

# Doctors with Daltonism and the implications for counselling

**Daltonism is the most common human inherited defect. Although there is a wealth of well-researched knowledge about the condition, most people know little about it. Those who are born with it have a double disadvantage - they sometimes fail to see what other people see quite plainly, and they can be unaware of the occasions when this occurs<sup>1,2</sup>. This leads to the common attitude that they have little need for advice<sup>3</sup> which, in turn, presents a challenge to those who advise them.**

This article gives the results of a questionnaire study of 40 doctors with this deficiency of whom 35 were GPs. It is designed to show the range of difficulties they notice due to it in everyday life and in medical practice<sup>4</sup>. It was thought that doctors, as trained observers with some knowledge of colour vision, would provide valuable evidence on the subject. Counselling, and an effective method of providing it, is then discussed.

Screening is needed to identify those who need counselling, but there is evidence that in recent years this is being less frequently performed for children (personal communication JC Read, Department of Health, 1996). Prevocational screening is required for certain occupations but there are other occupations for which it is rarely performed in spite of the fact that judgements of colour can be involved in the work. Examples of the latter occupations are medicine, nursing and veterinary surgery.

Although there is a large literature on

Daltonism, little has been published on the method, or technique, of counselling for it. It is important that the method is considered because of the tendency of sufferers to reject advice - based on the assumption that the deficiency has little effect on the powers of observation. This author's conclusions depend upon a study of the literature, personally interviewing 40 doctors with Daltonism, and the fact that he is a deuteranope.

The term Daltonism is used here because it is thought preferable to the other two terms more commonly used in the UK and some other western countries. The term colour blindness can lead to misunderstandings that may be another reason for the rejection of advice - they know that they can see colours. The term congenital colour vision deficiency is four words rather than one and, in addition, the word congenital can have unpleasant associations. Both these terms involve an attempt to explain as well as to name, and for such a complex condition this is clearly attempting too much. The word Daltonism may need a brief explanation, but should not lead to misunderstandings.

## Method

Forty doctors who responded to letters placed in the medical press completed a questionnaire. They were then tested for the type and severity of their deficiency either in university optometry and visual science departments or by the author. They were told the result of these colour vision tests and briefly counselled. The study was conducted in 1993.

The tests used and the numbers taking them

were as follows - Ishihara Plates (39), City University (33), Farnsworth D15 (22), Farnsworth-Mansell 100-hue (22), Nagel Anomaloscope (18), Pickford-Nicholson Anomaloscope (2), American Optical HRR (6).

The questionnaire was designed to elicit knowledge of - (i) the deficiency, (ii) the range of difficulties encountered in everyday life, (iii) the range of difficulties encountered in medical practice, and (iv) the response of doctors to their difficulties in medical practice.

## Results

The sample comprised 38 male doctors and two female doctors, with a mean age of 48.3. All but five were general practitioners; nine were retired. All had received screening tests prior to the study. Of the 42 who requested a questionnaire, 40 were included in the study.

### Colour vision test results

- Deutans - 33  
(6 slight, 10 moderate, 17 severe)
- Protans - 7  
(1 slight, 1 moderate, 5 severe)

### What advice were you given when you were screened as a child or prevocationally?

- None - 27
- Misinformed - 1
- About future work - 12 (in most cases, the advice given was very limited)

### What difficulties did it cause in everyday life (give examples)?

See **Table 1**.

### What difficulties did it cause in medical practice and as a medical student?

To guide the doctors, the following headings were given - paediatrics, general medicine, surgery, dermatology, infectious diseases, otoscopy, ophthalmology, mouth and throat examination, endoscopy, test results, and charts (**Table 2**).

For medical difficulties, doctors with a mild deficiency reported fewer difficulties compared with the combined results of those with moderate and severe deficiency ( $P < 0.03$ ;  $n = 40$ ). No significant difference was found between protans and deutans for the number of difficulties reported.

### If you have difficulties in medical practice, how do you overcome them?

Seventeen doctors answered that they did so by close observation or cross checking; they specified looking, touching, doing special investigations and giving attention to lighting. Seven asked for help from others. Four gave more attention to the patient's history. Only one reported using a meter for reading test-tapes.

**Table 1** What difficulties did you have in everyday life?

Subject	n
Dress sense	28
Décor	15
Traffic lights and signals	13
Birds, berries, flowers, insects, books, letterboxes	12
Sports and games	10
Navigation (lights and buoys)	7
Aesthetic appreciation (art and nature)	6
Maps	5
Art as a hobby	4
Naming of colours	4
Memory of colours	3
Signs (other than traffic)	3
Others: food and drink (2), bird-watching (2), uniform recognition (2), flushing of the face (1), philately (1), gardening (1), bank notes (1), star watching (1), blackboard (1), print (1)	13

### The significance doctors gave to difficulties

Eight doctors thought their deficiency of major significance by virtue of the fact that they believed that they should not practise in certain specialties and, in the case of one doctor, because he believed he had put a patient's life at risk by deciding that fresh blood in vomit was bile. The specialties mentioned were - histology, haematology, bacteriology, surgery, pathology, dermatology, anaesthetics, and retinal work in ophthalmology.

There were three doctors with severe deficiencies who reported no difficulties and eight with moderate or severe deficiencies who reported very few difficulties (less than three) and who gave them no or very little significance.

