

Submission 195
EoB Inquiry (Exhibit 140)

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31/07/01

KAY ELSON MP
Federal Member for Forde
Chair - Standing Committee on
Employment, Education & Workplace Relations.
PARLIAMENT HOUSE
CANBERRA. A.C.T. 2600

Re: Inquiry into Boys Education.

Dear Ms K. Elson,

Thank you for the opportunity to be able to forward a submission to the Standing Committee on the above inquiry. My research on COLOUR BLINDNESS (Colour Defective Vision) does fall within the "Terms of Reference" of the inquiry.

My original research on COLOUR BLINDNESS resulted from insufficient studies and publications to be able to assist children, parents and teachers on the subject. After some 2 years of research, I published a COLOUR BLIND HANDBOOK, specifically designed to meet their needs. I am no scientist, nor do I have any formal qualifications in colour defective vision, but I know what it is like to be colour blind and I felt sorry for the young colorblind children in today's colour world.

Despite researchers continually stating that colour blindness has no adverse effect on the learning process, I hope the committee reads my report in its entirety and comes to the same conclusion I have? Colour blindness does effect the social, cultural and educational factors in the education of boys in Australian schools. Colour blindness has remained hidden for too long, yet, up to 10% of Australian males are colour blind or app one million of our population. My publication has been widely accepted by parents and Doctors, yet, Health and Education Departments are still to accept there is a problem. Insufficient understanding of colour blindness, has often, resulted in the handbook being referred to Vision Impaired and the blind associations.

The COLOUR BLIND Handbook is not a scientific publication but is based on scientific research and my experience to help the students, parents and teachers understand colour blindness in a simple form and how to address the issue. My report has been prepared so as to address the "Terms of Reference" of the Inquiry but to expedite matters I used extracts from my publication. I have also included a copy of the HANDBOOK with this submission for your consideration.

I would also like to express interest, to personally answer any questions of the Standing Committee on colour blindness, because the issue needs awareness to the community in general.

Yours sincerely,



Dennis R. Overton.

Dip. Teach, B.Ed, (Tech) A.N.Z.A.C. Fellow (1978) Winston Churchill Fellow (1995)

STANDING COMMITTEE ON EMPLOYMENT,
EDUCATION
AND
WORKPLACE RELATIONS.

INQUIRY INTO BOYS EDUCATION

SUBMISSION

COLOUR BLINDNESS
(COLOUR DEFECTIVE VISION)

REPORT
By

Dennis R. Overton.
Dip. Teach, B.Ed, (Tech) A.N.Z.A.C. Fellow (1978)
Winston Churchill Fellow (1995)

STANDING COMMITTEE ON EMPLOYMENT,
EDUCATION
AND
WORKPLACE RELATIONS.

INQUIRY INTO BOYS EDUCATION

TERMS OF REFERENCE

To inquire and report on:

The social, cultural and educational factors effecting the education of boys in Australian schools, particularly in relation to their literacy needs and socialisation skills in the early and middle years of schooling; and

The strategies which schools have adopted to help address these factors, those strategies which have been successful and scope for their broader implementation or increased effectiveness.

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The social, cultural and educational factors effecting the education of boys in Australian schools, particularly in relation to their literacy needs and socialisation skills in the early and middle years of schooling;

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(COLOUR DEFECTIVE VISION)

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STANDING COMMITTEE ON EMPLOYMENT, EDUCATION
AND
WORKPLACE RELATIONS

INQUIRY INTO BOYS EDUCATION

TERMS OF REFERENCE

To inquire and report on: **PART A.**

The social, cultural and educational factors effecting the education of boys in Australian schools, particularly in relation to their literacy needs and socialisation skills in the early and middle years of schooling.

COLOUR BLINDNESS
(COLOUR DEFECTIVE VISION)

1. OVERVIEW

People take for granted their eyesight and presume all humans perceive the same colours. Males will hide their colour blindness affliction, whilst women usually are unaware they carry the defective gene that they may pass on to future generations. So that the committee is well informed on colour blindness, I have included in this report background knowledge and information which is best explained via HANDBOOK EXTRACTS I published on the subject.

(PART HANDBOOK EXTRACT)

Colour blindness implies people can only see in black and white and not in colour! This is not true, well for 99% of us anyhow! Us, I mean 1 in 12 males and 1 in 200 females. (A mere 1 million Australians) Well, we see the world in our own colours, or perceived colours, which is not unlike normal people, except that some of our colours tend to merge. That is, certain colours like reds and greens, in my case, may look the same colour (what colour? – that depends on the light) but vary in intensity or shading. The same may be said for colours consisting of any red or green component such as violet and purple, which appear to me as blue. Something like a colour T.V. with the red and green tuning knobs broken. So you can imagine what it would be like for a child in kindergarten faced with a set of say 24 different coloured pencils, that some are perceived to be the same colour yet have different names. It happened to me!

So am I looking for a new minority group for the colour blind? No, just understanding! Colour blindness is *hereditary* and it is not curable or treatable, therefore the medical community tends to pay little attention to it. Like my grandson today, when I was diagnosed with colour blindness, you were told that you were colour blind that was it, nothing else!

Most authors on the subject state that people with colour blindness will adapt without any serious inconvenience or problems. That statement is partly true, but it is usually written by an author who is **not** colour blind. Colour blindness is inconvenient; it does effect learning and every day living, and does limit career opportunities. How would you like it not to be able to read of the blackboard or out of a book and not know why? Or not to be able to distinguish ripe or unripe fruit or follow colour coded instructions.

Perhaps for your clothes to be co-ordinated by some one else every day or your career path excluded from being a police, fire or ambulance officer, and marine or air pilot? (Can you think of a career that does not use colour?)

Some may say that who wants to be shot, burnt, poorly paid, ship wrecked or smashed into a mountain anyhow? That's not the point. If we are competent and can safely carry out the duties, and our only crime is not to pass the *Colour Blind Test* then why not? There was a case of the Cessna Pilot in Australia who was not allowed to fly at night because he was colour blind. Yet, colour blind Air Pilots, commanding 747 Jumbo Jets; were flying into Sydney from overseas. The Australian pilot went to court and won because he proved he was competent (he took the plane instruments into court). That is not to say some people may not be competent. Some people may not even be aware of their colour perception problem. Did you know that up to 47% of children leave schools without knowing they are colour blind? What would it feel like to be accepted by the defence academy on your academic achievement to find out later you are colour blind? How did you learn your colours? Does every person perceive the same colour or intensity of colour? Nearly all males with colour blindness have a sufferer in silence syndrome? Why? Because non-colour blind people fail to understand colour blindness.

*I have used the term colour blind, however, to be politically correct, the terminology is **Colour Defective Vision (C.D.V.)** and covers a number of specific colour defective conditions. The most common is red - green, which covers about 6-8% of the 8-10% of the colour vision defects. Perhaps if the correct terminology was used and understood, Colour Blindness (C.D.V.) would not be labelled or referred to the **Blind Association or Impaired Vision Support**.*

Today, at work and even leisure, with computers, maps, information, coding, timetables, weather maps, advertisement and games, colour is more prevalent than 30 years ago. As a matter of fact, you might say, we suffer from colour overload. Colour should be used to guide us through or to important information. The community, including teachers, employers and parents, fail to fully understand colour defective vision. As I said before, a child may not be able to read off the blackboard or out of a book or follow colour-coded work sheets. Employees may get orders mixed up. Travellers may not be able to understand colour-coded train or bus timetables or routes. Unknown to advertisers, colour may turn over 5% of the population off their product. (We can't buy it if we can't see it?) Yet, up to 10% of males and 0.5% of females of the population, are excluded or ignored.

*What can we do? Well, designing for people with different types of colour defective vision is not easy, as you are not going to please them all. But at least by being aware there are colour deficiencies in the world, is a start, and keeping to some basic rules of colour then **colour compensating**, will result in a lot more people accessing the product and or information. By basic colour rules, I mean, use bright colours like yellow, black, blue and white. Keep away from low intensity colours on small bands. By colour compensate it means you can still use red and green but not together instead use red **or** green with different intensity of colour. Use shading instead of colour or use secondary navigation clues.*

Unfortunately red and green is still being used for school work sheets. How long would it take to check to see if any of your students are colour blind?

There is at least 1 - 2 colour defective vision students in every class (Not maybe) and they are not going to tell you! Do you know what to do if they are? Also students should not be totally excluded from a career that requires a degree of normal colour perception but should be counselled and made aware of the colour career challenges that lay ahead of them.

*Less than 0.5% of women have colour defective vision, yet app 1: 7 of women will carry the defective gene which causes the colour defective vision in males and they may not even be aware of it. Therefore with **C.D.V.** it is also a question of awareness for females. Believe it or not some babies with **C.D.V** will be turned off food because of colour blindness.*

However before I start giving further details and facts on colour defective vision and its effect on the social, cultural and educational factors effecting the education of boys, it would be prudent of me to explain some background knowledge to the committee on colour defective vision.(**C.D.V.**)

THE EYE'S HAVE IT

Colour vision is complex and is best explained as per:

HANDBOOK EXTRACT

In this chapter I will give a simple overview of colour and defective colour vision, as I understand it, from being a defective detective. It can then be best explained to a child, or to an adult for that matter, without being turned off by complicated scientific explanations.

What colours do your eyes see? None! The eyes do not see any colours at all! Instead, light given off by an object enters the eye through transparent tissues turning it into an Electro-chemical signal, then sending it via nerves to the brain, that interprets it into a visual image. Sounds simple? Well, before we go any further, lets look at a bit of history.

THE DALTON GANG

In 1798, when John Dalton, a noted chemist, described his own defective colour vision, was there any acceptance of individual differences in the ability to discriminate colours? It is ironic that it took a chemist, not a doctor, to understand defective colour vision. John Dalton was no ordinary scientist. Throughout his career he studied gases, and from the results of his experiments he developed an atomic theory. Part of John Dalton's atomic theory is still accepted today. I wonder how a colour blind scientist working with colours would be accepted today?

Thus we have a new term for colour blindness or defective colour vision, DALTONISM. (It sounds like we are suffering from onset of some old age disease!) Yes, believe or not, the term is frequently used to describe colour blindness! Don't worry there are still some more scientific terms to come to describe the affliction!

However, I prefer to use the term the Dalton Gang. Like the Dalton Gang, who were American Outlaws and regularly held up rail stations in the American Mid-West during the last century, today's Dalton Gang regularly hold up train stations trying to figure out how to use the colour coded network maps. (All major cities in the world I have visited have similar colour coded train network diagrams and they wonder why they are held up!)

THE NUMBER'S UP

Ultimately, whether you have normal vision or not, at some time in your life, you are going to be tested for colour blindness! The dreaded find the number in the coloured dot book.

(Well dreaded as far as I am concerned – for reasons I will explain later). Your secret, if you have hidden one, is going to be found out. There are many tests available to measure colour vision defects but the most common is the Ishihara pseudo-isochromatic plates. (Invented by Ishihara - in 1917, pseudo-isochromatic is not his last name). This test is the most widely used for red – green colour deficiency and contains 38 plates of which 25 contain numerals and 13 contain pathways. Detect the wrong numeral or do not find a numeral and you are in big trouble! The test is useful in detecting some colour vision defects but not all. (This will be discussed later once we get you onto the right wavelength of colour vision).

There is a story; I picked up on the Internet, about a C.D.V. gentleman who wanted to be an officer in the United States Navy. The poor man was so desperate to be accepted he contacted a Navy doctor to ask if he could borrow the C.D.V. Plates, so he could study for the test. (Definitely Officer material!)

Well, how many get the wrong numbers or can not see any numbers at all? Or how many members in the Dalton Gang are there? It is difficult to put a precise figure or percentage on C.D.V. because it depends on which study or studies you believe! The results of reliable studies I have read vary from 6% to 12% in males and from 0.05 to 1% for females. This is understandable depending on the numbers in the study, race and the country of origin.

The above figures exclude accident or illness acquired colour blindness. Yes, this can happen! However, there is one escapable fact, colour blindness is hereditary, so males can usually blame their mother and paternal grandfather for that. This is why the figure is higher for males. (Hereditary colour blindness will be discussed later in this chapter). The most consistent study figures seem to be 8% for males and 0.5% for females. (See TABLE 1.)

The studies also show the incidence of colour blindness is also higher for caucasian males and lower in males from Asian and African countries. Some studies also indicate a high incidence in East European males. So that's about the best numbers I can give you of the Dalton Gang members.
(See TABLE 1.)

So who leads the gang now? I don't know? But I do know that at least two Presidents of the United States of America were Dalton Gang members. The Dalton's exclude other OUTLAW gangs (outside the law of averages), therefore the figures could be slightly higher, considering the suffer in silence syndrome as I discussed before. The figures can also be broken down into the various categories of colour blindness. Yes, we are all so special; they found sub-group names for all of us. For me the correct scientific terminology for my red – green problem is ANOMALOUS TRICHROMAT (meaning I have all the necessary equipment in the eye, three special cones for correct colour vision, but some thing is not working properly) If you believe that theory!

