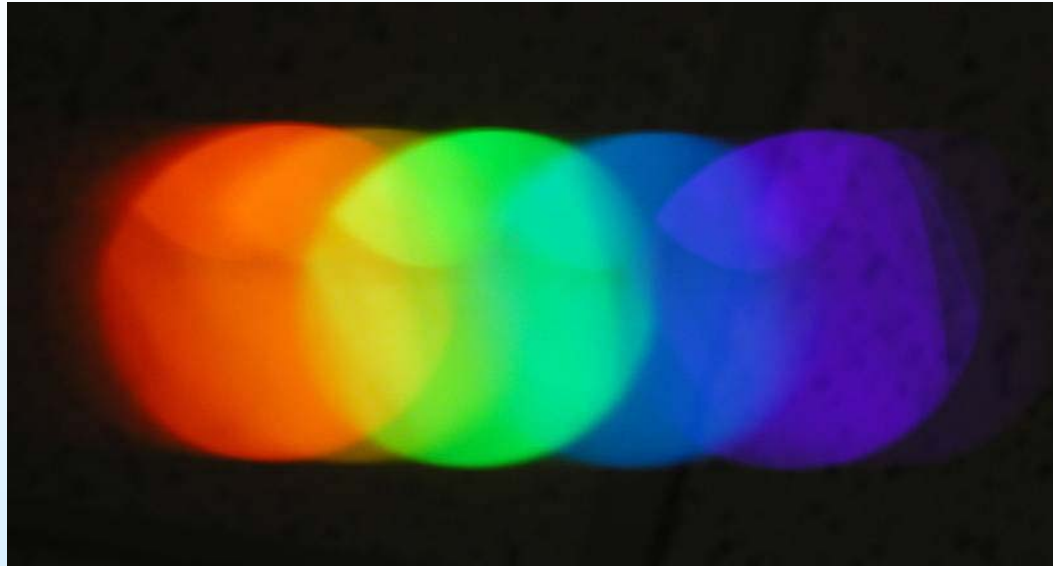


# Checking Color Perception



The following cards will allow you to determine if you are Color Normal or Color Deficient

# Introduction

Dr. Shinobu Ishihara of the University of Tokyo, Japan designed the plates used in this color vision presentation.

My interest in the color vision assessment process is very basic. If you are going to train someone in your ceramic department, you need to know if they are going to have difficulty seeing subtle shade variances.

Or whoever is taking the shades needs to be color normal. If they have a Red-Green deficiency then all of the shades we see in teeth will be different.

Slide #8 in this presentation should help explain why red-green is so important, in both people & lighting sources.

**When you are looking at the disks. Limit your focus to 3 seconds.**

# The Ishihara Color Test System

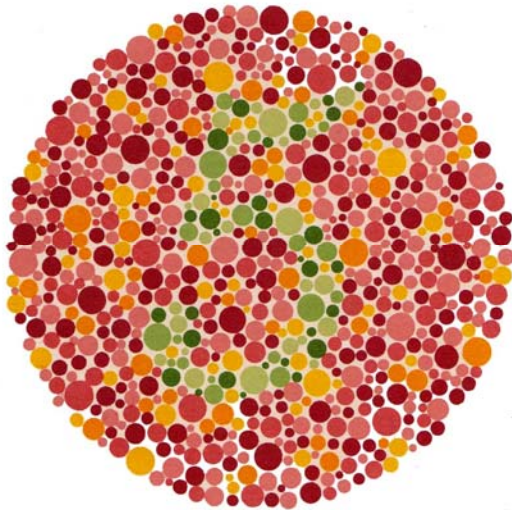
If you saw a 5 in the circle you are color normal

If you saw a number 2 you have a Red–Green Color deficiencies.

Total color blindness would not read any numeral at all.