### Discussion

The results confirmed the findings of earlier studies showing that Daltonism causes difficulties in everyday life<sup>5</sup> and in medical practice<sup>6</sup>. The doctors in this study were self selected and it follows that it is not possible to extrapolate accurately to the frequency of difficulties in the general population. However, it does provide evidence of the range of difficulties which are noticed and how the doctors reacted to them. Not only do the difficulties involve activities related to efficiency and convenience, but also dangers to human life and health. Errors in recognising navigational signals and fresh blood<sup>7</sup> as signs in medicine are examples of such dangers. Difficulties therefore call for serious attention.

The number of reported difficulties was shown to differ widely between individual doctors. This difference occurs even within the group with severe deficiencies. It is likely that those in this group who report few or no difficulties or give them little significance are failing to notice their difficulties. The fact that these doctors, in contrast to others, did not report ways of overcoming difficulties tends to confirm this.

Colour provides a system for communicating information and people with Daltonism are not able to rely on this system consistently. However, they often use cues which, in some circumstances, effectively replace reliance on colour. Brightness difference is an example of such a cue. But sometimes an observation of colour is pivotal<sup>8</sup>. This occurs when a decision depends solely on the observation of a particular colour. A red light at sea for a navigator, and red urine for a doctor are examples. Without audit or any other system of feedback, such errors will not necessarily be noticed. It is unlikely that one interview following colour vision testing will enable a person to make a full adjustment. This is the difficult task presented to the counsellor - the need not only to provide information but also to convince the person counselled that it is necessary.

Subject	n
Widespread body colour changes: pallor (12), cyanosis (9), jaundice (3), cherry-red (2)	26
Dermatology/rashes/erythema of skin (6)	25
Charts (13), slides (5), prints (2), codes (4)	24
Test-strips for blood and urine	22
Ophthalmology: disc pallor (3), diabetic changes (2), haemorrhage versus pigment (1), glaucoma (1), haemorrhage in anterior chamber (1), Kayser-Fleischer rings (1), others (9)	18
Body products: blood or bile in urine, faeces, sputum, vomit	18
Otoscopy: the inflamed drum (8), wax versus blood (1), others (5)	14
Microscopy (students: 11)	13
Mouth and throat conditions	9
Ishihara test giving	8
Chemistry end-points (students)	7
Colour naming	5
Tissue identification (surgery: 3)	4
What am I missing?	3

Table 2 Difficulties reported in medical practice as a student

### Counselling

An appropriate definition of counselling is - "An enabling process in learning of new behaviour and attitudes"<sup>9</sup>. The advice given here is not claimed to be definitive. It is for adults. Children require a modified form which accords with their understanding. They will usually need additional advice when they are older but their parents need advice at the time the deficiency is discovered, particularly about any limitation on future employment.

### General advice

In most situations, the deficiency causes no difficulty - but the belief that it causes none needs confronting, particularly if the deficiency is moderate or severe. One way of doing this is to show the subject photographs of various scenes and objects selected so that they can clearly show how failure can occur in discrimination, naming and matching of colours<sup>10</sup>. The subject can also be asked to perform the experiment at home or elsewhere by having a piece of red string placed on a lawn and timing themselves to see how long they take to find it, compared with a person with normal colour vision.

However, gaining insight into when difficulties occur depends on self-training and effort, and may take several years<sup>11</sup>. Discussion with others with normal colour vision may help, both with normal and abnormal colour vision.

The subject may have experienced or caused danger due to the deficiency. Simply listening to their account of this may help in the process of adjustment.

### Specific advice

#### 1. Confusing colours

- The colours confused are across most of the spectrum and not just reds, browns and green.
- The difficulties are in discriminating, naming, and matching colours.
- Conditions of observation can help or hinder. Relevant factors are - lighting, atmospheric conditions, the presence or absence of cues (particularly light/dark difference), the nature of the background (when variegated the difficulty is greater), and the angle an object subtends at the eye (small and distant objects being more difficult). When an object subtends an angle of less than 2° at the eye, the subject with a severe deficiency (i.e. dichromat) will be completely unable to distinguish red from green. It can be helpful to know that 2° is the approximate angle subtended at the eye by the last segment of the thumb when held at arm's length.
- With severe deficiencies even some bright colours can be confused. Mild deficiencies only rarely cause difficulty.
- Deutans and protans confuse the same colours but protans have greater difficulty with red - they can even see it as grey or black when it is dark or viewed in poor illumination.

#### 2. Employment

Awareness of a deficiency and its severity is an important first step in planning a career. Required standards of colour vision vary among careers and between countries.

To obtain information it may be necessary to contact the occupational health department of the employer concerned. Careers known to require colour standards have been listed<sup>12</sup>. For some occupations, for example medicine and nursing, private enquiry before making a decision is the only way of deciding whether to train for it.

### 3. Driving a motor vehicle and aviation

There is no bar on driving a private motor vehicle but standards apply in public transport and aviation. Caution is needed for all drivers with Daltonism in reading traffic lights and other road signs particularly in foreign countries and in responding to braking lights

### 4. Inheritance

An outline of the genetics should be given<sup>12</sup>. For the occasional complex cases, expert advice may be needed.

### 5. Tinted lenses

The advantages and disadvantages should be explained<sup>12,13</sup>.

6. A written version of the diagnosis and advice should be provided, and also a report for the prospective employer.

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### About the author

Dr Anthony Spalding was a general practitioner in Newham, London, for 25 years. He retired 12 years ago and has since then been studying the effects of Daltonism on doctors' clinical skills. He is a member of the International Colour Vision Society. No financial support was received for this study.

Dr Spalding's book - *Effects of Colour Blindness* - is reviewed on page 42.