To be fair all people with correct functioning cones are called TRICHROMATES (three types of cones for colour vision). ANOMALOUS means abnormal, therefore, I have abnormal cones for colour vision. Of course, there are other types and names for abnormal colour vision and I will briefly discuss these types later. The sub – groups are even sub-grouped again, can you believe it?

My scientific terminology sub-sub-group name is DEUTERANOMALIA (meaning that, of the three types of special cones in eye, only two of the types of cones are only functioning properly - abnormal green sensitivity.) ANOMALOUS TRICHROMAT DEUTERANOMALOUS, like me, account for 5-6% of the 8% of males and nearly 0.4% of the 0.5% of females in the incidence of colour blindness. (See TABLE 1.) So by far, the green - red eyes have it! O.K. now that you have seen the numbers, lets look at colour vision.

“COLOUR” said Isaac Newton,
“IS IN THE MIND NOT THE OBJECT”

In the 18th century Sir Isaac Newton said that colour is in the mind and not the object and research over the years has proved him to be correct. People think the eye is a separate part of the body and has it's own function. Well the eye does have it's own function but as I said before it does not see. In fact the eye is a part of the brain and is the only part of the brain we can see. (So to speak.) Vision is a very complex subject, therefore I will be only discussing colour perception with regards to the mechanics of colour blindness, being a mere colour defective detective.

There are a number of theories and research on colour perception and readers might like to follow other theories or research in this area. However unless we can enter our brain and find out how the eye - brain operates, it will be just that, theory! The eye-brain pathway constitutes a computer more complex and powerful than any human engineer could ever build. Given time, new technology and the key to unlock our genetics, we may enter the brain to find out how the hard drive to our computer brain works.

As a matter of fact some scientists think red- green Dalton's may hold the key to unravelling some of the secrets of our genetics. (See also the "X" files.) This research does seem ironical, given a Dalton found a key to destroy us and another Dalton may hold the key to reconstruct us!

How many colours can we see? Oops, I mean the brain perceive? I read an article from the United Kingdom; the National Bureau of Standards identified 7500 colour names. In another article I read there are apparently 7 to 10 million colours we can perceive.

Well, not all, but it makes you think how we can distinguish all those colours? For me, I get confused with 24 coloured pencils let alone 10 million! I get freaked out just thinking about it!

As I said before, we speak of seeing colours but we do not actually see them. We actually see the light that objects reflect or give off. Our eyes absorb the light and change it into electrochemical signals sending it to the brain via nerves which in turn interprets them into colour images. Light is a form of energy that behaves like a wave (as in water) and is called a lightwave. (Naturally) A wavelength is the distance between any point on the wave and the next corresponding point on the same wave. (measured in nanometres.) I thought you wanted to know that! In humans, our eyes can only detect a very small visible portion of the radiant energy spectrum, which ranges from cosmic rays on one end to radio waves and A-C circuits on the other. The visible spectrum we pick up ranges from VIOLET, wavelength app. 400 nanometres, to RED wavelength app.700 nanometres. (remember the rainbow ROY G BIV. Red, Orange, Yellow etc;) To distinguish colours or wavelengths we need different types of colour sensors in the eye, known as cones (after their shape), and each cone is tuned to a specific wavelength.

We humans have three specific types of cones tuned to the specific wavelengths, not exactly, but close to, RED, long wavelength, GREEN, medium wavelength and BLUE, short wavelength. I hope you are beginning to see the light? No, do not turn off the light just yet, we are getting to see some colour! (See FIGURE 2. for help)

The three separate types of cones, as I said before, respond to the three primary colours of light RED, GREEN and BLUE. Mixtures of these colours in various combinations create different wavelengths and stimulate cones to various degrees. For example when YELLOW enters the eye, it falls on the BLUE cones, not much happens. When YELLOW falls on the RED and GREEN cones, part of red and a certain part of green are detected. We all know red and green make yellow! (A bit like mixing paint but we are mixing light)

The RED - GREEN signals are sent to the brain that turns them back into YELLOW (Pretty smart!) and it all happens in the blink of an eye. (well the speed of light!) Of course colour perception is more complex than the little example I have given you but I don't want you to catch a different wave. Bare in mind we have not discussed vision, movement and depth, and that is another story. What if it is night and there is very little light, how do we perceive colour? Do you see colour when it is dark? No? To complicate things a little more, in our eyes we have RODS (named after their shape) and are sensitive to dim light but cannot distinguish wavelengths. (That's why we cannot see colour in a dark room, only grey). As light dims the cones cease to function and the rods kick in. Both rods and cones have special material in them that need to be replenished, a protein, (it gets used up) that is why we need time for this material to be replaced when we go from light to dark or visa versa.

Well how many of these little CONES and RODS have we in our eyes? The figures vary, but not much, and seem to be about 130 million RODS and 6.5 million CONES per eye. (I do not know who counted them or how?) Another study suggested the CONE population of a non-Dalton consisted of 4.8 million RED cones, 1 million GREEN cones and 0.7 million BLUE cones. (I thought you might like knowing those figures). The pattern of the cones and rods in the eye is interesting too, with all cones at the centre of vision, then some cones and rods and finally all rods at the perimeter. Non - Dalton, RED, GREEN and BLUE cones,.. does this give you a clue about my colour perception problems?

It should, but it does not explain it all. Schools of thought, including some studies, suggest some of the cones are missing or are malfunctioning and there are even names for missing cones. But wait, there is still some more data to come before we make any judgement ourselves. A strange fact is the cones and rods face in, not out, to catch the lightwaves. Connected to the ends of the cones and rods, (antennas) amongst other cells, are the GANGLION CELLS, more gang members, (like an encoding machine) whose fibres transmit electrical impulses to the optic nerve (power lines), thence to the LATERAL GENICULATE NUCLEUS (lets call it a relay station) and on to selected areas of the VISUAL CORTEX. (Our computer, the brain). (See FIGURE 3/4. For help)

Since normal colour perception depends on all the events, connections and cells outlined and not just cones and rods, then a disturbance in any part of the LINK or a power failure could alter our colour perception. (an interesting thought!) This probably explains why we have differences in colour perception or degrees of defective colour vision and why an illness can effect colour vision. There is a very small population that is colour blind and do only see in black and white. But we are all born colour blind! Well, that is what one doctor indicates. Apparently human cones do not begin functioning until a baby is four months old and about 1 in 40,000 babies never develop cones, seeing black and white through out their life (these poor people have a name too?) ACHROMATOPSIA. (A name for the use the rods only) There are also names for people with other missing or malfunctioning cones basically RED and GREEN but extremely rare for BLUE. Rods are also excellent for picking up movement and since they are at the outside perimeter of the eye perhaps it explains the old statement: "I saw something out of the corner of my eye". (And why schoolteachers have excellent vision while writing on the board! ...) I have spoken to Dalton's who have remarked about their sensitivity to bright light and apparently ability to see clearer than Non- Dalton's at night. I found no studies on this statement but from a personal point of view I am in concurrence with this theory.

Maybe it can be contributed to like losing one sensitive (cone) and being double sensitive (rods) in another?

That is not the end of colour perception but enough to explain the problem and perhaps wet your appetite. Once you read about or try to understand the eye - brain function, the more it becomes complicated.

Like, we have two eyes that have to work in conjunction and half the nerves cross over on their way back to the brain, let alone considering movement and depth. Apparently over half of our brain (computers hard drive) is needed for vision, well, you know what I mean!

THE "X" FILES

This is where we get into some scary stuff and make your eyelashes stand on end! So you think some primates and we humans have excellent colour perception? Is three types of cones the ultimate in colour perception? Do you know that many insects and fish have four cones and chickens six cones? The higher number of cones, of course, permits finer colour discriminations. That is why chickens peck the ground finding food we humans would find hard to colour discriminate. Bees can see ultraviolet light that is invisible to us humans but cannot see red! Bulls are colour blind and do not see red, despite the red capes. How do we know? Colour blind test? No someone cut an eye out. That's NO bull. An octopus is colour blind yet it can change its colour to suit the colour of its surroundings!

Why did we need colour in the first place? Lunchtime! Well, that is, Professor's Derrington theory. ... The ability to discriminate reds and greens and other colours in between the red-green spectrum was acquired fairly recently, in our evolutionary history, so that we could distinguish ripe and unripe fruit particularly against any green foliage. I guess my ancestors, to survive, were plain dwellers and meat eaters! Professor Derrington went on to say that if we are to understand how colour vision works, then research has to branch out from physiology into ecology, chemistry, and molecular biology. (from what I have read it sounds fair to me.) Professor Derrington said also that, our cone pigments for red - green colour discrimination, have the same general structure and 95% of the chemical content is identical, giving thought to a common ancestor. The theory also means the genes that code the pigments can pair illegitimately, producing intermediate pigments, or double copies of the same pigment, giving rise to different forms of red - green colour blindness. (not a bad theory!...)

This understanding of chemistry and molecular biology, according to Derrington, means we can test for colour blindness from a tissue sample. Some genetic detectives did just that and took a sample tissue of John Dalton's eyes (his eyes were preserved in a jar in a collection at Manchester) and confirmed his colour deficiency. (it just goes to show not to leave your eyes lying about when you don't need them!)

Developing blood tests for colour blindness would be useful for small children who are not able to take the dreaded colour test. As I stated before, colour blindness is a common hereditary condition and usually passed (50% chance) from mother to son. The son usually passes colour blindness (100% chance) to his daughters.

The daughters pass the colour blindness (50% chance) on to their sons and so on. How? We all know the 23rd pair of our chromosomes is sex chromosomes?

Well they are! One pair of chromosomes can be either X-X or X-Y. If we are X-X then we are female and if we are X-Y we are male. But you all knew that!

The colour-blind gene is carried on one of the X-chromosomes, which happens to be one of the sex chromosomes. Since men have only one X chromosome (X-Y) and if it carries a Dalton then they will be colour blind. If a woman carries a Dalton on one X chromosome (X-X) and one does not carry a Dalton, then she will not be colour blind but will carry the Dalton to pass on. (See FIGURE.1a b c d for help) For a female to be colour blind then the father must be colour blind and the mother must carry a Dalton. (Two defective X chromosomes) or for all females and all males to be colour blind then a colour blind male and female union must exist. That is why a female Dalton's rare. If this union exists then all the males will be colour blind and all the females will be colour blind. (a true Dalton Gang... ..)