**Bear in mind that Red-Green deficiencies would cause you great difficulty in selecting shades.**

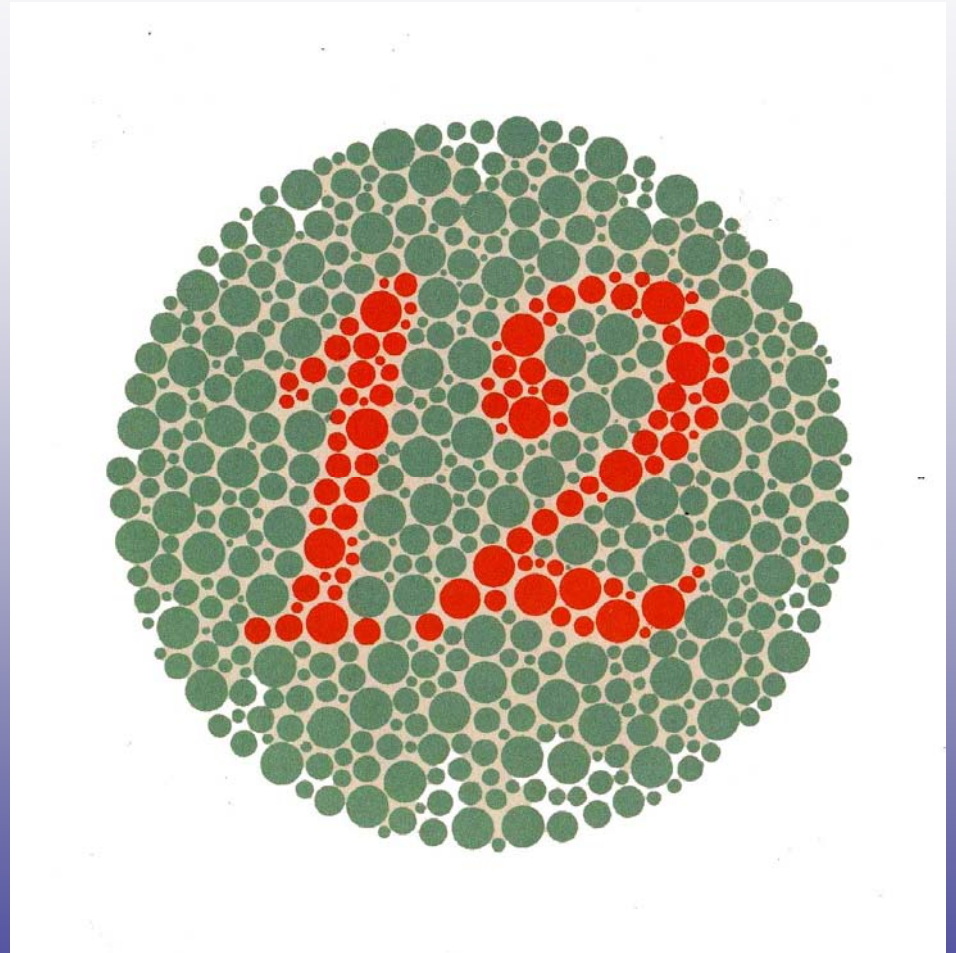
**All of the shades we see in natural teeth are based in a blend of Red to Green. This is explained in our color book “Color In Dentistry”**



# Learning More About Color Deficiencies

We have 17 plates to show you & they will deal with slight to complete color blindness.

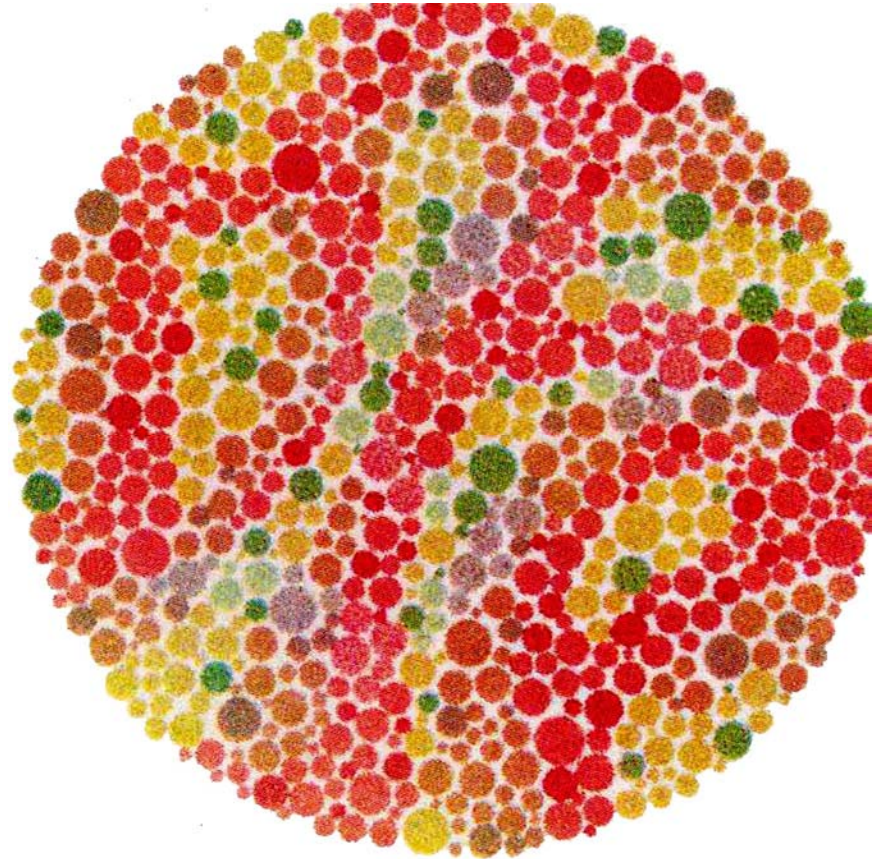
Both normal and those with all color deficiencies should be able to read the number 12



# Red-Green Deficiencies

Normal color vision people & those with color blindness should not be able to read any number.

