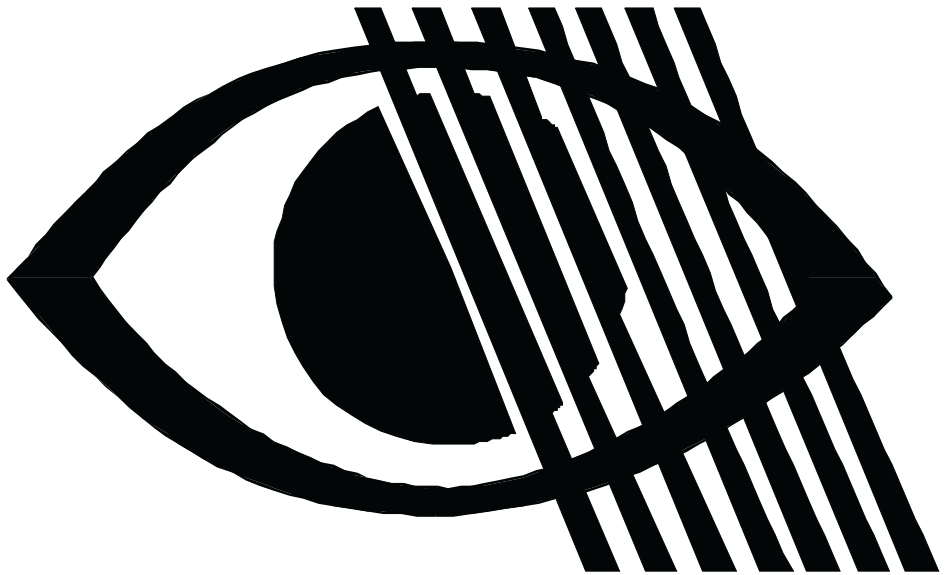


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*Bulletin of the  
Applied Vision  
Association*



G.J. Burton Award  
AVA 2000 - meeting report  
AVA Aston - meeting report  
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 1999/2000 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 has a new co-opted member: Keith Langley from UCL. This issue of the Bulletin contains notification of the travel award from the GJ Burton memorial fund. The issue also contains a report of the AVA Annual Meeting in London. We also include a report of the AVA Christmas meeting written by Tom Troscianko - you should read this if nothing else! All comments to Tom please. If you have any comments on the Bulletin of the AVA then do contact me: [mscase@dmu.ac.uk](mailto:mscase@dmu.ac.uk)

**Deadline for copy for the next Bulletin - 19<sup>th</sup> June 2000**

## **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 1<sup>st</sup> 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:

28<sup>th</sup> February 2001

for conferences held between 1<sup>st</sup> March 2001 and 28<sup>th</sup> 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/>

## Geoffrey J. Burton Travel Award

The Geoffrey J. Burton Award for 2000 was announced at the AVA AGM in March. The AVA Committee decided to make an award of £400 to Jane Aspell from the University of Newcastle to contribute toward her travelling expenses to the ECVF conference in the Netherlands in August 2000. Jane will be presenting the following abstract:

Interactions between visual and auditory movement perception in a direction discrimination task.

Aspell, J.E., Bramwell, D.J. and Hurlbert, A.C. Physiological Sciences, Medical School, University of Newcastle upon Tyne, NE2 4HH, UK.

**Purpose:** To investigate interactions between the perception of visual and auditory movement. **Methods:** Observers viewed random dot kinematograms on a CRT display while listening to sound movement simulated by interaural amplitude modulation (IAM) of a 500 Hz tone over headphones. Each trial began with a “noise” phase, during which the dots moved at random while the sound remained stationary, followed by the “coherent” phase, during which a percentage of randomly selected dots moved together leftwards or rightwards, while the sound moved in the same or opposite direction. Observers maintained visual fixation on a central marker throughout. In the visual task, observers ignored the sound and reported the direction of coherent dot movement. In the auditory task, observers reported sound movement direction. The degree of IAM and the percentage coherence were both varied independently in all combinations from sub- to suprathreshold levels. **Results:** For 5/5 observers, the presents of concurrent visual motion enhanced performance on the auditory task, whereas conflicting visual motion degraded performance. For 3/5 observers, sound movement had significant effects on performance of the visual task; for 2 observers, the effects were degrading for both concurrent and conflicting sound movement. The effects cannot be explained by probability summation of two independent mechanisms signalling motion direction.

