

Colour Vision Deficiency:

Is it a problem and if so whose problem is it?

Is it a problem?



Colour Vision Deficiency: is it a problem and if so whose problem is it? | Colin Egan

Scheduled for 27 Jan 2021



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Some Terms

Colour Vision Deficiency:

the inability to differentiate certain colours;

Colour Blindness:

the inability to differentiate colour (other than shades of black and white).

Some Terms

Trichromacy:

the ability to differentiate between the three primary colours (rgb);

Dichromacy:

the ability to differentiate between two of the primary colours resulting in the inability to differentiate between shades of (red and green) or (blue and yellow);

Monochromacy:

the inability to differentiate between any shades of colours.

Some Terms

Deuteranopia:

the inability to differentiate between shades of reds and greens;

Protanopia:

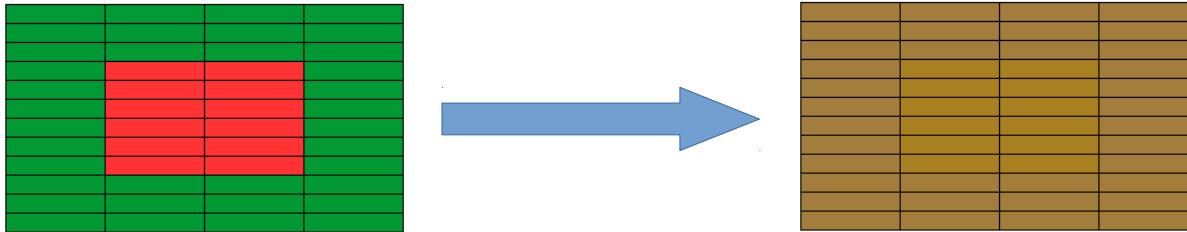
also, the inability to differentiate between shades of reds and greens;

Tritanopia:

the inability to differentiate between shades of blues and yellows.

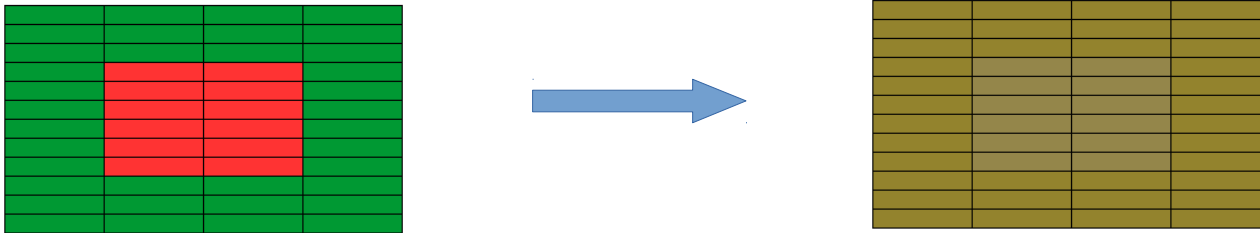
CVD

Deuteranopia: the inability to differentiate between shades of reds and greens;



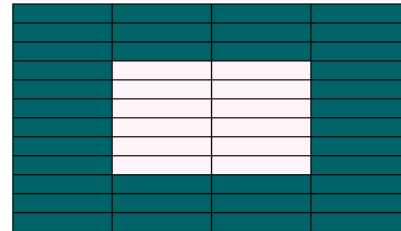
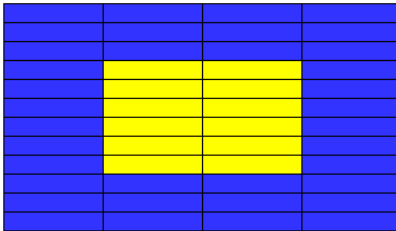
CVD

Protanopia: the inability to differentiate between shades of reds and greens;