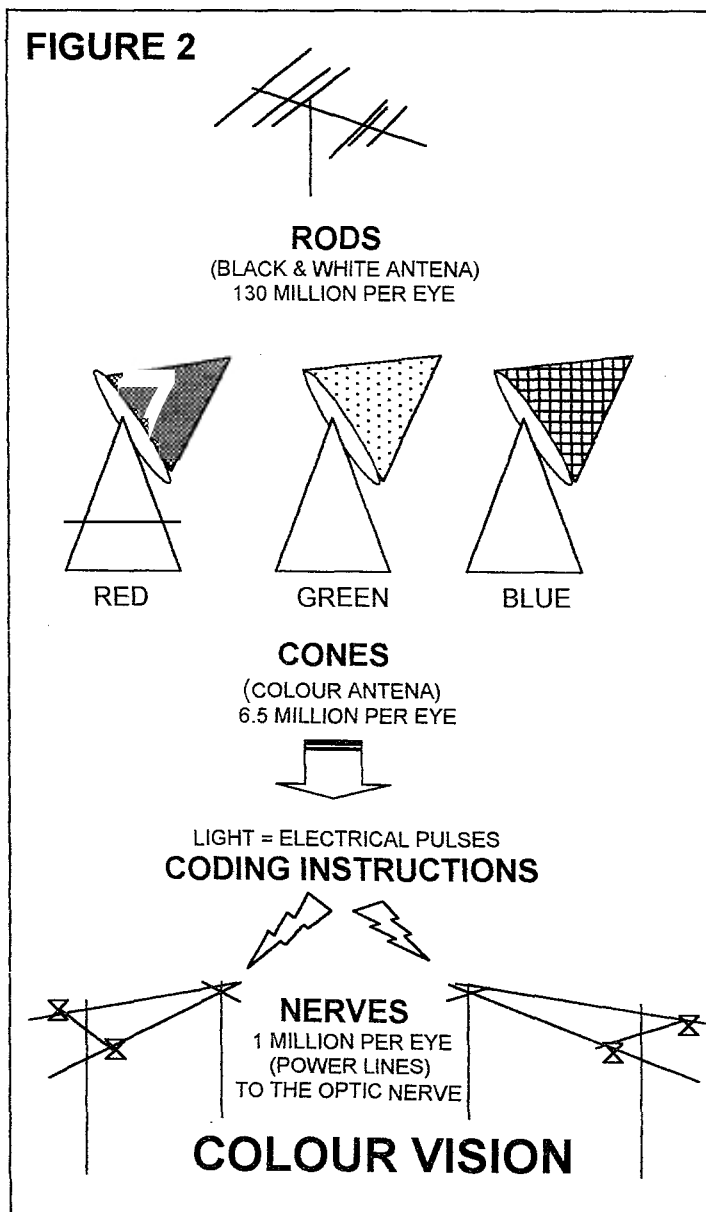
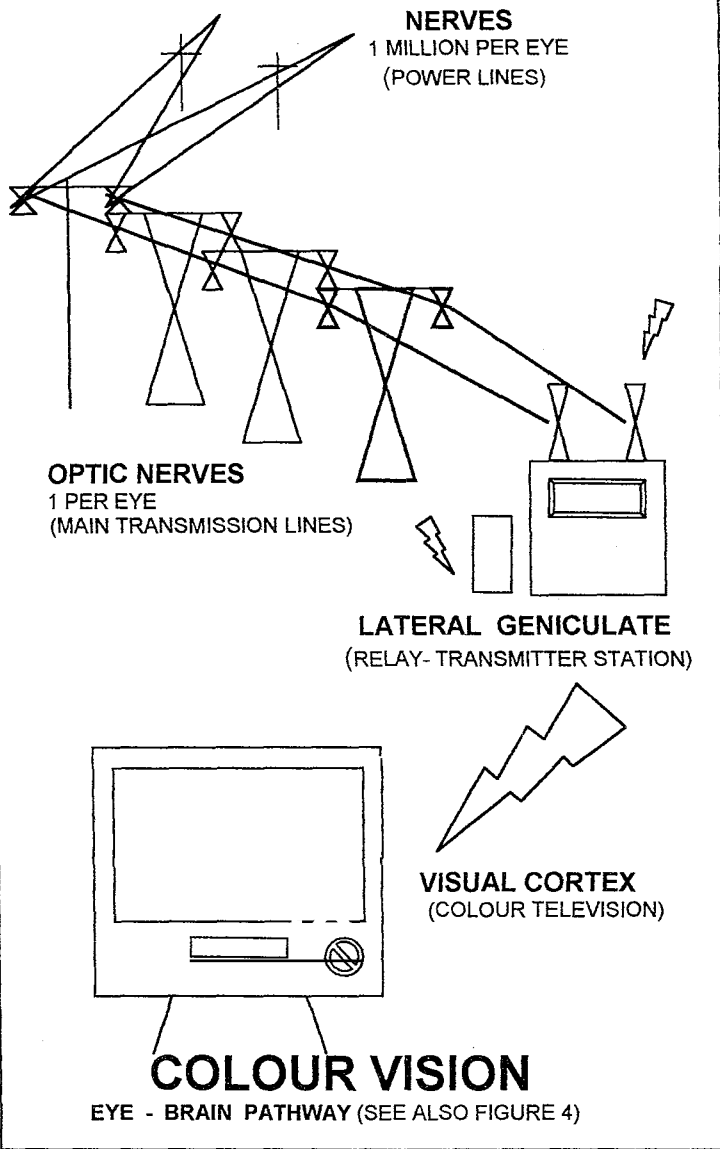
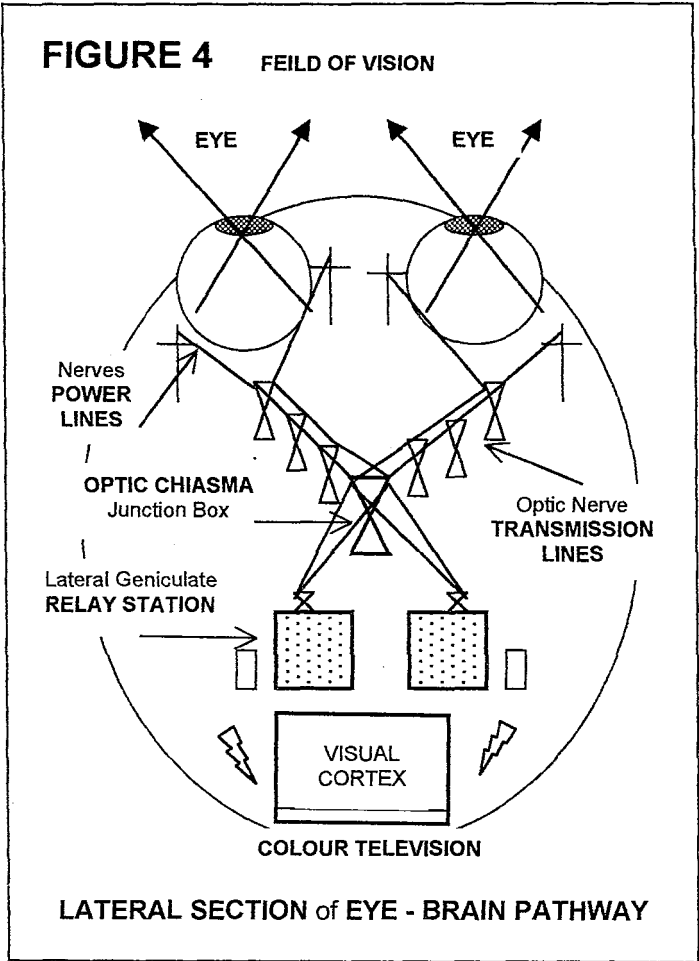


FIGURE 3



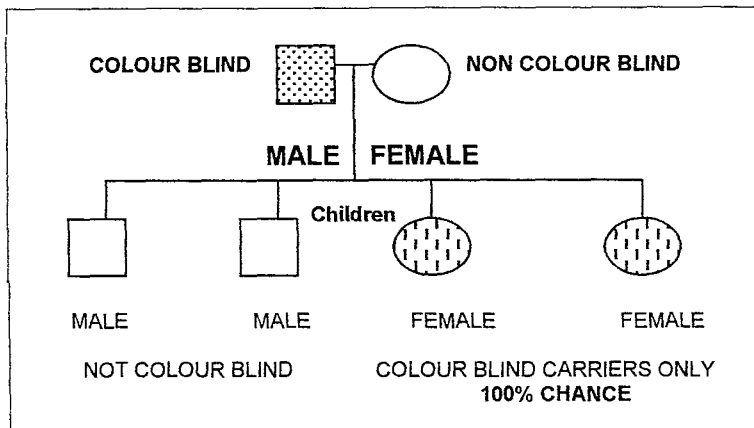


COLOUR VISION

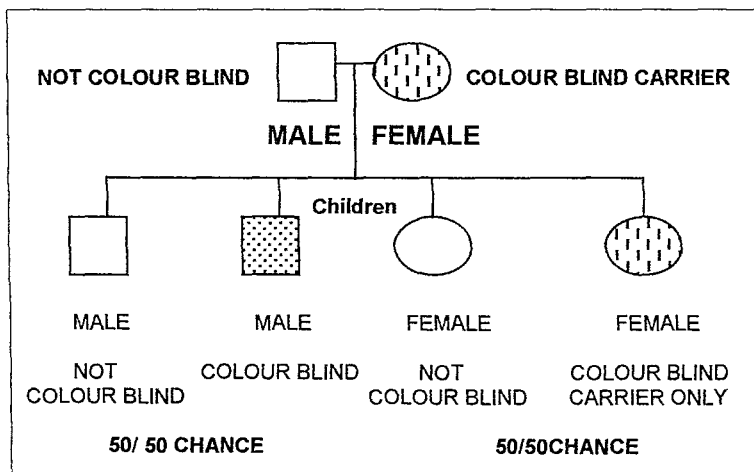
FIGURE 1A/B

THE "X" FILES RECESSIVE HEREDITARY SEX LINKED X CHROMOSOMES

MALE COLOUR BLIND



FEMALE COLOUR BLIND CARRIER



COLOUR DEFICIENT POPULATION

I have collected up to date figures on the colour deficient populations, which was available to me at the time of publication of my HAND BOOK.

THE NEW ZEALAND HEALTH TECHNOLOGY ASSESSMENT REPORT
(October 1998)
COLOUR VISION (Colour Max™; July 2000)
CURRENT OVERSEA'S MEDICAL INTERNET RESEARCH
(See Handbook References)

The most consistent figures from all sources for **C.D.V.** seem to be **8% for males and 0.5% for females**.(see TABLE1).

1. There seems to be no significant current research for Australia on **C.D.V.**
2. The figures indicated are for **HERITDARY C.D.V. ONLY**
3. The figures do not include accident or illness acquired **C.D.V.**
4. The figures do not include **ACHROMATOPSIA** or complete Colour Blindness.

Given and including the above information and the Australian ethnic mix it would be fair to assume about 10% of AUSTRALIAN MALES have colour defective vision or **C.D.V. If we apply this percentage to our population app.**

ONE MILLION AUSTRALIANS HAVE C.D.V

COLOUR DEFICIENT POPULATION

Area	Males	Females
Eastern Europe	9.31%	0.50%
Europe	8.76%	0.50%
North America	8.00%	0.50%
Asia	6.00%	0.50%
Africa	4.00%	0.50%

North American Population	Males	Females
Normal Trichomats	92.00%	99.60%
Anomalous Trichomats	6.00%	0.36%
Dichromats	2.00%	0.04%

Note

According to research there are more than 12 million people in North America and 250 million people world wide with hereditary red -green colour blindness. The above figures exclude acquired defective vision. 6. Colour Max® Technologies, Inc.

AUSTRALIAN BUREAU OF STATISTICS
1999
PRIMARY AND SECONDARY EDUCATION
SOURCE SA 4221.0

ALL STATES

PRIMARY - SECONDARY STUDENT POULATION

STUDENTS	POPULATION	FEMALES	MALES
PRIMARY Pre-Year 1 - 7 * #	1,885,400	918,190 (48.7%)	967,210 (51.3%)
SECONDARY Year 7- 12	1,341, 300	669,309 (49.9%)	671,991 (50.1%)
TOTALS	3,226,700	1,587,499	1,639,201

* PRE YEAR 1 NOT QLD OR WA
YEAR 7 NOT N.S.W. VIC TAS ACT.

COLOUR DEFECTIVE VISION STUDENTS

MALE STUDENTS	COLOUR DEFECTIVE
1,639,201 (10%)	163,920

COLOUR DEFECTIVE VISION STUDENTS

FEMALE STUDENTS	COLOUR DEFECTIVE
1,587,499 (0.5%)	7938
1,587,499 (14%)	(222, 250 CARRY THE DEFECTIVE GENE)

AUSTRALIAN BUREAU OF STATISTICS
1999
PRIMARY AND SECONDARY EDUCATION
SOURCE SA 4221.0
AMENDED

ALL STATES

ALSO FROM THE SAME STATISTICS DOCUMENT

1. TOTAL STUDENT INTAKE INCREASED TO

3,247,425 AS AT AUGUST 2000 -- a total increase of app 20,000 on the previous figures. (No M/F break up given)

2. STAFF STATISTICS

THE FOLLOWING STATISTIC IT WAS DULY NOTED THAT WOULD AFFECT ALSO THE SOCIAL, CULTURAL AND EDUCATIONAL DEVELOPMENT ASPECTS OF YOUNG MALE CHILDREN.

THAT 75% OF THE TEACHING STAFF AT PRIMARY SCHOOLS ARE FEMALE.

- A. This statistic would indicate no male school teacher role models for early childhood development.
- B. This statistic would also indicate a small number of male school teacher on staff with *C.D.V.* as role models for early childhood development.

2. SOCIAL FACTORS EFFECTING THE EDUCATION OF BOYS IN AUSTRALIAN SCHOOLS

PARTICULARLY IN RELATION TO THEIR LITERACY NEEDS AND SOCIALISATION
SKILLS IN THE EARLY AND MIDDLE YEARS OF SCHOOLING

COLOUR BLINDNESS (COLOUR DEFECTIVE VISION)

Because people assume we all perceive the same colours, it is difficult for those people who are not colour blind to understand what colours we do perceive and how this effects our daily life. If you are born with *C.D.V.* you do not notice any difference until you figure out you do not perceive colours that every one else perceives? Then you are embarrassed in not being able to perceive colours that are needed in every day life. This happens from a very early age and continues through life and males will hide this fact because they are different!

THE HARDEST FACT I HAVE TO ACCEPT BECAUSE OF MY *C.D.V.* IS NOT BEING ABLE TO COLOUR CO-ORDINATE MY CLOTHES AND MY WIFE HAS LAID OUT MY CLOTHES FOR THE PAST 35 YEARS.

I cannot even go shopping and pick out my clothes. As a child what GAME, BOOK, INSTRUCTION, COMPUTER AND SIGN do not use colour?
More importantly what instructional sign for STOP, GO, HOT, COLD, DANGER etc; do not use red and green?

WHAT IS IT LIKE TO BE COLOUR BLIND?

The following is an extract from my HAND BOOK which best explains what it like for me to be colour blind. Think about what it be like for a child to colour blind and what social skills would be needed to avoid being found out you are colour blind?

It's a world of colour that most people take for granted but its not the colour of my world!

Let's start in the morning.

My wife said: "Look how beautiful sunrise is?"

