result in selective deficits following brain damage, however the association between such asymmetries and the prevalence of left neglect must be tested experimentally.

Going round in circles? Shape and the Ebbinghaus illusion.

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Previous explanations of the Ebbinghaus illusion have centred on two main ideas: an object-based, size-contrast hypothesis and an edge-based, contour-interaction hypothesis. We tested these theories by measuring the illusion with the central test element of one shape and the surrounding inducer elements of another shape. Four different shapes (circle, hexagon, triangle and irregular) were tested in all 16 possible combinations. With circular test figures there was a systematic relationship between the illusion's strength and the degree of similarity between the test and inducer shapes. However, with irregular test figures there was no such relationship. Our data are thus inconsistent with the predictions of any of the current hypotheses on the origin of the illusion, and pose a challenge for future models.

Height in the field and binocular cues support natural prehensile movements

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Although binocular cues are typically considered pre-eminent in the control of prehensile movements, accurate and efficient movements are still possible under monocular viewing. The aim of the present study was to examine the efficacy of (i) binocular information, and (ii) height in the field (HIF) information in the control of reaching and grasping when both cues were available in isolation. To do this subjects reached for and picked

up 3 different objects at 3 distances under binocular and monocular viewing in an impoverished visual environment (complete darkness with self-illuminated objects and hand) in which objects were placed along the line of sight to eliminate HIF information. A MacReflex motion analysis system was used to analyse the kinematic parameters of subjects' movements. The efficacy of binocular information was assessed by comparing monocular and binocular reaches. The efficacy of HIF information was assessed by comparing monocular reaches under the present conditions with those made where HIF was available (Watt and Bradshaw, 2000). In the absence of binocular and HIF information, peak wrist velocity no longer scaled with object distance, and peak grip aperture no longer scaled with object size. However when either source of information was present the transport and grasp components scaled normally with object properties. In addition significantly fewer on-line corrections were evident in the reach profiles. These results demonstrate that both binocular cues and HIF, are sufficient when presented in near isolation to specify object properties for the control of natural prehensile movements.

AVA2001

21 March 2001

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References supplied (as usual!) by:

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Meetings Calendar

2001

March 21	AVA 2001 College of Optometrists, London Contact: kl@psychol.ucl.ac.uk
April 29-May 4	ARVO 2001 http://www.arvo.org/arvo
May 4-8	Vision Sciences meeting Sarasota, Florida Abstract deadline: 15 December http://chuma.cas.usf.edu/~sanocki/vssupdate.html
September 7-11	24^{th} Pupil Colloquium, USA Contact: P.A.Howarth@lboro.ac.uk http://www.mailbase.ac.uk/lists-p-t/pupil/files/