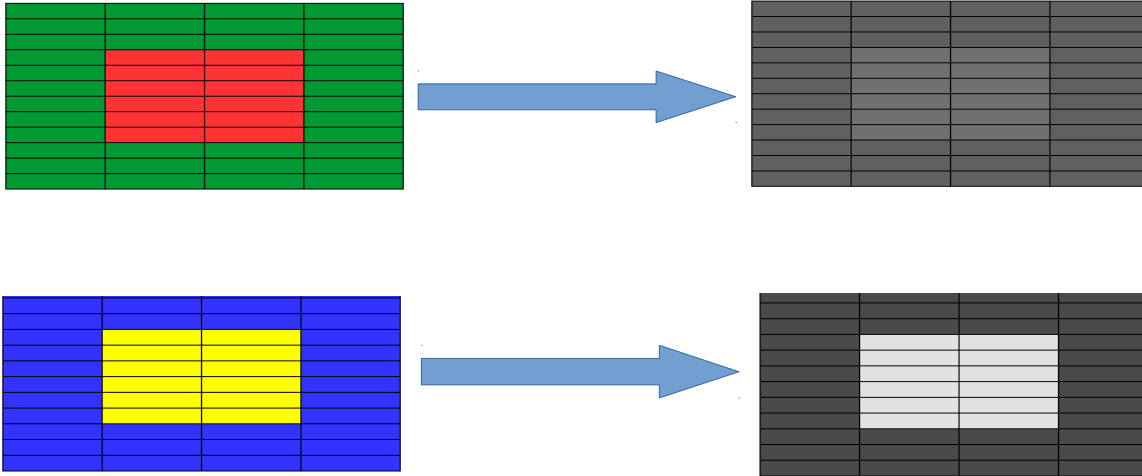
CVD

Tritanopia: the inability to differentiate between shades of blues and yellows;



CVD

Monochromacy: shades of black and white;



Me

I have been involved in CVD research (on-and-off) for over 10 years;

I am not CVDt;

I have 'bumped' into many many people who are either CVDt or they know someone who is;

Before becoming a Computer Scientist, I was a Life Scientist;

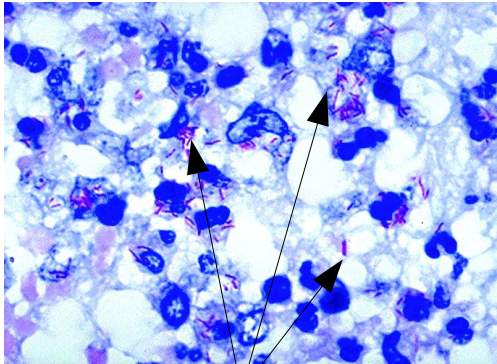
Me – Microbiologist

Mycobacterium tuberculosis:

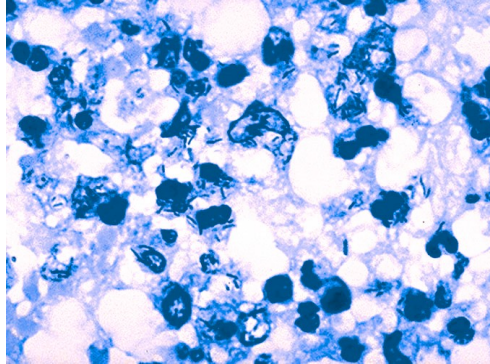
In the late 1970s, it took up to 6 weeks to grow *M. tb*;

Microscopy of a Pathology sample using the staining technique, Ziehl Neelsen;

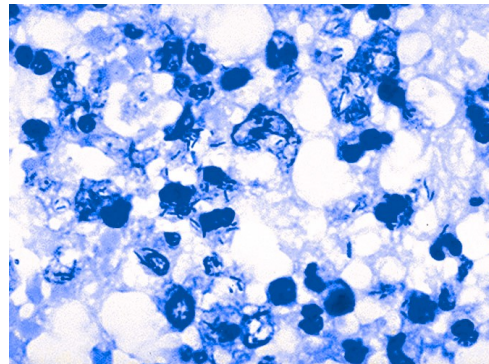
<https://www.pathologyoutlines.com/topic/breastTB.html?mobile=off>