I replied: "Well its O.K; but let's not get carried away!"

Breakfast,

My wife said: "Pick up some apples and banana for lunch"

I replied: "Which ones are ripe?"

My wife said: "Take that pink shirt off; it does not go with your green pants."

I replied: "Why? It looks O.K."

Driving the car to station,

*I said to myself: "Concentrate, remember no distractions,
lights up top, must STOP!"*

Arriving at the station, I realised, I had to pick up some documents on the way to work.

I gave up trying to find the route on the colour coded rail network map, so I asked the woman next to me which train to board. I told her I was new to Sydney!

*I arrived at the new station and then tried to find the office building to pick up the documents. I asked for directions from the man next to me,
"No worries mate, that building down there with the green roof, where the grey car is" he said.*

"Yrrrr right" I replied.

I found the building, the office had a note and it read "Press the red button" I found a green button, but where is the Red Button, must be here somewhere?

I finally arrive at work.

"O.K. who has been changing the colours on my computer?" I said, just as my employer asked me to look at some statical figures, colour coded of course!

A phone call from my wife. She asked me to pick up some paint charts on the way home. I am glad she knows what colours to use, the chart reminds me of those... colour pencils again!

Homeward bound, as I pass a music shop, compact discs are on sale, sticky – dot pricing, " Excuse me miss which red dot has the 10% off and which red dot has the 20% off the retail price?"

Drive home, tired, must concentration –green traffic lights can look like streetlights at night! (I will discuss this little problem in more detail in a later chapter.)

Relaxing at home, and watching some television,

"It looks like it's snowing in Cairns again, Dear!"

I said to my wife, looking at the weather map? (Well not really, but the colour coding looks that way to me?)

I like those little red and green lights on mobile phones and printers that indicate when to use. Not forgetting the L.E.D. information systems. (you know those little lights that form the shape of numbers and words in yellow, green and red) ... AARRR. And so it goes on.

I will not bore you with any more. Of course, remember some author said that colour blind people have little difficulty in ordinary life. Still not convinced? Then look through my eye's and try this little test.

Write the word GREEN in a thick RED pencil on a piece of white paper, look away for a few minutes, then look back and read the word out loud.

A little bit of hesitation? This is called a STROOP effect; but does give the reader some idea of the conflicting signals confronted by a colour-blind person.

But then how did I figure out what red should look like? By it's position? By it's shape? We all know the grass is green, don't we? What if I have none of those hints? By the way, my favourite colour is beige! Who in hell invented that colour anyhow? My favourite flower is on the Christmas bush. What flower? I hope by now you are beginning to understand some of the problems faced by Colour Defective Visionaries.

AFTER 35 YEARS MY WIFE FINALLY SAW WHAT I SAW. UPON VIEWING A WEB SITE, SHOWING RED GREEN COLOUR BLINDNESS , SHE WAS SHOCKED. AFTER ALL THIS TIME SHE THOUGHT SHE KNEW WHAT I SAW, UNTIL SHE VIEWED THE WEB SITE? I THINK IF THAT OTHER PEOPLE WOULD LOOK AT THIS SITE THEY MAY UNDERSTAND OUR C.D.V. WORLD?

TRY WEB SITE [www. Tsi.enst.fr/~brette/](http://www.Tsi.enst.fr/~brette/) **AND SEE WHAT I SEE?**

COLOUR MY WORLD

How far have we gone so far to help the world of the colour blind?

Colour in our society today is not just used for signage or information but also describes our feelings and effects our moods. Colours have a psychological, emotional and physical effect on us, whether we like it or not? Colours can have a positive or negative effect. Why do we like some colours? Is it because we associate colour with some happy event? Is it the way our brain perceives colours? Is it because the pigments vary in our cones or is it the number of cones we have in each eye? However, no matter which way you look at it, colour perception to the human species is very much an emotional and subjective issue.

RESPONSE TO COLOUR

Studies have shown the peoples response to individual colours is that BLUE is the most popular colour, followed by GREEN and then RED. BLACK is preferred to BROWN and that YELLOW sometimes evoked an adverse reaction. Whilst colour can alter our state of mind, it can also effect us physically. For example, blood pressure of patients confined in small areas bathed in RED light, have raised blood pressure, and patients in the same experiment bathed in BLUE light, resulted in a fall of blood pressure.

How then are colour blind patients effected by colour?

Why is it when we feel down we say we are BLUE?

Why is it when we are angry we see RED?

Why are we GREEN with envy?

Why when we are well we are in the PINK?

I think I must feel GREEN when I see RED? I am sure though Elle McPherson in a BLUE swimsuit will raise my blood pressure!

Colour therapists also claim particular ailments respond to particular colours such as;

- *YELLOW - diabetes, constipation.*
- *GREEN - ulcers, colds and flu.*
- *BLUE - burns, cuts and boils.*

The healing force of colours may be considered quackery since there is no scientific evidence in treating physical illness but in the fields of social medicine such evidence cannot be disputed. Institutions such as hospitals employ experts for advise on restful and calming colours. The colour scheme is also important in large working areas for people who spend considerable time in one area.

Even large fast food chains discovered that RED and YELLOW has a psychological effect on customers and the correct colour combination can attract extra customers to spend more money and feel better about it. For some reason when marketing chocolates or sweets, BLUE should be seen on the packets and not GREEN, as GREEN on a sweet packet is perceived as astringent. How then are Dalton's affected?

THE WORST and sometimes the BEST COLOUR

YELLOW, pure bright lemon YELLOW, is considered the most fatiguing colour, as bright colours reflect more light and thus result in excessive stimulation of the eyes. Apparently babies cry more in YELLOW rooms and husbands and wives argue more in YELLOW kitchens. (an interesting study of these facts!) Critical work areas should not be painted YELLOW.

Conversely, on the other hand, YELLOW is the most visible colour and the first colour we notice, it is used to get our attention, such as YELLOW signs with BLACK text. The data for these studies are found in books and on the Internet, and as to how you wish to interpret these studies, is up to you! I make no claims but merely bring it to your attention. I would, however, like to see some studies on the best and worst Dalton colours.

DISTURBING COLOURS

Emotional stress will distort some colour vision as will alcoholism by causing disturbances to the optic nerve. (Probably why we see PINK elephants) Diseases such as GLAUCOMA and DIABETES effect colour vision, as will the effects of a stroke. Personally I have found some anti-depressant medication has effected my colour vision. (Actually improving it).

LEARNING COLOURS

How do colours affect our memory? We use a colour to highlight points on pages of information to remember.

*Survivors of an earthquake, in Japan, said that they had lost colour memory of the most stressful parts of the event and can only recall parts of the earthquake in black and white. Which brings me to another point that people sometimes ask me is that do I dream in **TRUE COLOUR** or **DALTON COLOURS**? That is a good question? What would you think?*

*Remember I said at the beginning of this book how did you learn colours, were the colours shown to you to remember or were they described to you? How would you describe colour to a person who was totally blind from birth? Some people who were totally blinded later in life have commented that after 15 years they had forgotten what colours looked like! **Yet a study on people with dementia or memory loss whilst forgetting names and objects rarely forgot the names of colours when shown to them.***

Does the colour on the walls and floors of a classroom facilitate learning in younger children? There have been some studies conducted on coloured learning stimulation in America suggesting, Yellow walls to stimulate brain cells with Green to provide balance and motivation, will facilitate learning in younger children. (Of course would this work if the teacher were a complete bore?) What if there was too much yellow? Would the students be overstimulated?

How do these colours effect us Dalton's? Autistic children are markedly affected by colour, such as black and white floors, where the black can be seen as deep holes.

BLUE for BOYS and PINK for GIRL'S.

These stereotyped colours according to some researchers were in vogue since the 1950's.

Baby blue the palest tint of blue associated with baby boys.

Baby pinks the softest of the true pink favourite of baby girls.

But intuitive knowledge in the 19th century described blue having a calming affect on boys and pink having a stimulating affect on girls. There are many theories into colour gender association and perhaps it was not always the case but the above theory does seem logical. Early religious paintings portrayed the Virgin Mary in pale to medium blue and became associated as a feminine colour. (It is also suggested the blue was needed to balance the composition of the painting.) Christ is sometimes portrayed in red and Judas yellow. Symbolism in the church is very much associated with colour; Blue - St Mary's colour, Purple - Advent / lent, Green - Periods of Trinity and Epiphany, White - Feasts of St Mary/ festivals and Red - Pentecost/ Palm Sunday/ Martyrs etc;

LOOKING THROUGH ROSE COLOURED GLASSES

The idea of using red - orange filters to make it easier to interpret colours or to see better contrasts is not new as this was proposed in the nineteenth century. Recently however there has been considerable interest in coloured contact lenses for colour deficient individuals to enable them to better interpret colours. Different types of lenses may be required depending on the colour defective classification as well as further colour vision enhancements depending on the individual. There are some advantages and disadvantages of wearing rose coloured glasses or lens (on one eye only) and these have to be weighed up by the individual.

Whilst the advantages are obvious, disadvantages may include poorer vision and depth perception. In some countries, glasses or lenses, may not be recommended for driving or to circumvent colour vision testing, for safety or occupational requirements.

(A statement that brings up an other point, whether you like rose coloured lenses or not, what is the difference between wearing rose coloured lenses for colour vision and glasses for long or sighted vision?)

A COLOURED EYE

An electronic eye has been developed in America that indicates the correct colour when the instrument is beamed on to the object. Not a bad idea but would have some limitations.

A TRAINED EYE

There are institutions in Japan that help colour deficient individuals train their brain to help overcome their afflictions. Good, but nothing a colour deficient individual can not do them selves or are already doing.

ENOUGH BLOOD TO MAKE YOU SEE RED

Blood tests for colour defective vision, resulting from D.N.A. research, will be helpful in diagnosing children who may have difficulty in understanding instructions or simple colour tests. (Thus ruling out other causes or illnesses.) However, unless the tests indicate 100% the degree of colour blindness, the results could be used like the Ishihara pseudo-isochromatic plates, an inconclusive guide. (And stop being pigeon holed for employment?)

EMPLOYMENT

I have discussed the effect colour blindness career options in PART B CAREER ADVISORS for students, however social issues continue at the work face and serious implication being that of **safety. Included in this section I have looked at every day colours in use the community and at home and how it also effects safety.**

EMPLOYERS

SAFETY COLOURS

No matter what industry or type of work you do, there is always going to be colour involved in some way. Employers use colour stickers on their products for sale, on boxes for the colour of product, discounted products and cataloguing. Colour is also used in various situations such as work sites, warehouses, retail stores and commercial business. Employers must be mindful of not only the customers but also their employees including safety and training. An adult employee is not going to exactly tell an employer, that they are colour blind, for fear of losing their job!. (Some may not even know they are colour blind) There is a story, about a carpet retailer who noticed a high percentage of carpet being returned, to find that both of the carpet storemen were colour blind and each thought the other person knew what he was doing!

- **STOCK**

MONITOR

How is the stock monitored or distributed? Is there a high percentage of recall of some coloured products?

STRATEGIES

You have good employees so take no drastic action. Find the problem area and in consultation with the employee's come up with an alternate solution it may increase sales or distribution.

- **SAFETY**

MONITOR

Safety is an important consideration and if you have more than about 20 employees, statistics indicate, there is going to be some colour deficient people included. Remember 1 in 12 males, not might be, but are colour blind! Problem areas include safety signs, line markings, directions, evacuation and emergency plans.

STRATEGIES

In consultation with a person who is colour blind, may be one of the workers, the employee's, safety committee and employer look for possible problem areas and implement strategies accordingly.

- **EXPLOSIVE POWERED TOOLS**

MONITOR

Some explosive power tools are driven by coloured coded cartridges and require an operator to be licensed. The cartridges are colour coded according to the power of the charge for fixing nails etc; in different types of materials.

For example the brown, green and yellow are low charges while black is high charge. It is important to start with low charges first when fixing nails to walls otherwise if you use a high charge the nail may penetrate through the wall. To obtain a licence, the operator must not be colour blind.

STRATEGIES

Since the object of the colour blind test is that the operator will know what colour charge to use if all the charges were mixed up in the container. A colour blind test such the Ishihara test is usually used as part of the licensing requirement but again I have seen some unusual results. It is better to use the actual cartridges as a test for colours rather than the Ishihara test for it is a practical test as suggested in previous chapters.

I have had a number of students who have failed the Ishihara test but have actually passed the charge test, including myself.

DESIGNERS

ANNOYING COLOURS

There are a number of annoying manufacturing-design colours, that need attending to, for colour-blind people. These small changes would help us Dalton's out considerably, without creating a New World order.

- **TO HOT TO HANDLE**

I don't know how many times I have been burnt, by turning on the hot water tap, instead of the cold water tap, particularly when showering. The problem is the very small colour patch on some taps indicated with a splash of red and a splash of blue. (a very funny splash of blue) There is no way I can tell them apart because the hot water is not always on the left! At least old type taps have H or C! A central mixer is also recommended.