# **AVA Annual Meeting and AGM Motion Perception and Imaging**

Wednesday 15<sup>th</sup> March 2000  
College of Optometrists, London

GEOFFREY J. BURTON MEMORIAL LECTURE

**Professor A.T. Smith**  
**Department of Psychology, Royal Holloway, London**  
**“fMRI studies of the human visual cortex”**

## **Meeting Report**

On Wednesday 15 March the first AVA annual general meeting of the third millennium or the very last of the second millennium took place. The meeting was hosted in the very elegant surroundings of the College of Optometrists London, and following the great tradition of AVA meetings was a very friendly gathering. Although the meeting was titled “Motion Perception and Imaging”, the talks and posters liberally interpreted the theme of the meeting giving sufficient diversity to maintain high levels of attention. As a backup an auditory alerting system was employed which effectively modelled the inadvertent kicking of a strategically placed cup and saucer.

The first talk was by Allen and Derrington from Nottingham. They examined whether luminance and contrast defined motion is processed serially or in parallel. They concluded that luminance defined motion can indeed be processed faster than is possible using a serial strategy whereas contrast defined motion required serial inspection. The second oral paper was by Ian Thornton from the Max-Planck-Institute. Ian examined how observers process biological motion, he presented work using point light figures of biological motion with different masking techniques. From his work he concluded that the strategies employed in perception of biological motion are highly adaptive. The next paper was by Edward Powell and Mark Georgeson from Birmingham. Their paper considered an opponency mechanism in motion detection. The talk covered existing theoretical models and experimental data, and then proceeded to discuss their own work on grating motion detection under different masking conditions.

They concluded that their results could be successfully accounted for by an open system in motion detection.

Edward and Mark were followed by Keith Langley of UCL. Keith presented a model of motion adaptation and after-effects, which was based on principal component regression. He proposed that linear regression models are not sufficient for the complexity of human visual motion detection and that the nature of the visual signals in the spatial and temporal domains constrains models to a principal component regression. Keith's talk raised a lively discussion. The last talk of the morning was given by Tim Meese of Aston University. Tim sought to examine the properties of complex motion detectors by measuring coherence thresholds in random-dot kinematograms. He presented results from four experiments examining complex motion detector characteristics.

Following Tim visual stimuli were augmented with olfactory input in the form of an excellent buffet lunch. This was followed by the AVA AGM, a relatively brief meeting was held. Mark Scase gave his inaugural address as AVA chairman and I, leaning heavily on my predecessor's work gave my first AVA treasurer's report. The AGM passed peacefully with only the murmuring of words like "logo".

The Geoff Burton Memorial Lecture was presented by Professor Andrew Smith of Royal Holloway College. The lecture, "fMRI studies on the human visual cortex", began with a balanced review of the background to the technique and some of the criticisms levelled at it. Andy then went on to discuss some of the work he has undertaken examining changes in the cortex with attention and retinotopic mapping. The lecture raised an interesting discussion on both areas of work.

O'Grady and Muller from Birkbeck College kicked off the afternoon's papers. The paper was presented by Rebecca O'Grady and examined object-based selection. The work used a ring cueing paradigm measuring target detection performance. Three experiments were reported, the first used colour to cue the target ring, the second and third examined whether the observers were exploiting illusory depth cues in the experimental stimulus. They demonstrated that disrupting the illusory depth cues significantly reduced the ring cueing effects. An interesting discussion followed on the potential role of additional illusory depth cues from chromostereopsis. The second paper of the afternoon was presented by Professor John Barbur of the AVRC at City University. John presented results from a large

experimental programme examining the independence of luminance and colour contrast defined motion. John demonstrated that suprathreshold perception of luminance contrast defined motion was independent of chromatic contrast noise, suggesting independent mechanisms underlying the perception of luminance and chromatic contrast defined motion.