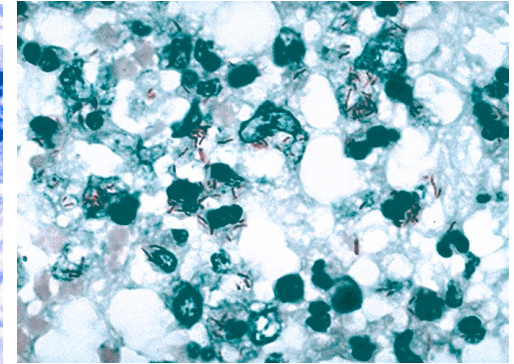
I would see



Deuteranopia



Protanopia



Tritanopia

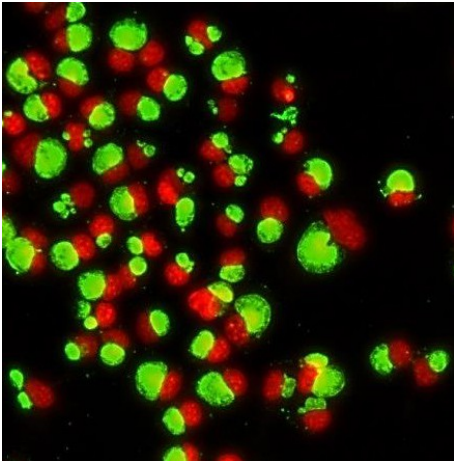
Me – Microbiologist

Chlamydia trachomatis:

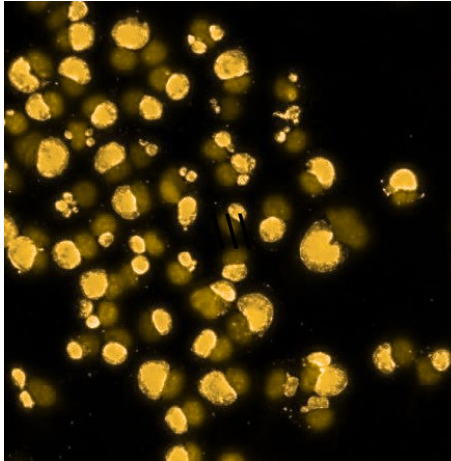
In the mid-late 1980s;

Microscopy of a Pathology sample using an immunofluorescence
monoclonal antibody staining technique,

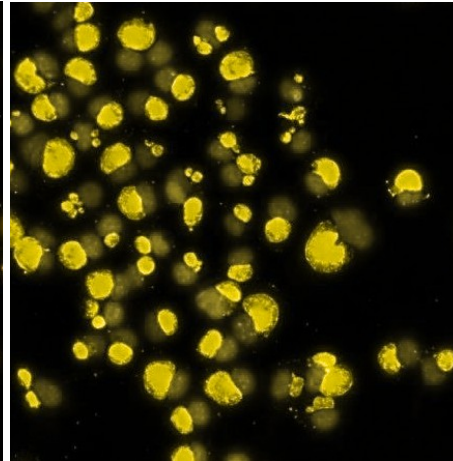
<https://www.dkfz.de/en/f030/groups/roesl/index.html>