- **WARNING LABELS**

Warning labels commonly use RED and GREEN. Indicators such as circle with a slash or print the entire message in large capital letters would benefit the colour blind and older people.

- **MEANINGLESS COLOURS**

If there is one thing that really gets to me as a colour blind person is the names of some colours! Colours like BEIGE and VERMILION send my colour converter in my brain into overdrive since the name gives me no clues to which I can attach the colour too. Other colour names which convey no meanings to me are; BURNT SENIA, INDIGO, TURQUIOSE, LAVENDER, CHARTREUSE and SEPIA.

- **DUMMY PARKING METERS**

On a recent visit to a very well known tourist destination, I was dismayed to find the council had just installed brand new state of the art ticket parking machines.

No great drama (if you are not a Dalton, that is) until you go to pay. Yep, press the old red button trick to get your display ticket! What was the drama, well the council in their wisdom had allowed for on the meter for future use, (I don't know what?) another two dummy buttons, both painted green.. All Daltons have to do is to press every button, like I did, until something works (At least all of the buttons are on the same pole)

LET'S HOPE the designers do some Dalton research before they get excited with what do with the other buttons!

- **COLOURS of OLYMPIC PROPORTIONS**
During the Olympics, with locals and visitors seeking information, some of the glossy information brochures suffered from colour coding overload adding to question overload to the customer services. (I was a customer service officer and I had my own problems!)
- **THE COLOUR THAT COUNTS**
*At one of this countries most important referendums (Republic or Monarchy) and adding to an already confusing ballot paper we had to contend with colour coded ballot papers? One was one of my favourite colours **BEIGE!***
- **IT'S JUST NOT CRICKET**
To improve our knowledge of cricket we have all types of interesting innovations such as stump cam, L.B.W. line and the batsman's run - wagon wheel, colour coded of course. Dalton's can not see where the runs were scored it's just not cricket.

SPORTING SKILLS

Colour blindness in sport creates some interesting situations and complications. I have included a few stories that happened to me, so think what it would be like for a child?

GREAT MOMENTS IN SPORT

SOCCER

Not long after I was married I took up soccer refereeing. I was a soccer player in my younger days and naturally enjoyed refereeing. Being a Dalton, it never worried me when I was playing soccer because I knew all the players, irrespective of the colour of the shirts. After refereeing for a few weeks the day came that I had a real problem. I blew the whistle and on to the field came the two teams. Both teams wore the same shirts or what looked like the same shirts to me. I nearly fell over backwards.

The team shirts appeared to be green and white stripes so I knew one of the teams must be red and white stripes. I looked closely at the teams and noticed that one team had striped socks with a green top and the other team had all white socks with a red (green) top.

During the game I was sweating not because it was hot but because I had to concentrate so intensely looking for the damn socks. Now refereeing soccer is hard at any time, trying to watch for offside, and is even harder when you have no linesmen! The game was going well for a while and of-course you make some wrong guesses. The game then took on a new dimension because the socks came down leaving only the tops visible. After that things got serious. Two goals were scored one for each side and I sanctioned both goals because there was no yelling or booing from the parents at the sideline. In the last moments of the game there was a scramble in the goalmouth and there was no way I could tell who did what to who or who was off side, so I did the only fair thing possible, I blew full time! Obviously I did something wrong because as I left the field a parent chased me and hit on the head with an umbrella!!!

SNOOKERED

Ever thought what it would be like to play snooker with colour deficient vision. Well it is not easy, that is why I liked pool because all you had to look for was the thin or wide stripes. Snooker has plenty of reds, a brown, green and yellow amongst other colours, a C.D.V. nightmare! The only way I could play was to keep my eye on the brown ball (that was the main problem) when my mates nominated it to sink! But mates being mates called the wrong colours just so they could watch me sink the wrong balls (nice mates!!!)

GOLF

Golf now here is a game that does not rely on colours. For me, I am on the green all the time, except some places are flatter than others!! My mates were helpful too. They would always bring the golf tees for me; you know the red ones? There was no way I could find the tees after I hit the ball!

3. CULTURAL FACTORS EFFECTING THE EDUCATION OF BOYS IN AUSTRALIAN SCHOOLS

PARTICULARLY IN RELATION TO THEIR LITERACY NEEDS AND SOCIALISATION
SKILLS IN THE EARLY AND MIDDLE YEARS OF SCHOOLING

COLOUR BLINDNESS (COLOUR DEFECTIVE VISION)

Australian culture is unique and sometimes it is difficult for me, a seventh generation Australian, to accept?

WE LIKE WINNERS, TO CALL OUR OWN -
YET, WE DO NOT LIKE TALL POPIES-
WE LIKE THE UNDERDOG -
YET, LOSING IS NOT OUR OWN
WE ACCEPT PEOPLE WHO ARE DIFFERENT
YET, WE DO NOT LIKE BEING DIFFERENT?
WE ARE A SERIOUS PEOPLE
YET, WE LAUGH AT OURSELVES

That is not more evident in Australia with people having colour blindness and is best summed up by what happened to my Grandson!

As I said before, that being colour blind, you have to have a sense of humour because if you did not you would cry! Having a good laugh at yourself about colour perception helps but after reading some of the stories you might understand why we do not laugh with you!

SCHOOL

THE RED PENCIL TRICK

When my grandson (a Dalton - X file member of my daughter) was about 5 years old he was watching a rugby league match on television between SOUTHS and CANBERRA with his mother and father. During the game he said to his mother; "Hey mum, why are the two teams wearing the same colour shirts?" This had my daughter and her husband wondering about a possibility of his colour blindness. South's team was wearing RED and GREEN and the Canberra team GREEN. I used to get both teams confused myself! So they asked me, knowing I was colour blind, about the possibility of their son being colour blind?

Their son is also one of non-identical twins and would they be both colour blind? Colour blindness is about being a SIS'S, so while I knew about the possibility of haven given a Dalton X file to my daughter, it came as a bit of a shock. My first thought was "You poor kid"

So we pulled up a colour-blind test. via the Internet 1 (this does not always work because of the variations of colour on your computer) but it was enough for us to confirm he should take the colour-blind test. If you think about it, colour blindness is like having a computer that some colours do not perform properly, as a matter of fact, our eye – brain system works similar to a colour television set. Well, the twin brothers were tested and one (little J) found to be colour blind. As usual the statement by the optometrist was that your son is RED – GREEN colour blind, that's it! Well, that's not it! That is why I am writing this book!

The parents duly informed "little J's" schoolteacher, so she would be aware of his colour perception problem. The teacher then told the parents that would then help explain a few colour situations that happened to "little J" in class. On one occasion "little J" was colouring at his table when the teacher politely called him to come out the front to discuss his homework. "Little J" put his red pencil down amongst the other 30 or so coloured pencils on the table and went out to the front to see his teacher. After talking to his teacher for a few minutes, "little J" returned to his table to resume his colouring in. Not being able to find his coloured pencil he yelled out in a loud voice:

"O.K. who took my RED pencil"

A little girl next to him said:

"Here J"

And she gave him her RED pencil.

The teacher thought it was strange because there was at least three RED pencils on the table. So, even at an early age, children learn how to fool people. A good trick, I must give him that! Obviously he knew he had a colour problem and knew he was different from other kids but did not say anything about it until he was finally caught out.

You will note from my further observations and the help for parent's section on colour blindness that I have indeed stressed the need for a colour sense of humor. Why? Because of the communities' expectations of what colour blindness is!

MY GRANDSON AND ME

When we first thought my grandson "little J" was colour blind and we tested him and his twin brother on the colour blind Ishihara test on the Internet, "little J" still did not want to seem different to that of his brother. "Little J" listened and looked at the chart and memorised what his brother was saying. Why? After the rest of the family left, there was only "little J" and me at the computer and so I took him through some other colour-blind test sites. "Little J" was now at ease with what numbers he saw and with me his grandfather that we shared an affliction that I could help and even laugh at.

The "little J's" of this world today face more colour perception problems than I ever faced and it is important for a grandfather or extended family member to support and encourage them. Colour blindness will skip a generation or may be two and many families may not even be aware of the colour defective vision they have or pass to the next family member.

MY FAMILY

I never knew my brother was colour blind until he was married and our wives were discussing how hopeless we were with colours. My uncle was never told he was colour blind until he changed jobs and had to have a full medical when he was 50 years old! After researching for this book I found the "X" factor was working over time in my family! In my mothers family 2 females including my mother carried the "X" file and 2 males were colour blind out of a total family of 2 females and 4 males. My mother has 4 children, 2 males, my brother and myself both colour blind, and 2 females which carry the "X" file. My brother has 3 males so the "X" files stops. I have 2 males and 2 females and so far in one daughter the "X" file has shown itself. She has 3 males, (1 set of non identical twins) 1 of the twins is colour blind, other "X" files are yet to show.

Why did it take so long for my brother and my uncle to find out they were colour blind? They were both born in the late 1930's and colour was not exactly rampant. They both knew they were not strong at colour perception but put it down to just that. Both my mother and grandmother never even knew what colour blindness was!

Well let's look at the late 1930's, 1940's and 1950's. What paint colours were available? White lime wash was IN where we lived. The Brownie Box camera was state of art with black and white film. The calculator was a set of tables. Radio and later black and white television (until 1975) was our entertainment. Computer was a slide rule if you could afford it! Dark suits and hats were IN. As for colour of any thing, who cared, as long as you had a manufactured product and it worked!

MY UNCLE, MY BROTHER AND ME

In the 1950's I received my first set of 24 colour pencils which I thought was great but why have so many shades of the one colour? When I was buying my first car, I brought home one day, a 1961 holden for mum and dad to look at. They thought the car was great but why BRIGHT PINK?

My "X" file sister did not know I was colour blind until I was 50 years old, and like every body else when I mentioned that I was colour blind, guess what! What was the colour of my sock? and this and that .. ARH rrr. Yet my sister carries the "X" file.

My uncle is in his late 60's, my brother is in his early 60's and me, well lets say, I am in my 50's and it has only been since I have researched this book that we have discussed our affliction in detail. It may sound silly but my uncle, brother and I all agreed, that the most embarrassing part of our affliction to accept, was for our wives to set out colour coordinated clothes we needed for each day! During a recent family gathering, we (my uncle, brother and me) found ourselves in the same car, and boy, did we have a few laughs, not at any jokes, but at what colours we perceived at the traffic lights?

So even in the same family "X" file there were some small variations but I think this had more to do with what colours we perceived colours green and red should be. Think about it?

How can I call an object green when I don't see green, but how do I know what colour green is when I call another object green?

Confusing? Can you see what I see?

4. EDUCATIONAL FACTORS EFFECTING THE EDUCATION OF BOYS IN AUSTRALIAN SCHOOLS

**PARTICULARLY IN RELATION TO THEIR LITERACY NEEDS AND SOCIALISATION
SKILLS IN THE EARLY AND MIDDLE YEARS OF SCHOOLING**

COLOUR BLINDNESS (COLOUR DEFECTIVE VISION)

The majority of health and education departments ignore colour blindness. It seems no one wants to take responsibility, yet colour blindness can exhibit a wide range of negative responses to school, **READING, COLOURING, WORKSHEETS, GAMES and SOCIAL ACTIVITIES INCLUDING LOSS OF INTEREST OR WITHDRAWAL OF PARTICIPATION.**

I have commented in depth on what is being done at school for colour blindness and what strategies should be implemented in PART B STRATEGIES

GENERAL

Despite all the experts stating colour blindness is not a serious issue, try telling that to a five-year-old child in kindergarten who cannot perceive colours like those of his or her friends. It is not as easy as you think to check if your child is colour blind because unless you are aware of the problem, children become adept at hiding their deficiencies.

Remember the story I told you about "little J" and the red pencil. Even though our family has a history of colour blindness, "little J" hid his problem even before his parents, teacher or I knew about it. The children may even question their own ability without mentioning the colour problem to anyone including their parents.(even at 5 years old.) How did "little J" get away with it for so long? He had a twin brother who is not colour blind and "little J" simply copied his responses. Children also can watch their classmates and copy their behaviours and responses as well. That is why it is so important to recognise if a child has a colour perception problem as soon as possible. Students with colour blindness can exhibit a wide range of negative responses to school, reading, colouring, work sheets and social activities including loss of interest or withdrawal of participation. Responses should be observed and monitored closely and an appropriate test administered. Beware because responses could be the result of other physical problems or illness.

For fear of creating the New World order, I would like to see colour blind testing administered when children start school, just like measles or other inoculations.

STATISTICS

I have submitted to you overall statistics of colour blindness but let us look at a typical primary school of say, 750 children. This would equate to 37 male children and 2 females. That is nearly two classes of colour deficient children?

As I have said before, I do not want to create a New World order, or a new minority group, but just apply colour commonsense and understanding when nearly 1 million of us Australians are colour blind! Colour blindness today largely goes unnoticed by females and hidden by males. According to studies, about 1 in 7 females will genetically continue to carry the mutant "X" gene, yet when you consider females also have a 1 in 11 chance of contracting breast cancer, then women have a greater chance of passing on hereditary colour blindness than contracting breast cancer. (Hereditary or otherwise) Admittedly colour blindness is not life threatening but with both conditions, associated with only females, it is a question of awareness.