After tea and poster viewing, MJ Wright from the Department of Human Sciences at Brunel discussed his work on CSF for temporal phase discrimination. The paper examined whether perception of luminance gradients is dependent on a low temporal frequency mechanism. As CSF from temporal phase discrimination was measured using a phase discrimination task. The subjects had to determine whether two gratings were modulating in or out of phase. The results indicated that the CSF was low pass in nature with a cut off in the region of 3-7Hz. Mark Bradshaw followed with work undertaken at the University of Surrey in collaboration with the Defence Evaluation and Research Agency Farnborough, (DERA). The study examined how increasing retinal disparity affect depth perception as measured through a reaching and grasping task. Subjects viewed the stimulus on a stereoscopic display relaying images from a pair of cameras. Stimulus disparity was varied by changing inter-camera distance. Mark demonstrated that increasing the disparities in this way disrupted reaching task performance. Interestingly little learning or adaptation affects were found. The last oral paper of the day was presented by Richard Jones of the Centre for Human Sciences, DERA Farnborough. Richard described an experimental display that has been developed to allow investigation of various display parameters, such as zero persistence and scan pattern on visual performance. Preliminary experimental results on flicker sensitivity and brightness matching for a continuous and zero persistence display were presented. An interesting discussion followed on the nature of the display system and its application.

In addition to the oral presentations the meeting also had seven poster presentation which were scrutinised during breaks. Of course no AVA meeting would be complete without the sound of glasses being filled with wine and AVA 2000 was no exception. The meeting closed with wine and further opportunity for poster viewing. Many thanks are due to the presenters in both oral and poster format, the quality of work and presentation was consistently high.

Patrick Ward  
DERA, Farnborough.

# **From Sensation to Perception The 4<sup>th</sup> AVA Christmas Meeting**

**Vision Sciences, Aston University  
21<sup>st</sup> December 1999**

## **Meeting Report**

For the last three years, the frenzy in the run-up to Christmas has involved a trip to Aston University where, for about the same price as a decent bottle of champagne, it's possible to enjoy the offerings of some of the keenest minds in Vision Science in Britain, and to conclude with a bacchanalian feast (well, those ubiquitous "goujons" and wine).

The meeting's popularity is growing. It's a nice time of year to remind oneself that there's more to life than teaching; plus Tim Meese, the organiser of the meeting, achieves saturation bombardment with CV-Net announcements of the meeting – so we all know it's happening.

This year's meeting was divided into three sessions – one in the morning and two in the afternoon. The morning one began with an invited talk by George Mather, on whether the visual system uses "depth-of-focus" type blur as a cue to relative depth. The answer is that it does so to a limited degree. The best part of this talk, for me, was a very clear explanation of the computational theory of the situation. With creeping age-related presbyopia, my days of depth-from-focus are surely numbered, but it's great to hear George explain about what I will be missing out on from now.

There followed four submitted talks. The first one was by Troscianko, Chirimuuta, Parraga, and Tolhurst. The Fourier content of natural images determines their overall perceived contrast (so that enhancing either low or high spatial frequencies lowers overall perceived contrast). We tried to argue that this effect depends on higher-order statistics of the image. In question time, Mark Georgeson proposed a more specific possible metric,

but it may be hard to apply this to a complex image rather than a synthetic one.

The talk by Michael Wright (with co-authors Green and Baker) looked at whether one can detect change in arrays of multiple Gabor patches. A neat relationship emerged: the log of the Weber fraction for spatial frequency change was proportional to the log of the number of targets, and it was shown that this limitation is due to a combination of attentional and memory effects. Work of this kind can answer questions about the origins of the sexy “change-blindness” effects which people tend to demonstrate with much more complex images.

Tim Meese then told us about his doubts about the results of Bonneh and Sagi (1998) on probability summation for Gabor patches. This all began with an attempt to design a nice’n’simple experiment to demonstrate probability summation to Tim’s students (whose views on the success of the venture were, sadly, not available at the meeting). Tim challenges the idea that the mechanisms concerned here deal with contour integration; for example, the effect works for Gabor patches of orthogonal orientation, whereas no self-respecting contour would have bits at right-angles to the rest of it. The lecture was delivered with traditional vigour and authority.

Tim’s academic “dad”, Mark Georgeson, then told us lots of new stuff about the tilt aftereffect (TAE). We probably all teach our students about the distribution-shift model of the TAE. But we need Mark to come and sort it out properly, with a computational model of a bank of tuned filters. When the handle is cranked on this model, it turns out that the filter properties that predict the actual TAE are not the orientation-tuned cells in V1, but may have more to do with a later stage which extracts orientation. As always, it’s a delight to hear Mark explain an effect, and the results force us away from our simplistic models of how things happen in the brain.