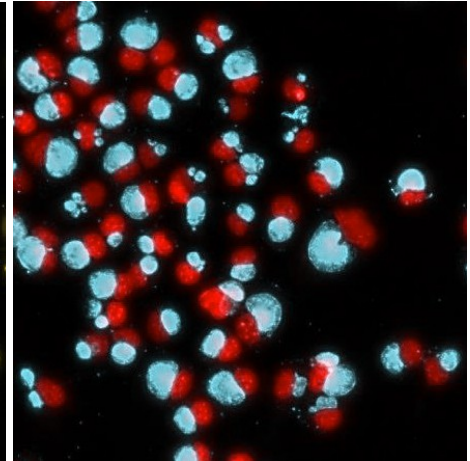
I would see



Deuteranopia



Protanopia



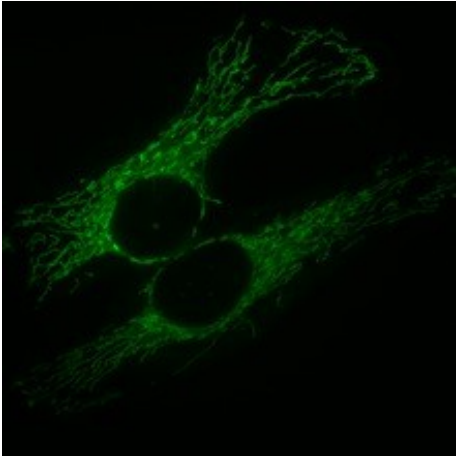
Tritanopia

Me – Neurotoxicologist

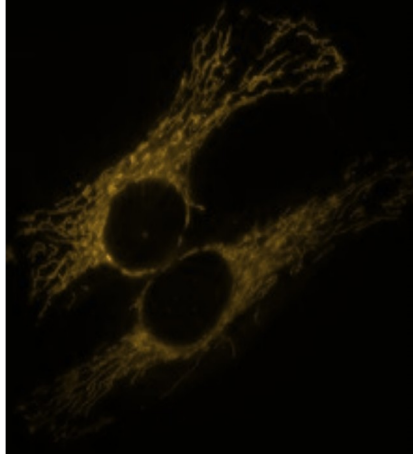
Mitochondria - involved in cell respiration:

In the early 1990s;

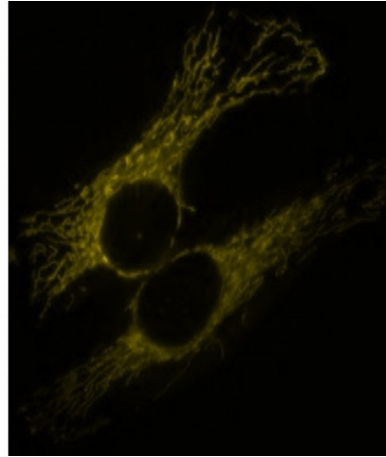
Microscopy of *HELA* cells using the Janus Green staining technique;
https://wikivisually.com/wiki/Janus_Green_B



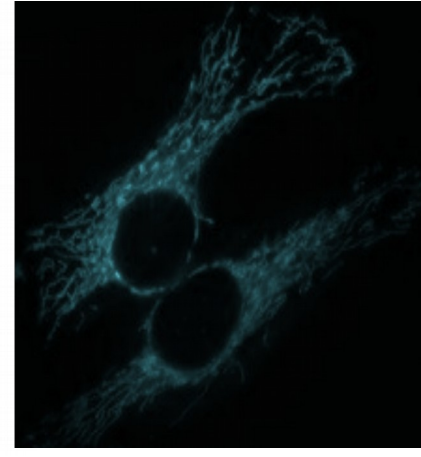
I would see



Deuteranopia



Protanopia



Tritanopia

Co-vid 19

Let's find out what the latest Co-vid 19 situation is in Europe:
The European Centre for Disease Prevention and Control;

<https://www.ecdc.europa.eu/en/covid-19/situation-updates/weekly-maps-coordinated-restriction-free-movement>

I have chosen this website for two reasons:

- 1) Co-vid 19 is highly topical;
- 2) The webpage shows a “CVD friendly” image.