STUDIES

But what I would really like to see are valid studies conducted on adults and children with colour defective vision. Not that the studies I found were not relevant but some were inconclusive and others flawed in their methodology. The study or the study of studies surveyed could be interpreted to whatever hidden agenda was needed. How can you prove beyond a shadow of doubt that colour blind people have more accidents or that children are not affected or disadvantaged educationally by defective colour vision?

Some may say, well it did not affect you, yes, and that may be correct, but I had to work twice as hard as everybody else to overcome the colour issue. I also had a transitional start into the colour world, not thrust into it?

Of course money has a lot to do with it and I don't mean for the study! We all know RED means stop, hot or danger and GREEN means go or safe doesn't it? Imagine changing all the traffic lights, shipping and aircraft lights to RED and BLUE. Then we would have complaints from the RED and BLUE colour defectives. Or supplying a specially trained teacher for at least one class in every primary school! But does it have to be? Why not just make some slight colour modification. Who thought of using RED and GREEN as an information highway anyhow? RED and GREEN probably originated from the NAVY when they used coloured flags to communicate between ships, but then we have progressed since then haven't we or have we?

NZHTA REPORT 7 (OCTOBER 1998)

The following is the EXECUTIVE REPORT on COLOUR VISION SCREENING on some 61 studies. Whilst, as a colour defective individual, I do not agree with some of the findings of the New Zealand report it does highlight some of the issues in this submission.

SEE ATTACHMENT 3.

STANDING COMMITTEE ON EMPLOYMENT, EDUCATION AND WORKPLACE RELATIONS

INQUIRY INTO BOYS EDUCATION

TERMS OF REFERENCE

To inquire and report on: **PART B.**

The strategies which schools have adopted to help address these factors, those strategies which have been successful and scope for their broader implementation or increased effectiveness.

- a. Strategies which schools have adopted to help address

COLOUR DEFECTIVE VISION

1. IDENTIFICATION OF COLOUR DEFECTIVE VISION

Strategies, which both Primary and Secondary schools have adopted for identifying male students with *C.D.V.* seems to be a hit and miss affair. I cannot speak with any authority for all states but in N.S.W. this is mainly due to a lack of knowledge and understanding of *C.D.V.* and the extent it is entrenched into our community. From both my experience and research, males are not going to advertise that they have *C.D.V.*, even at a very early age, for:

1. A fear of being different
2. Embarrassment over such a simple every day task of not being to distinguish some colours.

Children with *C.D.V.* will guess, copy siblings or other students in relation to colours and it may be difficult for teachers to distinguish between *C.D.V.* and some other impairment or illness! It took my daughter (Not the school) two years after my grandson started Kindergarten; to find out he had *C.D.V.* (He simply copied his twin brother). Such awareness then helped identify another 30 males and 3 females with *C.D.V.* at his primary school. (But schools still do not acknowledge there is a problem?) Depending on which figures you use 40 - 47% STUDENTS LEAVE SCHOOL UNAWARE OF *C.D.V.*

2. CURRENT C.D.V. IDENTIFICATION PROCESS

In N.S.W. not all schools apply a simple Ishihara pseudo- isochromatic test to school children when they start school.

Some AREA HEALTH SERVICES do screen school children for *C.D.V.* when they start school but unfortunately they are in the minority. I have even written to ask VARIOUS HEALTH SERVICES what procedures they use to screen school children and when and even what has happened to the results or what referrals, to be totally ignored. Some Secondary schools use Ishihara pseudo- isochromatic test to identify students with *C.D.V.* but in first or second class at high school. It is a bit late and usually conducted as a by-lesson in Science.

3. CURRICULUM

Nothing is currently being done to colour compensate for students with *C.D.V.* in the curriculum or for student WORKBOOKS (Examples attached Appendix 1). They are still using red- green, two of the worst colours you can use together. I wrote to the curriculum branch addressing my concerns and again no response except to be referred to the BLIND AND VISION IMPAIRED SECTION OF THE DISABILITIES AND LEARNING DIFFICULTIES UNIT

4. DISABILITIES AND LEARNING DIFFICULTIES UNITS

Correspondence from the above unit acknowledges that with *C.D.V.* there is a potential impact on early education but the section does not directly support children with *C.D.V.*? Who does? But at least I might get some awareness from the articles? (See Appendix 2.)

5. TEACHER EDUCATION

It seems little or no *C.D.V.* awareness courses are done in this area.

6. *C.D.V.* COMMUNITY SUPPORT UNITS

With the introduction of glasses / or lens from optometrists, for some *C.D.V.* people, Private Health Services (See H.C.F. June Magazine) promote glass / lens coverage, fee of-course, suggesting also that PARENTS get support from the **BLIND ASSOCIATION**. (They also do not respond to letters or phone calls.) I have tried the glasses they are expensive and whilst they do rectify red - green other colours may be lost. (See page 73-74 of my HANDBOOK)

7. OPTOMETRISTS

When I was diagnosed with *C.D.V.*, (14 years) you were told you were colour blind? No help - no suggestions!
Nothing has changed, today, when my grandson was finally checked for *C.D.V.*, you are *colour blind* that was it, no help or any suggestions!
I researched and contacted a number of optometrists regarding *C.D.V.*, who tell me the same story about the numbers of young males, about to apply for Police, fire services or defense forces, to be told they have *C.D.V.*, and are completely devastated.

8. PARENTS

Parent awareness of *C.D.V.*, like the rest of the community, is virtually none. Parents usually contact their doctor first, who then checks the child or refers them to an optometrist. Awareness that 1:7 women / girls carry the defective gene that causes *C.D.V.*, a figure which is also totally ignored at the home or at school.

9. CAREER ADVISORS

Most career advisers, because they are ill informed about *C.D.V.*, or recall old data, can completely devastate students with the career choice available. Think about it, what job or career does not include colour. I was told I could be a CAMOUFLAGE EXPERT! That is not to say we do not have some prominent people who made careers despite their *C.D.V.*, but that path could have been explained or made easier and not trashed out of hand?

HAND BOOK EXTRACT

Professor Li said that New World monkeys (South America) Posses only one "X" linked gene and one autosome (blue cone) photopigment gene, so that the male sees only two colours. Strangely in these monkeys two variants arose in the "X" chromosome, similar to the human red green pigments, allowing the female monkey to use three colours and the male to use only two colours. 4

Thus indicating adaptive evolution? The female South American squirrel monkeys forage for fruit because of their sensitivity to colour while the male can better determine texture and detect camouflage, making them protectors of the family.

Some career advisers/researches must subscribe to the same theory, for the career most recommended for Colour Deficient Visionaries is that of a CAMOUFLAGE EXPERT? Yes, apparently, we can see outlines of camouflage, hiding ammunition dumps, tanks, fuel dumps etc; so in the mean time we wait for the next war and see if the ARMY, NAVY or AIRFORCE needs about 1 million Australian CAMOUFLAGE EXPERTS? I cannot believe such misunderstanding of Colour Deficient People.

*The use of colours does extend to the work environment and does effect jobs and careers, which require normal (what is normal?) colour identification. A typical list from researchers/educationalists for careers/ occupations/ industries requiring colour vision is set out in ATTACHMENT 1. The list is not comprehensive but will give you an idea of the suggested career choice irrespective whether we Dalton's (*C.D.V.*) can carry out the duties correctly or not?*

The American Medical Association names only a few careers that could be particularly challenging to colour deficient people.

AIROPLANE PILOT, MARINE PILOT, TRAIN DRIVER, ELECTRICIAN, JEWELER, COMMERCIAL ARTIST AND COLOUR PHOTOGRAPHER.

Other careers not mentioned that would be challenging, if not impossible to be recruited, would be the ARMED SERVICES, AIR TRAFFIC CONTROLLER and the POLICE? COLOUR CHALLENGED? I like the sound of that description for us Dalton's, particularly when career choice is involved?

See page 85-86 of the HANBOOK.

10. LOCAL, STATE OR FEDERAL DEPARTMENTS.

I am yet to see any of the above Departments publish material that is *(C.D.V.)* accessible with colour coded information. Using colour for the sake of colour? *(C.D.V.)* students then have difficulty understanding and interpreting the information for studies. It is just not statistics but Maps, Bus- Train routes etc; which if colour compensated correctly will make it *(C.D.V.)* accessible.

11. COMPUTERS AND THE INFORMATION HIGHWAY.

As yet, I am not aware of any standard for web pages and has it been made *C.D.V.* safe. It is very difficult for students with *(C.D.V.)* to access information from computers that they cannot see! Again information is decorated on web pages using colour for the sake of using colour and it is not only people with *(C.D.V.)* who are disadvantaged. Try accessing information from a computer using red text on a blue background?

Obtaining information and even playing games on computers in the classroom (they have them in kindergarten) can be very difficult for children with *(C.D.V.)*

CONCLUSION

Colour blindness or *(C.D.V.)* is completely misunderstood by the community as a whole and rejected by schools and health departments as a learning difficulty. When and if *(C.D.V.)* is diagnosed children are referred to the wrong areas of support and in general teachers are unsure what to do?

STANDING COMMITTEE ON EMPLOYMENT, EDUCATION
AND
WORKPLACE RELATIONS

INQUIRY INTO BOYS EDUCATION

TERMS OF REFERENCE

To inquire and report on: **PART B.**

The strategies which schools have adopted to help address these factors, those strategies which have been successful and scope for their broader implementation or increased effectiveness.

- b. Those strategies which have been successful and scope for their broader implementation or increased effectiveness for

COLOUR DEFECTIVE VISION

GENERAL

I do know of any strategies that are in place for *C.D.V.*, which encouraged me to write my Handbook. The strategies to use, which I have taken the liberty to set out, can not be taken in isolation and the community, not just schools, should all understand the problems of *C.D.V.* and take some responsibility. *C.D.V.* does impact on all those issues set out in the terms of reference including the social, cultural and educational factors.

1. IDENTIFICATION OF *COLOUR DEFECTIVE VISION*

My hope is that **all children** should be screened for *C.D.V* before they attend **Kindergarten** along with the other possible leaning difficulty afflictions such as hearing etc; Whether this is done by the school or Health Department or in conjunction is a matter for debate. As long as students are identified and the teachers aware of the *C.D.V* problem and can colour compensate, I can not foresee any problem which may require further assistance by the Learning Difficulties Units.

2. PROCESS OF IDENTIFICATION OF *COLOUR DEFECTIVE VISION*

It is important with any process that identifies a disability of any kind, but particularly with *C.D.V.* that it be treated as unique trait and not a personal downfall. The teacher may have to make some temporary classroom adjustments and handle the situation as a whole class or on an individual basis. Male sensitivity is at stake and shows its self at a very early age.

3. CURRICULUM

A Curriculum acknowledging there are some colour deficiencies in the world would be a start. A careful look at the purpose of the instructional material and what is it trying to achieve. Be aware of confusing colours? See also PRIMARY TEACHING STRATAGIES.

HAND BOOK EXTRACT

- *WORK SHEETS*

MONITOR

Colour enhanced (I like that phrase) instructional material such as student work sheets are definitely a problem. If it is the intention to test children's colour knowledge with colour enhanced instructional material then some of the work sheets I have seen are definitely biased toward normal colour vision.

For example the following sheets:

Colour the big frogs red colour the little frogs green?

Colour the frogs pink, brown, grey, white and green?

Colour the cats red, blue, green, yellow and purple?

I cannot distinguish between violet, lavender, purple and blue and also dark brown and black? For some children the names red, orange, yellow, and green are simply different names for the same colour they perceive?

STRATEGIES

What is it you are trying to achieve with the work sheet colour recognition or aptitude or both? If it is colour then the strategies outlined in general colouring are appropriate or you may have to slightly modify the work sheet. Use shading or pattern in -lue of colour.

4. DISABILITIES AND LEARNING DIFFICULTIES UNITS

I have found the above units very understanding of the *C.D.V.* problem. They continually provide excellent support for teachers and whether it comes under their umbrella is a matter for debate! As I stated before class teachers are in a better position to help students with *C.D.V.* but the above units could be a good support. Lets hope someone takes responsibility?

5. TEACHER EDUCATION

Teacher education programs at University or Teachers College on *C.D.V.* could expose some myths and encourage awareness. Teacher education of current teachers on *C.D.V.* is critical.

The following is suggested *C.D.V.* TEACHER strategies

HAND BOOK EXTRACT

TEACHER (also additional Parent help)

PRIMARY COLOURS (Primary school children)

As a teacher with a large primary class I guess the last thing you want is to know is that out of say 28 children in your care at least 1 or possible 2 children are colour blind. Your students will have a wide range of aptitude, skills, and their own personality. Your classroom strategies and student management is required to meet all those challenges. Now we have a new challenge for you, colour defective vision. The way I look at teaching is, at college, we learnt to use a set tools (classroom strategies- management) and depending on the student and the situation or problem we use that tool.

