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◆ **Behavioural correlates of differences in colour naming experiments using colour sorting, colour mapping, and colour choice**

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According to Berlin and Kay, the number of basic colour terms that languages may have, range from two to eleven. Most languages with between four and six terms have a term for 'grue' (green and blue). Although the prevalent view is that language differences do not arise from perceptual differences, Bornstein has argued that grue might reflect reduced sensitivity to blue light in the speakers of such languages. These languages tend to have originated in the tropics where there are high levels of ultraviolet light; a short-wavelength filter would protect the retina from damage and reduce chromatic aberrations, but effectively reduce the discriminability of blues and greens.

We report a comparison of two European groups with a group from Botswana and a fourth 'simulation' group of British subjects wearing short-wavelength filters, on a colour selection test, a colour grouping task, and a colour mapping task.

There were common patterns of performance across the samples, but in addition there were systematic differences which were associated with differences in language. The simulation group showed an extreme form of the Botswanan behaviour, thus lending tentative support to the Bornstein hypothesis.

◆ **Maximum-likelihood estimation of location in the three 'cardinal' directions of colour space**

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Objects are distinguished from their background both by virtue of their luminance variation and on the basis of their chromaticity variation. We have addressed the problem of what stimulus features, both of luminant and of isoluminant stimuli, may be used to allow spatial thresholds to be distinguished in the hyperacuity range. We have applied a maximum-likelihood method to estimate separately the location of Gaussian stimuli defined in the three cardinal directions of colour space (Krauskopf et al, 1982 *Vision Research* **22** 1123–1131). We found that in each case, it was the ratio between the outputs of two filters, one even-symmetric and the other odd-symmetric, that was used to make the estimate. The results may be interpreted in terms of the location of a point-like stimulus being attributed to some kind of nonlinear centroid in each of the three cardinal directions of colour space. The double-opponent units in the striate cortex that mediate chromatic and achromatic information may be considered to be the neurophysiological correlates of the filters. The computer simulation showed spatial thresholds to be in the hyperacuity range for the three kinds of stimuli. The relevance of the above approach, in our opinion, is that no a priori knowledge was needed to derive the filters, but that these were derived solely by the maximum-likelihood method.

◆ **Correlations between judgments of colour differences and visual ERPs corresponding to the colour presentations**

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We studied the correlations between subjective estimations of colour differences and event-related potentials (ERPs) corresponding to the colour presentations. Five colours (blue, green, cyan, red, and magenta) on a black background were used. Each single presentation contained three successive displays of the following sequence: colour (200 ms), background (50 ms), colour (200 ms), background (50 ms). After each presentation the subject estimated (on a scale from 0 to 9) the difference between the two colours. A session contained ten trials for each pair of colours, ie $5 \times 5 \times 10 = 250$ single presentations in random order. The ERPs were recorded with four monopolar electrodes located at points F3, F4, P3, and P4, and A2 as the reference (international 10–20 scheme). The results of one very experienced subject from three sessions were averaged relative to the trials and the sessions. Correlations between mean ERPs corresponding to the different colours were calculated too. In this way five matrices (5×5) were obtained: $M1$—mean estimations of the colour differences; and $M2_k$ ($k = 1 \ldots 4$)—correlations among mean ERPs corresponding to the four EEG record points. In addition, the correlations between $M1$ and $M2_k$ were calculated: 0.10, −0.06, −0.16, −0.27 (significantly at the level of 0.85) for the points F3, F4, P3, and P4 respectively. It was concluded that there exists a correlation between subjective estimations of colour differences and the right parietal ERPs corresponding to the colour presentations.