Then came lunch, with posters. I was attracted to the one by Summers and Thomson, which gave similar results for blur detection in natural scenes as we had reported for perceived contrast. Mitch Thomson is the one person I know who really knows his higher-order image statistics, and he gives us little choice but to learn about them too, since the effects generated by them are neat. As in the paper by Troscianko et al, we saw that the effects depend on the phase spectrum, i.e. the higher-order

statistics. Poor old Fourier model of the brain – don't you feel nostalgic for it?

There were visits to the MEG-machine down the corridor. I finally made it after the next session, and was glad I did. Compared to the trauma of enduring an fMRI scan (with its ghastly noise and claustrophobia), the MEG is a doddle. I just sit in a large hair-dryer contraption, and look at an ordinary video screen (no need for LCD displays here); and out pops a functional map of a part of my brain. I always find it mildly surprising that the thing still works. Perhaps it was "one they had prepared earlier", but it looked genuine enough. I came away wanting to play more.

Afternoon session. "Motion, form, and colour". The invited speaker is David Badcock. Take the "two-streams" hypothesis of vision. What are the responses of these streams to first- and second-order motion stimuli? Iconoclasm being now the order of the day, it was not at all surprising to hear that the supposed independence of the form- and motion-pathways was seriously in question. It's often the way: someone proposes a simple idea, which accounts for some data. Later, we find that life ain't as simple as that. When it gets impossibly messy again, the next simple idea comes along, and so on. David is a fine fellow for driving this happy process.

Next, Keith Langley. A talk on the role of opponent and non-opponent processes in speed perception. Now I hate to admit this, but I don't think I've fully understood a single talk that Keith has ever given. Perhaps I just want him to perform his famous gymnastic back-flip; perhaps it's because I really fancy having a pint and gossip with him after the talk. Anyway, I've long ago decided that Keith is dead clever and I'm a moron, and I'm too old to change my ways now. So here's a sentence or two from Keith's abstract: "The nulling strategy codes for the space-time product of spatial and temporal gradient signals by scaling the squared sum of these elements and subtracting the square of each individual element. The nulling scheme posits that adaptive effects stem from suppression of ancillary neurons rather than signal-bearing neurons; a reversal of traditional explanations for adaptive effects as posited by energy-based speed coding." Ha! More iconoclasm!

Rebecca O'Grady next presented a talk (co-author H Müller) looking at evidence for object-based selection in an array of targets. They used a cueing paradigm. Psychologists in the audience could breathe again, this is good, familiar, territory. The results suggested that a 2-D saliency

representation may underlie object-based selection, and that this process happens before the system knows all about the object.

Mitch Thomson (and co-authors Westland and Shaw) then turned to the question of metamerism in natural scenes. Metamerism occurs when two samples which have a different spectral distribution look the same under one illuminant but not under another one (e.g. matching textiles under artificial light and then finding that the match does not hold in daylight). So, in order to tackle this question, one needs to know both about the reflectance of natural objects and the types of illumination. The results suggested that metamerism is rare in nature, both for isolated objects, and combinations of objects (such as may be obtained by optical mixture of distant objects). This is another neat demonstration of how our colour vision is well matched to the prevailing scenes. Michael Wright asked what would be the case for a colour-anomalous observer – this was not known yet but would be interesting.

Next, more iconoclasm from someone who is himself something of an icon – Brian Rogers. Remember Gibson's love of optic flow? It's something my second-year students have learned to hate, with that picture of the airport runway and distant mountains. Do we actually use optic flow information to determine our bearing? Er... no. Brian asked what would happen if we were trying to move across a moving conveyor belt to a target on the far side. What provides the information? Optic flow, motion parallax, or static cues? Under many conditions, optic flow comes out as the poor cousin of the other cues.

As if this body-blow to the self-confidence of my second-year students was not enough, there followed a further talk (by Andrew Glennerster, with co-authors Hansard and Fitzgibbon) that investigated the role of fixation in the business of trying to analyse the optic flow. Well, if our brain does decide to use such flow to recover the shape of the world around us, it would be well advised to fixate the eyes, since this simplifies that extraction of underlying shape. Andrew is another clever (and handsome) bloke who works out the computational theory of a problem in elegant detail. As part of the solution, the representation includes the problem of how the scene structure is built up over a series of fixations.

Ian Thornton, who is now at Nissan R&D in the other Cambridge, talked about a little-known effect called the Onset Repulsion Effect (also called the Fröhlich effect). Here's the crux. You watch something start to move.