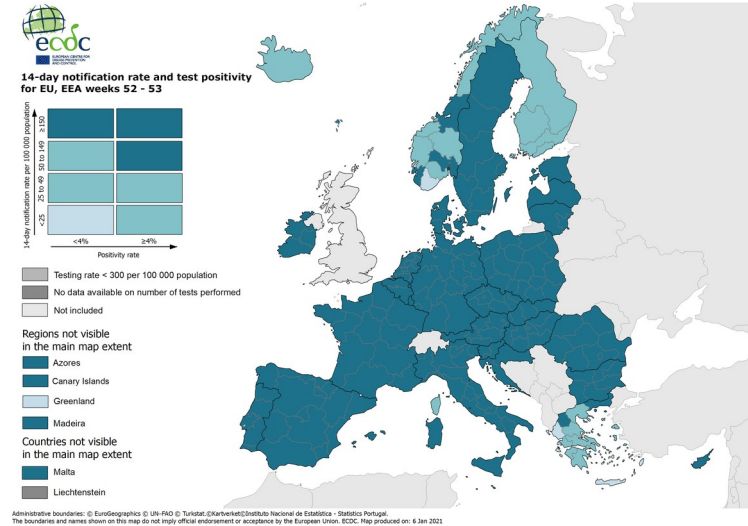
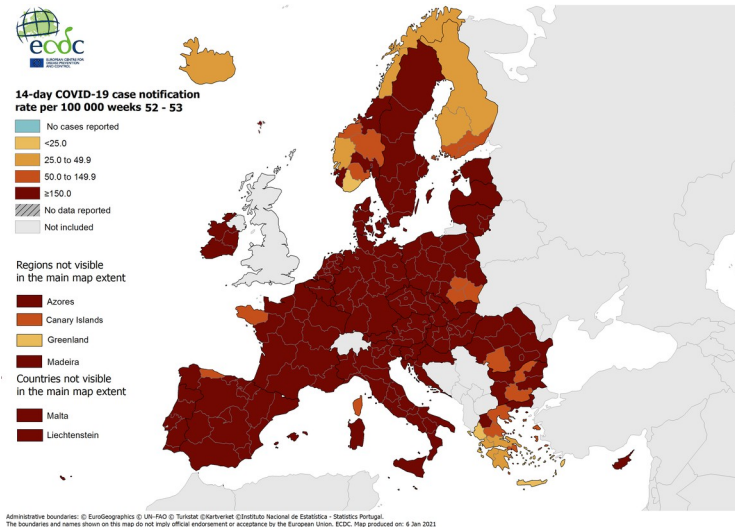
European Centre for Disease Prevention and Control

Copy and download the two images entitled:

- 1) Combined indicator: 14-day notification rate, testing rate and test positivity, updated XX January 2021;
- 2) Combined indicator: 14-day notification rate, testing rate and test positivity, updated XX January 2021 (colour-blind friendly).

European Centre for Disease Prevention and Control

I downloaded my versions of the two images on 07 January 2021:



Coblis

Let's see how “CVD-friendly” these maps are;

There are many CVD Emulators on the Internet;

For this talk I am using Coblis:

It is a good emulator that is quick and simple to use;

<https://www.color-blindness.com/coblis-color-blindness-simulator/>

Coblis

Use the Coblis “browse” tab to select your downloaded “non-CVD-friendly” image:

Under “Dichromatic view” select the Red-Blind/Protanopia radio-button:

Have a look at the output image and save it, if you wish to;

Repeat with the other two radio-buttons for the other two conditions:

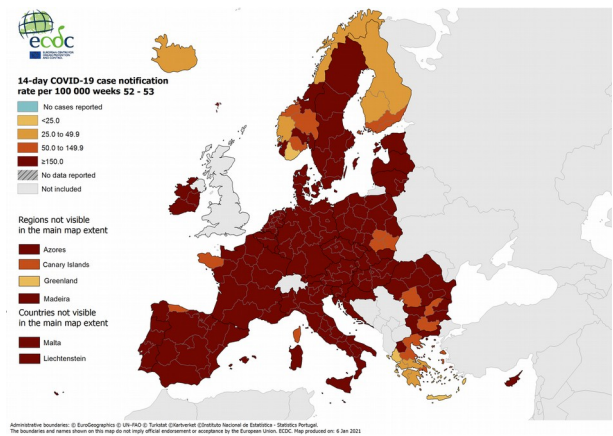
Have a look at the output images and save them, if you wish to.

