



COLOUR BLIND
AWARENESS AND SUPPORT GROUP
AUSTRALIA
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Received 11/11/05

**The Committee Manager,
Committee on Children and Young People,
Parliament House,
Maquarie Street,
SYDNEY. N.S.W. 2000**

Dear Sir / Madam,

**Re: Committee on Children and Young People,
Inquiry into Children, Young People and the Built Environment
COLOUR PERCEPTION**

In a world of many technological advances, colour perception has become a very important issue. An increased emphasis on colour technology with signs, information, safety, directions, bus and train routes etc; has raised concerns about the awareness of colour blindness. (Colour Defective Vision).

The majority of the community and businesses are not aware of the origins of colour blindness and the many different types and variations even though many people are effected by it. Australian and world studies have consistently shown that nearly 1:10 males and 1:200 females are effected by colour defective vision. (Nearly 100,000 N.S.W. school children)

Statistics have consistently shown both here and overseas that not less than 47% of children leave Secondary school without having been tested or knowing that they have colour defective vision. Since the children have been exposed to the colour deficiencies for his or her life, it is commonplace and an everyday occurrence to them that they are not aware or do not want to make others or their teachers aware about their disability. This may lead children with Colour Defective Vision to not be able to discriminate between certain colours and thus impede or slow identification of any colour coded technology or information.

Therefor it is important for the committee to look at the prevalence of colour defective vision in children and that impact on the built environment.

On behalf of the Colour Blind Awareness and Support Group and to assist the committee to be conversant with the facts, problems and possible solutions, we have set out a brief summary on the following pages, consisting:

- COLOUR DEFECTIVE VISION " THE FACTS 1 & 2 "
- COLOUR DEFECTIVE VISION " BUILT IN PROBLEMS 1&2 "
- COLOUR DEFECTIVE VISION " BUILT IN SOLUTIONS 1&2 "
- COLOUR DEFECTIVE VISION " CONCLUSION "

The lists are by no means complete but we have tried to indicate to the committee the type of colour issues faced by the children with colour defective vision. We would only be too pleased by further giving personal accounts and evidence.

Further we would be only to pleased to assist the Government in any way to achieve a fair and economical way of supporting some colour change to the built environment. Most issues can be resolved economically by raising awareness of colour defective vision to Business, other Government Departments and authorities and by the use of some COLOUR COMPENSATING.

Yours faithfully,



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10/11/2005
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COLOUR DEFECTIVE VISION "THE FACTS SHEET 1"

- Results of World and Australian studies have consistently shown that **Between 1:10 and 1:12 males and 1:200 females suffer from colour defective vision.**
The figure **does not include** colour vision loss due to **injury, sickness, diabetes etc;**
(Sewell, 1983; Lewis, Retizammer & Amous, 1990; Cole, 1988 /2004)
- Given the above figures and according to the statistics figure given in **Issue Paper 1 (2,227,500 children)** then given app 50/50 male / female and using the lower percentage ;
Conservatively some 92,812 male and 5,569 female children suffer from colour defective vision in New South Wales.
- The community does not realise there are at **least 8 classifications of colour defective vision plus individual variations.** Hence the **confusion we are either blind or do not see any colours at all.** Briefly and to keep it simple, in the eyes we have CONES AND RODS. Most people with regular colour vision are Trichromatic that is; they use all three colour cones. (Red/Green/Blue, well, wavelengths close to those.)

People with **Anomalous Trichromatic** vision use all three colour receptors but reception of one of the cones has faulty wiring or firing.

PROTOMALY - Reduced Red sensitivity
DEUTERANOMALY - Reduced Green sensitivity
TRITANOMALY - Reduced Blue sensitivity

Dichromatic vision is where one of the actual cones is missing and not just misfiring.

PROTANOPIA - Unable to receive Red
DEUTERANOPIA - Unable to receive Green
TRITANOPIA - Unable to receive Blue

People with **Monochromatic vision** can only see one colour, that is, full grey scale or very low colour recognition. These unfortunate people can be classified as: TYPICAL MONOCHROMAT or ATYPICAL MONOCHROMAT

COLOUR DEFECTIVE VISION "THE FACTS SHEET 2"

- The most common colour defect is DEUTERANOMALY, that is, Reduced Green sensitivity and 6% of the 8% with colour defective vision suffer from this colour defect. The condition is hereditary caused by a faulty gene on the sex chromosome, passed from the male to the female offspring who then has a 50 / 50% chance of passing it to her offspring. Hence the condition will never die out. In fact some 14% of the female population carry the defective gene and do not realise it?
- There is no mandatory colour vision testing for Australian School Children. Consequently statistics have shown both here and overseas that approximately 40 to 47% of children leave Secondary school without having been tested or knowing or wanting others to know that they have colour defective vision. (N.Z.H.T.A., 1998; Cole 1988)
- Further research has also shown in Australia (Cole, 1988) that: **Less than 8% of Anomalous Trichromats were aware of their defect at PRIMARY SCHOOL, whilst only 28% reported they become aware of their condition at SECONDARY SCHOOL.**
- In the same paper approximately 15% of Anomalous Trichromats were alerted to their defect only after being given a medical examination required for a potential employer.
- The parents of children with colour defective vision all agree that the children will go to great lengths to hide their disability for fear of being different, particularly males.