You are then asked where it was when it started to move. You say (wrongly of course) that it started at a point further back along its line of travel than the place where it really started. Onset repulsion, right? Why do we have this effect? Ian engagingly went through a number of options (acceleration effects, length errors) and the evidence was not compelling for any of these. In questions, I added another possibility, namely perceived time – which depends on micro-fluctuations in arousal. In my (obviously sad) life, the start of a motion is an arousing stimulus, and this could lead to a mis-perception of position. Perhaps we all need more in the way of excitement.

Such excitement could be provided by an approaching projectile, and this was dealt with by Simon Rushton (co-author Mark Bradshaw). How do we catch one? Simon has in the past argued that optic flow is not used in estimating our bearing, and egocentric direction is used instead. Simon and Mark got their subjects to deflect approaching balls while looking through prisms (which perturb egocentric direction but not optic flow). The results, as in the previous published work, suggest that optic flow is not used whereas instantaneous direction is. All except, of course, for the English cricket team, whose ideas about optic flow are probably still based on my second-year lecture material.

In my mind, no AVA Christmas meeting can be complete without a talk by Lewis Griffin. His talk this year was entitled “Psychological colour space is physical colour space”. Lewis is fairly unique in the field of colour science in that he does not show his subjects any coloured stimuli; instead, he gives them printed word-pairs such as “brown – pink” and constructs a colour solid based on the judgement of similarity between the pairs. The space that emerges looks curiously normal, and Lewis emphasises its physical nature by constructing the space out of coloured plastecine and drinking-straws. I think the favourite dream I never had is to see the real colour solid (instead of photos of it) and to watch it slowly melt and deform under a powerful light while at the same time becoming gradually achromatopsic.

Ian Holliday wrapped up the proceedings by talking about the MEG system. After this, and my subsequent visit to it, I put one on my list for Father Christmas. Sadly, Christmas dawned without a MEG on the bed. Perhaps Ian will let me come and play with his.

The day then degenerated nicely, with fermented grape juice, more food,

and then a nearby pub called The Sacks or some such. My last memory is walking past the Department of Vision Sciences at about 11 PM, and, through the window, seeing Tim Meese and Mark Georgeson locked in conversation. It was a touching tableau, one not to be disturbed. Till next Christmas.

Tom Troscianko  
University of Bristol.

## AVA books for sale

The AVA still has a number of new books for sale from conferences that it has organised over the years.

Payment can be by cheque or postal order in UK pounds (sorry, no credit cards) to “Applied Vision Association”. Send your payment with the order to:

AVA Secretariat,  
Applied Vision Association,  
College of Optometrists,  
42 Craven Street,  
London WC2N 5NG.

### Books available:

The cost for each book is £15 (including postage in the UK) for AVA members or £20 for non-AVA members. If you are outside the UK then add £5 per book to each of the prices above.

Gale, A.S., Astley, S.M., Dance, D.R. and Cairns, A.Y. (1994) **Digital Mammography**. Elsevier (424 pages).

Gale, A.S., Brown, I.D., Haslegrave, C.M., Krusysse, H.W. and Taylor, S.P. (1993) **Vision in Vehicles IV**. North Holland (355 pages).

Brogan, D., Gale, A. and Carr, K. (1993) **Visual Search 2**. Taylor and Francis (477 pages).

The cost of the Dalton conference book is £43 (including postage in the UK) for AVA members or £48 for non-AVA members. If you are outside the UK then add £5 per book.

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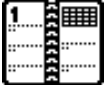
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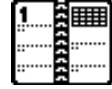
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**References supplied (as usual!) by:**

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# *Meetings Calendar*



**2000**

- April 30-May 5                      ARVO Ft Lauderdale, Florida, USA  
Abstract deadline: 3<sup>rd</sup> December 1999  
<http://www.faseb.org/arvo>
- August 27-31                        ECVP Groningen, The Netherlands  
Abstract deadline: 1<sup>st</sup> March 2000  
<http://ecvp.med.rug.nl>
- September 15                        AVA Natural Images 3, Bristol  
Abstract deadline: 4<sup>th</sup> August 2000  
contact: I\_Moorhead@dera.gov.uk
- November 4-9                        Society for Neuroscience  
New Orleans, LA  
<http://www.sfn.org>