Coblis

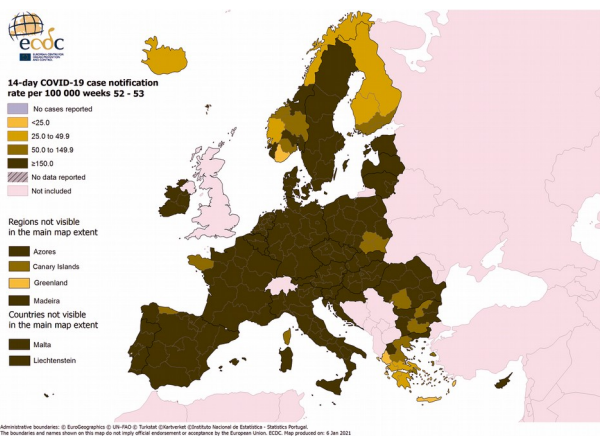
Repeat the exercise but this time use your downloaded “CVD-friendly” image:

Have a look at the output images and save them, if you wish to.

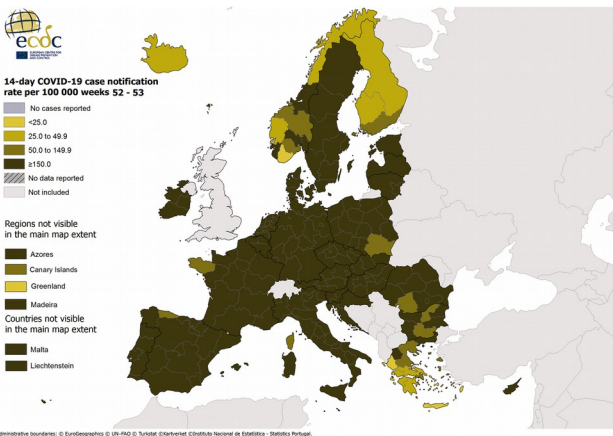
Coblis - European Centre for Disease Prevention and Control “non-CVD-friendly” image