COLOUR DEFECTIVE VISION "BUILT IN PROBLEMS 1"

- As stated before **Anomalous Trichromats have Green Sensitivity (MAJORITY)** and if one of those types of cones is malfunctioning or missing the brain cannot perceive the correct colour. The most common is GREEN or RED, NOW THAT DOES NOT MEAN IT IS JUST GREEN or RED COLOURS **BUT ANY COLOUR WITH GREEN-RED IN IT.** Hence children may see reds-greens-browns- as perhaps grey and any purples, violets as blue and some yellows and oranges may look the same. **Some times it will differ with the amount of light... either too much or to little..**

- **The continued use of RED AND GREEN for the information highway** the two worst colours for colour vision defectives.

WARNING LABELS, SIGNS, INFORMATION

- **The continued use of COLOUR for the sake of using colour in SIGNS and INFORMATION because it is easy.**

COMPLEX OR TOO MUCH INFORMATION ON SIGNS

- **SIGNS and INFORMATION** should be used to lead, inform and to seek further instructions or information. Most colour coding boards, signs in Australia today are not colour defective friendly:

TRAIN ROUTES - BUS ROUTES - SIGNS - PARKING - INSTRUCTIONS
BUILDINGS - INFORMAL CUES etc;

- **SAFETY** and emergency instruction are poorly coded and include the following in most hospitals or business such as

PRESS THE RED BUTTON, EVACUATION AND EMERGENCY PLANS

- **MANUFACTURES** of fittings to the built environment such that use **small identifying colour patches** that most colour defectives would find hard to discriminate. This is also a **SAFETY ISSUE.**

TAP FITTINGS and EQUIPMENT

COLOUR DEFECTIVE VISION "BUILT IN PROBLEMS 2"

- **LIGHTING** over or near signs has a detrimental effect on colour discrimination...either too much or too little.

NIGHT ELUMINATION SIGNS

- **ELECTRONIC DISPLAY INFORMATION** or **L.E.D. with the use of RED OR GREEN** dots colour defectives will not notice a change of colour.

ELECTRONIC DISPLAY SIGNS, PRINTING EQUIPMENT

- **COLOUR DISCRIMINATION** for advertising and packaging in store settings, If we can not see it we do not need it?

SHOPPING CENTRES

- **COLOUR CODED VISUAL DISPLAY** such as maps, directions and other information such as:

MAPS, WEATHER AND POLLUTION INDEXED INFORMATION

- **SPORT AND SPORTING AREAS** using coloured teams and instructions such as:

FLAGS, TEAM STRIPS, LINES etc;

The list is not complete but gives the committee an overview of a wide range of difficulties faced by colour defective vision children.

COLOUR DEFECTIVE VISION "BUILT IN SOLUTIONS 1"

- **Planners**, builders, developers, consent authorities and urban and town planners should be made aware of the high percentage colour defective vision children in our society and plan accordingly.

SUGGESTED SOLUTION "EDUCATION"

- **Due to the number of different classifications of colour defective vision** in children and adults we cannot make colour modifications to suit them all. However by targeting the largest group **Anomalous Trichromats, Green Sensitivity (MAJORITY)** we can economically **MAKE COLOUR CHANGES** to help some **80%** of the population with **COLOUR DEFECTIVE VISION**.

SUGGESTED SOLUTION **"EDUCATION and COLOUR MODIFICATIONS"**

- **COLOUR COMPENSATION** is the simplest way to assist people with colour defective vision. That is, with **ALL SIGNS**, information, evacuation plans etc; still use colour but use colours that are not conflicting or use secondary clues. *We have assisted the committee with a range of suggestions that can be used to suit particular signs or situations.*

SUGGESTED SOLUTION **"EDUCATION and COLOUR COMPENSATION"**

Some colour-blind people may **like bright colours** because they can detect them more easily. **Use blue, yellow, white and black.**

Use clear, recognisable and **meaningful navigational clues** on information to stop people turning off searches.

Use textures or line shading instead of colour. Consider additional labels or the pattern function on the computer, especially for maps and charts. Text must be pleasant and easy to read.

Use small palette of colours. Associate colour choices with each message or piece of information.