What I am getting at is, not all colour defective vision is the same therefore it may require skill to find if there is a problem and then how to manage it. Of course it would be nice if the children could be tested but you still have to manage the problem to suit the individual difference.

CLASSROOM MANAGEMENT

- **GENERAL**

MONITOR

A sound understanding of colour deficient problems as discussed in previous chapters and in the parent section. Discuss with parents any observations or problems. In a school population of say 600 students the number of colour deficient children varies but the average is 1 in 20 of the total population, about 30 children. (27 males and 3 females excluding illness acquired defective vision) This would represent at least one school class. Of course be careful because colour blind deficiencies may duplicate other learning disabilities or illnesses.

STRATEGY

Colour deficiencies will vary with individual children so the method of classroom management strategies will also vary depending on the individual and the mind set of the class. By that, I mean, is the strategy to be quiet individual help, no big deal or big deal everybody in the class helps or just a mate?

- **COLOURING GENERAL PICTURES**

MONITOR

Watch for pictures of colouring in that is messy, using dark colours or the wrong colour in some situations.

Children may loose interest in colouring-in.

Some children may exhibit behaviour problems.

Some children may laugh at the colours selected by a colour-blind child for grass or people.

STRATAGEY

A number of strategies could be employed depending on the child and the severity of the colour deficiency.

Ask his or her classmate to help.

Mark the pencils on that particular table.

Mark a tin on the tables for all reds, blues etc;

Mark a tin for all tables for all reds, blues etc;

- **READING BOOKS**

MONITOR

Some children may have difficulty in reading some pages of books, as they can not see the words. Purple on violet background or light colours from the same spectrum are a problem.

STRATEGIES

Pretty obvious but ask the student to turn the page and see if the problem persists. (it may yield some clues)

Be careful about asking students to retrieve the RED book etc; from the shelf.

- **GREEN BOARD OR WHITE BOARDS**

MONITOR

Some children may not be able to copy notes, instructions or read from the boards. Some colour chalk on green boards makes it impossible for some colour-blind children to see words at all. Different light or shade on boards could also effect colour vision.

STRATEGIES

Check the light conditions. Look from the back of the classroom to the green/white boards and check some colours that may work. Ask the child in question what are the best colours? Place colour-blind children at the front desk.

- **WORK SHEETS (PREVIOUS CURRICULUM)**

MONITOR

Colour enhanced (I like that phrase) instructional material such as student work sheets are definitely a problem. If it is the intention to test children's colour knowledge with colour enhanced instructional material then some of the work sheets I have seen are definitely biased toward normal colour vision.

For example the following sheets:

Colour the big frogs red colour the little frogs green?

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Colour the cats red, blue, green, yellow and purple?

I cannot distinguish between violet, lavender, purple and blue and also dark brown and black? For some children the names red, orange, yellow, and green are simply different names for the same colour they perceive?

STRATEGIES

What is it you are trying to achieve with the work sheet colour recognition or aptitude or both?

- *COLOURED RODS If is colour then the strategies outlined in general colouring are appropriate or you may have to slightly modify the work sheet. Use shading or pattern in-lue of colour.*

MONITOR

Coloured mathematical rods were invented by the devil. Some schools may still be using them so beware of sending some children into utter confusion. Thankfully I did not have rods at my school but I feel sorry for all those kids that suffered under its rule.

STRATEGIES

Use them to make houses?

- *COLOURED INSTRUCTIONAL MATERIAL*

MONITOR

Colour instructional material (assignment instructions) is used extensively at an early age basically because of limited reading skills. Some of the coloured instructional material is useless for a student with colour deficient vision.

STRATEGIES

The use of text in addition to colours, shading or patterns as alternatives to colour. I found grey photocopy of coloured sheets might help?

- *GAMES*

MONITOR

Coloured coded discs, games, lines or sport names cause confusion and students will be accused of not following instructions.

STRATAGIES

Give supporting directions.

TEACHING (also additional Parent help)

SECONDARY COLOURS (Secondary School Children)

In the latter years of secondary school colour deficient teenagers might admit to their schoolteacher they might have a colour problem. It is possible up to this stage in a Dalton's career they might not be even aware of a colour deficiency.

Statistics show that up to 40% of children with colour defective vision were not aware of their problem before they left secondary school. (See School Perception Chapter.) Perhaps if Art or Science is not your elective you might get away with it?

- SCIENCE

MONITOR

The following problems may occur in class for colour defective students:

Difficulty will occur with identifying some chemical reactions.

Watching litmus paper turn red with acid.

Identifying material by colour of its flame when burnt.

Copying other student's responses may be a problem.

STRATEGIES

A difficult situation, as a buddy system would suffice but what do you do for practical exams? Verbal response?

- ART CLASS

MONITOR

Colour defective students if they are in the art class by now you would know or you will soon find out? The problem here is not knowing how best to handle the situation?

STRATEGIES

I have obtained some encouraging comments by art teachers who have found colour-blind students in their class. Of course there is still other mediums such as pencil, charcoal etc; which require no colour definition.

I will let you decide what is best to suit your student but here is some strategies suggested?

One head teacher suggested to offer the CDV students:

A choice of coloured pencils, the type and colour of paper and object they want to draw. This method would give the teacher a better understanding what the student is seeing and also provide student with some security.

Another head teacher suggested:

Organise the student colour palette for him to memorise colour placement. In group projects (obviously other students were aware of a Dalton) the cans of paint were organised on the table so that similar decisions could be made. An interesting comment from the art teacher was that CDV student paintings were often refreshing because they were not swayed by preconceived ideas in their minds to what colours were supposed to be.

- ASSIGNMENTS

MONITOR

Some assignments in late Secondary Schools and University's in some subjects, other than science and art, such as marketing etc; (product research) will include some colour content.

STRATEGIES

A university professor found that a student after being given assignment on colour marketing confessed to being a Dalton and how this would his assignment. The professor immediately suggested product research on CDV customers, as very little research has been done in this area. (about time, but what of any follow up?)

- **GRAPHS and CHARTS**

MONITOR

Graphs and charts are common in adult education and it is important to give information to all students.

Graphs and charts using colour for the sake of using colour is a mistake as students do not know what is important and what is not?

STRATEGIES

Colour strategies as out lined before such as text with colour and for alternative shading or pattern is considered a better alternative.

6. C.D.V. COMMUNITY SUPPORT UNITS

The formation of a C.D.V. support group for children and parents would be helpful. In some cases I have taken on the role of tutor to help children with C.D.V. after being referred too by a local doctor.

7. OPTOMETRISTS

I would like to see optometrists get up to speed on C.D.V. and be of a more supportive role with up to date publications and strategies. Many of these are on the internet!

8. PARENTS

This is a complex issue so I will use, If I may,

HAND BOOK EXTRACT

Despite all the experts stating colour blindness is not a serious issue, try telling that to a five-year-old child in kindergarten who cannot perceive colours like those of his or her friends. It is not as easy as you think to check if your child is colour blind because unless you are aware of the problem, children become adept at hiding their deficiencies. Remember the story I told you about little J and the red pencil. Even though our family has a history of colour blindness, little J hid his problem even before his parents, teacher or I new about it. The children may even question their own ability without mentioning the colour problem to anyone including their parents.(even at 5 years old?) How did little J get away with it for so long? He had a twin brother who is not colour blind and little J simply copied his responses. Children also can watch their classmates and copy their behaviours and responses as well.

That is why it is so important to recognise if a child has a colour perception problem as soon as possible.

Students with colour blindness can exhibit a wide range of negative responses to school, reading, colouring, work sheets and social activities including loss of interest or withdrawal of participation.

These should be observed and monitored closely and an appropriate test administered. Beware because responses could be the result of other physical problems or illness. For fear of creating the New World order I would like to see colour blind testing administered when children start school just like measles or other inoculations. New World order off.

As a parent then what can I do to help with out creating more problems or scream discrimination? (and really we don't need that)

PARENTS

POO – COLOURS (Children Pre-School/ Primary)

*For your child to survive in the world of colour today, as a parent, there is a fine line to tread. **Parents need to be able to assist their children with normal colour perception but let the children in their own way reprogram their brain from the perceived colours to the normal colours and finally help them develop a colour sense of humour.** That is, help them with the normal spectrum colours and the position or shape you most likely to find them in and let them work it out.*

For example the name and the colour of grass so they would associate their perceived colour as green.

At an early age listen to what your children are saying are saying about colours? They might be just confusing some colours but it is worth a closer look.

COLOUR BLIND CHECK LIST

- **FAMILY HISTORY**
*Is there a family history of colour blindness?
Remember daughters may pass the x file down generations?*
- **CONFUSING COLOUR NAMES**
*Has the child been taught the correct colours?
Check the child is not copying other siblings?*
- **CONFUSING COLOUR PENCILS**
*Colour blind children will tend to select dark pencils.
Colour blind children will also tend use the wrong colour in the wrong position.
(blue grass?)
Some times colour-blind children may have messy colouring-in and /or lose interest quickly.*
- **READING PROBLEMS**
*Some colour pages may make it difficult for children to read.
Loss of interest in reading some books- colour may turn them off?*

- **LISTEN TO WHAT YOUR CHILDREN ARE SAYING**
Listen carefully to what your children say about colours- birds flowers- (green back spiders?)
- **FOOD**
Yes food, some children may be revolted by some food colours and may even have to smell food before they eat it. A colour-blind child once remarked the food looked like a cow POO?
- **SCHOOL**
Check with schoolteacher for any of the above signs or behavioural problems.

HOW CAN I HELP?

- **TESTING**
I can not stress enough early diagnosis of defective colour vision. If you suspect your child is colour blind have them tested by a qualified optometrist or doctor. The Ishihara test for children 4 – 6 years old is designed with shapes or images (circles squares or lines) that children can easily follow with their fingers. There may be other tests or games that could be used at an earlier age. (Check with your doctor) The school P.& C. may also be interested in purchasing a colour blind test kit?
- **COLOUR ADJUSTMENT STRATAGIES**
The colour deficient strategies you take with your child will depend on the TYPE and STRENGTH of the colour deficiency. Remember there are deferent types of colour blindness and even those types may be effected differently. For example I know other Dalton's with red-green colour deficiency the same as me but are not effected to the same degree. Thus any help should be in consultation with the colour deficient child and then the appropriate colour adjustment strategies worked out. Not all the colour strategies I suggest may be necessary.
- **ATTITUDE**
No matter how much we help the child with their colour deficiency and how good they cope at some stage they are going to be caught out.

The fine line is when do they admit they have a colour problem and when do they keep it to themselves (SISI'S) Children can be just as cruel as an adult when someone is different. As an adult I can laugh it off but it is not as easy in a classroom. Teachers may employ classroom strategies or management to help and I will discuss them under teacher help. There is nothing wrong with "O.K. I give up, I am colour blind, give me a break?"
- **FAMILY HISTORY**
If a family member or friend is colour blind ask them for help and advice on colour strategies.

It is also important to find a relative or friend who is colour blind so the child can share their colour problems and not feel too different.

- **CONFUSING COLOUR NAMES**
*Check true colours with your child and find where the most confusion is? Help with colours for usual position and or shape. Let's have child parent communication?
May be a brother or sister can help them?*
- **COLOUR PENCILS**
*This is an easy item. Just cut a flat section off the end the pencil large enough to write the colour of the pencil.
(red etc;) This will also reinforce colour recognition.
There are coloured pencils on the market with colour names printed on them but some of names like VERMILLION etc; may not give us some colour clues.
As the children become older pre-printed colour names are a bonus.*
- **READING BOOKS**
Early reading books may have lots of colour but if the colours are from the same part of the spectrum children may not be able to see the words let alone read them. Check with children which pages are better to read. Check also school in-class work sheets for possible colour problems.
- **FOOD**
This is a difficult situation for a family. May be having some colour in between the vegetables. A little food decoration would help until they learn it does not look as bad as it tastes?
- **TOYS**
*Usually not a great problem early but games with coloured discs or colour recognition would be a problem.
(some board games)*
- **LIGHTING**
Lighting is a major factor in colour defective vision. Bright, low, inside or outside or light can also effect colour recognition. The larger the colour area the better the recognition.
- **LISTENING**
Listen to what your child is saying about colours and help them. If it were not for the chance remark from my grandson about the football teams shirts would we not have found out about his colour deficiency?
- **SCHOOL**
Colour deficient vision problems should be discussed with your class teacher and the appropriate strategy for your child worked out. Reading off the blackboard or green-board certain colours make it hard for children to see. Teacher strategies are discussed under TEACHER - HOW CAN I HELP.

PARENTS

PUBITY BLUE (In -- between and Teenagers)

If your children are now up to teenagers, congratulations, you made it? Now for the birds, bees, flowers and the trees!