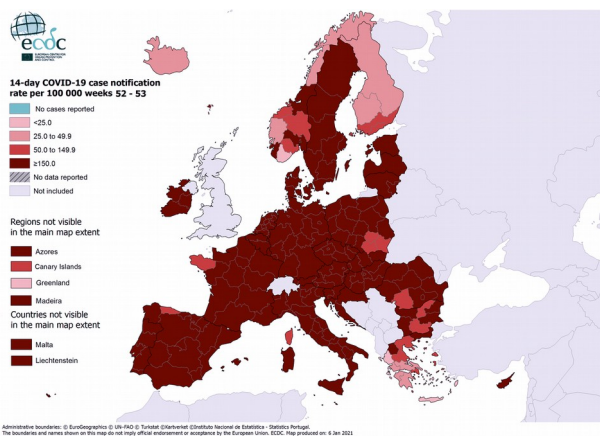
Deuteranopia



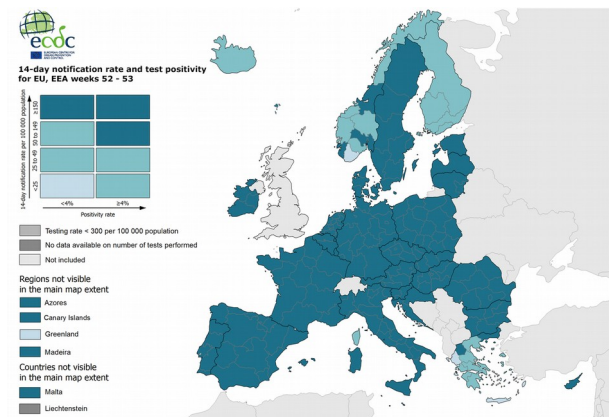
Protanopia



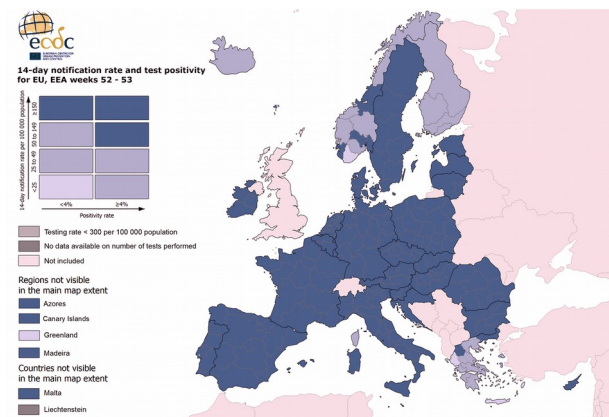
Tritanopia



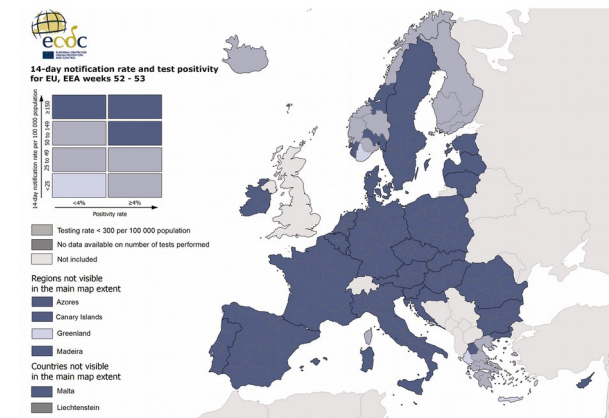
Coblis - European Centre for Disease Prevention and Control “CVD-friendly” image



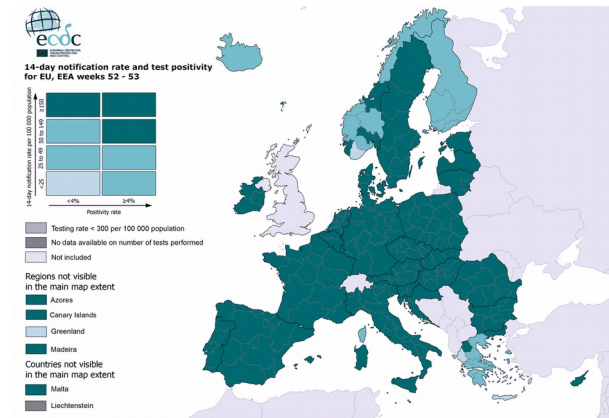
Deuteranopia



Protanopia



Tritanopia



Some additional information

Approximately 1 in 12 (~8%) of males are CVDt and approximately 1 in 200 (0.5%) of females are CVDt;

About 50% of the CVDt have moderate or severe conditions;

There is no cure for CVD;

Some additional information

The Equality Act 2010:

Are the CVDt considered to be disabled?

If so how are they protected under the Act?

CVD is not considered to be a disability under the Act and hence the CVDt are not protected;

There has been a number of cases that have gone to tribunals and, to my knowledge, none have been successful.

Round-up

Let's remind ourselves of the title of this talk:

Colour Vision Deficiency:
Is it a problem and if so whose problem is it?

Round-up

Is it a problem?

I consider I have provided enough evidence to demonstrate that CVD is a problem, and it can have detrimental consequences;

If so whose problem is it?

I consider it to be a problem not just to the CVDt;
As a software developer do you allow for the CVDt?
You should!

Round-up

Do I consider CVD to be a disability?

In my opinion - YES;

Do you consider CVD to be a disability?

I leave you to make your own judgement;

I ask you, in the future, to consider how the CVDt would view and interact with your work and hence I ask you to create “CVDt friendly” products.

Round-up



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<https://www.nhs.uk/conditions/colour-vision-deficiency/>

<https://www.colourblindawareness.org/>

<https://www.color-blindness.com/coblis-color-blindness-simulator/>

<https://www.gov.uk/guidance/equality-act-2010-guidance>

<https://www.gov.uk/employment-tribunal-decisions/mr-p-bessell-v-the-chief-constable-of-dorset-police-1400313-2016>