Colour that is? Your children that were headaches are now heartaches. Teenagers and those who think they are teenagers now know everything? Life, hormones, girls, boys and a pimple on the nose is one thing being colour blind is another? Embarrassing? So what can parents do to help? Well, tell them to read this book because nothing you say will help them with colour correction. Hopefully you know there is a colour perception problem by now with your children so diplomatic help is required for the new teenage colour challenges. Let us look at a few colour challengers they will meet?

HOW CAN I HELP?

- **BIRDS**

The feathered variety? Picking up the colour of some birds (lorikeets) in the trees is virtually impossible. Use some binoculars is the only help can suggest or get someone to point them out.

- **FLOWERS**

Another major problem? Any foliage or bush with a Red-green combination will cause heartache. The Christmas bush is a problem for me when it is in flower. What flower? The poitsetter is another problem flower. No clues here so get someone to help. If the flowers is for your girlfriend who cares what colour?

- **COOKING**

Teenagers cooking? Well, they might, but it is better to find out now at home than at say school. Us Dalton's will tend to overcook or undercook your meat because we cannot see any red inside. I suggest if cooking for someone else's meat, ask them

"Is that how you like your meat?"

OR look out for "Your colour blind, he he he"

- **FRUIT**

Red ripe fruit and green unripe fruit are a problem. (Tomatoes) Some yellows and greens are a problem too, such as ripe and unripe bananas and even lemons. I have even had the odd problem with a large deformed lemon and an orange. The only thing I can suggest here, is feeling the fruit, ripe should be softer?

- **CLOTHES**

For teenagers these days clothes should not be a problem, you can wear almost anything in any colour. If you do have to colour co-ordinate them take a trusted friend with you or hope you get a sympathetic sales person?

- **COMPUTERS**
This has been discussed at length so go for all 256 colours who cares it is your computer.
- **SCHOOL** (see also teacher for alternate assignments)
You are going to have trouble with science if you take it as an elective. Chemical reactions, litmus tests and identifying metal by flame are of prime concern. Speak to your teacher and or have a friend to help you.
- **CAREER CHOICE.**
This has been discussed in previous Chapters. Serious consideration of career path and know what colour challenges lie ahead. Do not be swayed by your colour limitation but only your own limitations. Speak to a colour Defective person if there is one in the career area. Get the correct facts on colour vision requirements for your proposed chosen career.
- **COLOUR PENCILS AND PAINTS.**
Colour pencils can be marked as mentioned before in parent section or use the pre labelled pencils.

The pre labelled pencils and paints may be marked BURNT SIENNA, COBALT, UMBER or VERMILLON, which really helps us Dalton's out? Put a sticker on the paint colour or re-mark the pencil.

9. CAREER ADVISORS

Career advice for children at an early age is important for those diagnosed with **C.D.V.** What male child does not say he would like to be a pilot, fireman or policeman when he grows up? Also students should not be totally excluded from a career that requires a degree of normal colour perception but should be counselled and made aware of the colour career challenges that lay ahead of them. Likewise employers should not rely on the Ishihara pseudo- isochromatic test alone and testing should be job specific.

So in my career I progressed from " Camouflage Expert" to a Winston Churchill Fellow working along with other experts in the world on the reconstruction of WINDSOR CASTLE. Yes it included colour identification and took some hard work on my part and NO they did not know I was **C.D.V.**
Not a bad **C.V.** for a **C.D.V.**

Lets look at some other studies:

HAND BOOK EXTRACT

Some Dalton's have indeed challenged the VALIDITY of colour vision screening conducted for some employment occupations. A report on colour vision screening by NEW ZEALAND HEALTH TECHNOLOGY ASSESSMENT (October 1998) 3, concluded there is no single test that can be recommended for the testing of colour vision for all occupations.

The report also stated that while the Ishihara Test is the standard for screening purposes, (acknowledging its sensitivity) that many occupations with restrictions in terms of impaired colour vision do not need such stringent criteria. May be there are limits for Dalton's and just how far we are prepared to challenge the STANDARD but it should not alter the pursuit of our dreams?

AVIATION PERCEPTION STANDARD

One such challenge was from an Arthur Pape, Australian, and a true Dalton who pursued his right to be a pilot and fly aircraft at night. The battle culminated in two landmark appeals to The Administrative Appeals Tribunal resulting in the removal of restrictions on night flying for all Australian pilots with colour vision defects. The tribunal also found after exhaustive examination of all the issues that colour vision defects do not constitute a risk to the safety of air navigation. Arthur proved his point by his experience as a pilot commanding aircraft equal to that of pilots with normal colour vision. Noting in his submissions that in the United States of America the colour perception standard had degenerated to such an extent that colour defectives were able to find work with major airlines and become captains of the latest jetliners. Ironically, the Dalton captains, could fly their 747 aircraft into countries whose colour perception standard would have excluded them from even being a private pilot for a Cessna!

I am not saying that all us Dalton's can be all Arthur Papes! As Mr Papes is a medical doctor (a Dalton Doctor too?) and Designated Medical Examiner for the Australian Civil Aviation Safety Authority; But it can highlight the fact that we all can follow a dream even if we are Dalton's.

The AVIATION COLOUR PERCEPTION STANDARD 20 is on the Internet and is worth a visit for Dalton's and Non Dalton's alike.

OCCUPATIONAL PERCEPTION

The NEW ZEALAND HEALTH TECHNOLOGY ASSESSMENT REPORT (October 1998) 3. evaluated studies conducted on the role colour vision impairment had on occupational performance.

One such study conducted in 1992 McElearney et al; (ENGLAND) A descriptive study evaluated the Ishihara test, Electrical Supply Industry (ESI) test and the Giles Archer Lantern test in pre- employment screening for colour vision impairment for aircraft mechanical occupations. (1020 male applicants)

One hundred (100) candidates failed the Ishihara test but (61) sixty-one passed both the ESI and the lantern tests and a further twenty-one (21) passed either the ESI or lantern test. In the study 83% of the candidates who failed some part of the screening colour tests were placed successfully.

Of course with any study you must look at how valid the study was because it did not state where the applicants were placed. However it does vindicate the appropriateness of some colour vision screening.

The NEW ZEALAND HEALTH TECHNOLOGY ASSESSMENT REPORT (October 1998) 3. also evaluated a study by Mertens and Milburn, in the United States of America in 1996. This study assessed the need for normal (there it is again!) colour vision in air traffic control tasks. There were 121 participants with normal vision and 123 with impaired colour vision as diagnosed by Nagel anomaloscopy. Four (4) air traffic control tasks validated as representative of the occupation were used to assess suitability for performance in that role. The results were that 95% of the participants with impaired colour vision failed. Not a good result but it did prove that at least six participants who would have been rejected automatically might have been accepted. The validity (my university skills coming out!) of the test is in question because seven (7) of the participants, with so called normal vision, also failed! (Now there is a worry!) So colour perception tests are guides and only guides and I do not think Dalton's should be restricted in career choice as much as people with red hair, height, weight and age if all other factors are taken into account. What is it with police forces all over the world that requires applicants with normal colour vision? I do not know? A few wrong red light tickets? We now have cameras! Do we miss the crooks with red faces? What about the ARMY, could they use some Dalton's for night fighting?

SCHOOL PERCEPTION

The NEW ZEALAND HEALTH TECHNOLOGY ASSESSMENT REPORT (October 1998) 3. evaluated a number of other studies that indicated approximately 40% of the male school population with impaired colour vision were unaware of their defect prior to leaving secondary school.

Again you must take the results of this type of evaluation with care since some of the studies were conducted in early nineties. However it does reinforce a point that all children should be tested for colour defective vision as early as possible.

My heart goes out to the little children in Kindergarten suffering because they cannot understand why they do not see the colours the same as their classmates. In Kindergarten colour is reinforced, nominating this object RED and that object GREEN etc; and the teachers assumes the children are all colour literate! How did you learn your colours? How long would it take for a colour test to be taken so those students were not labelled slow because they could not read out of a book or off the Greenboard? Yes, some colours make it hard for us to read. In fact some colours can even revolt us!

Think how some Dalton students would have felt with those damn-coloured rods that were in vogue some year's back to learn counting? Studies have shown that the Ishihara Test is not reliable for children under the age of 5 years but there is other tests on the market that have shapes and figures etc; in lue of the numbers.

Help for colour defective vision children will be discussed in Chapter 6, COLOUR WHO CARES?

From the same New Zealand evaluation of studies, the report indicated that there was no evidence between poor educational achievement and colour vision impairment. Perhaps true, but we Dalton's had to work twice as hard to achieve the same education. An interesting fact emerged from one of the New Zealand studies evaluated was that Maori children with colour defective vision accounted for only 2.3% of the males.

The same New Zealand report also indicated that 62% of the male school population studied, with colour defective vision, had chosen careers deemed inappropriate for their impairment. Who deemed them? It is important for the Dalton's of the world to be diagnosed as soon as possible, and be advised on the colour challenges that lay ahead, but not to discourage them. In an article I found on the Internet by Robert Earle describing his battle to join the police force with colour blindness. He said:

“ Therefore, next time someone says they are colour blind, think of it as another trait that makes them unique and not as a personal downfall. For the parents of a colour blind child, never let them abandon their dreams because of colour blindness.”

12. LOCAL, STATE OR FEDERAL DEPARTMENTS.

13. COMPUTERS AND THE INFORMATION HIGHWAY.

14. GENERAL COMMUNITY.

It is important for the whole community to understand *C.D.V.* and just not schools, if we are all able to access information.

HAND BOOK EXTRACT

Thankfully, with computers, you can make some changes without establishing a New World order, colour compensate. (I like that phrase). The lessons learnt in designing colours for web pages on the Internet, if you think about it, is really a colour compensation standard for information, products and marketing for colour blind people. Making colour compensation is a small sacrifice to pay if your product or information can be accessed by up to 10% more people. (It makes sense to me but has certainly been overlooked by some for a long time!)

COLOUR COMPENSATION

Research has found that colour has a tremendous effect on our behaviour including strong emotional and psychological impact. (Whether this is real or imagined)

No doubt, people react differently to colours (colour preference – is it because each of us perceive colour differently?) but colour psychology has been shown to have a

dramatic effect on business, image of a company, packaging and sales of products, increasing productivity and the moral employees. Why do large fast food chains basically use the same colour scheme? Why is it better to use blue colour for sweets and not green? How does colour affect our mood? If I am colour blind then how do colours, which I see differently, affect me psychologically? I don't know? But there are some areas that can be improved for colour blind design. Designing for people with defective colour vision is not easy because you are not going to please all colour deficiencies. But at least being aware there are colour deficiencies in the world is a start, keeping to some basic rules of colour and then colour compensating will result in a lot more people accessing the product and/or information.

Remember if you can not see it, you are not going to buy it! If you can not read it, you are not going to need it!

COLOUR COMPENSATION DESIGN HINTS

- ✓ 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.
- ✗ **DO NOT** use washed or low intensity colours particularly on small bands, lines or text, as this will cause difficulty in colour discrimination.
- ✗ **DO NOT** use,
RED, GREEN, BROWN, GREY and PURPLE
NEXT TO / ON TOP OF / OR CHANGING TO
RED, GREEN, BROWN, GREY and PURPLE
- ✗ **DO NOT** use light pastel colours in low light or bright light conditions.
- ✗ **DO NOT** rely on colour alone to convey a message - give some other visual clue.
- ✗ **DO NOT** use colour from the same part of the spectrum.

BEWARE some colours may be perceived to look differently when placed on top or behind some other colours.

The list is not complete, for fear of starting the New World order but gives enough information for those who can see what I see for colour compensation. Colour, you would appreciate by now, is a complex subject for both Dalton's and Non-Dalton's alike, therefore, the readers might like to consider further research! Do not forget if you are colour blind, your computer has 256 colours that can be changed to your hearts content. (just don't let anybody else use it!)

CONCLUSION

(C.D.V.) does effect every day of our life. It does effect the learning process and impacts on the social, cultural and educational factors affecting the education of boys in Australian schools.

What we do as C.V.D. individuals and how we overcome our colour difficulties is pretty well up to us, but with informed understanding, the non C.V.D.'s of this colour world could make life and opportunities equal for everybody.

**STANDING COMMITTEE ON EMPLOYMENT,
EDUCATION
AND
WORKPLACE RELATIONS.**

INQUIRY INTO BOYS EDUCATION

PART C.

RECOMMENDATIONS

I would like to submit the following recommendations for your consideration:

- A. Implement compulsory colour defective vision testing immediately when children start school.**
- B. Recommend colour defective vision awareness at ALL schools.**
- C. Recommend existing teachers undertake short in-house colour defective vision classroom management.**
- D. Recommend colour defective vision classroom strategies be included in University courses for teacher trainees.**
- E. Recommend existing career advisers undertake in-house colour defective vision career strategies.**
- F. Recommend further studies be carried out on colour defective vision**
- G. Recommend all local, state and federal departments be made aware of colour defective vision and colour material to be Colour Compensated.**
- H. Awareness on a broader scale of colour defective vision in the community so that coloured information is Colour Compensated and accessible to all.**