The majority of those with red-Green deficiencies should see the number 5

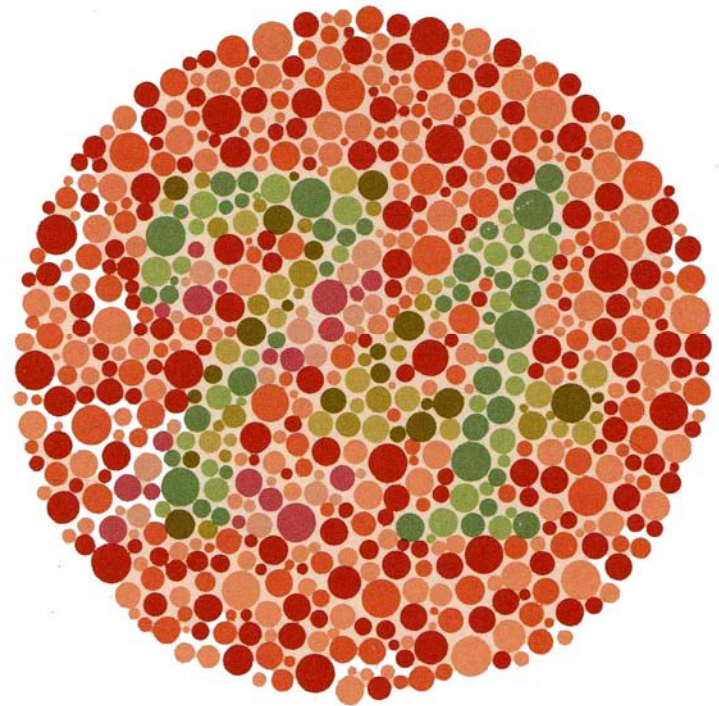


# Red-Green Deficiencies

Normal color vision will read the number 74

Those with color vision deficiencies should read this number as 21 or will read it incorrectly

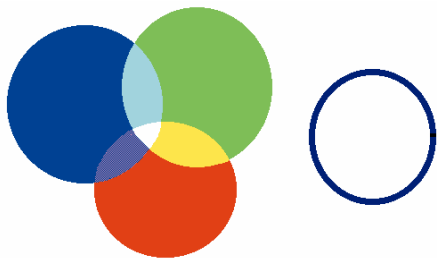
Totally color blind should not be able to read any number



# Perceptions In Color

- Say the color not the word
- **Yellow**   **Blue**
- **Orange**   **Black**
- **Red**   **Green**
- **Violet**
- Your right brain tries to say the color
- But your left brain insists on reading the word.
- **Many times the color selection is more of an assumption than a selection by decision**

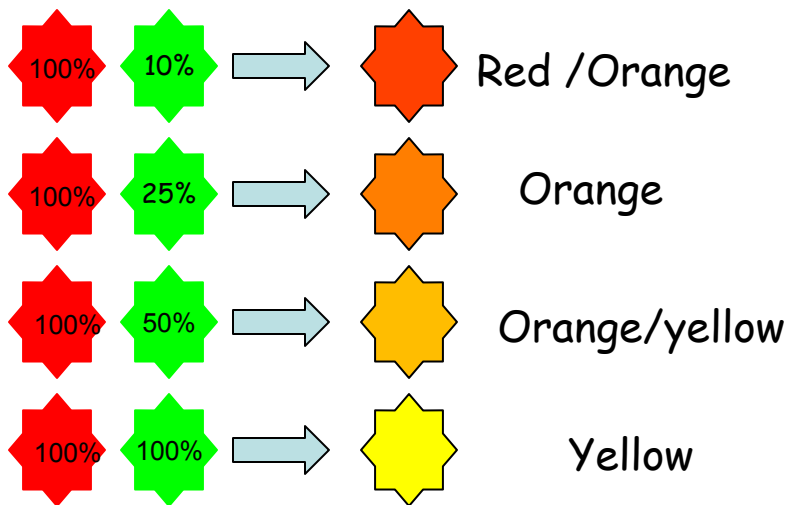
# Basic Colors In Light & Illumination



Red , Green & Blue are the primary colors in light. Normally we will see them identified by the letters **R G B**. These three **Primary** colors make up all we See in natural tooth colors. The over laps show what the secondary colors are. The center over lap shows that 100% Red, Green & Blue give us clear colorless light.

When fluorescent tubes age they emit increasing amounts of green. So, as you work under an aging light ,you will first see too much orange & send crowns that are too light. Then as the light ages you will see more yellow because of the light having more green & compensate with more orange. Now your shades will be too dark. Prismatic Paint chips will illuminate the color of the emitted light. Without the light chip indicator you have no way of knowing what your light source is emitting.

In the illustration on the left the amount of green to red in the illumination of a tooth gives us the various dominant hues (colors).



We see that an equal amount of green in the light will produce a pure yellow. The evidence of yellow being produced by two other colors does establish yellow is not a primary color when you are using transmitted color. Remember, when we are dealing with illumination of translucent objects the primary colors are red, green & blue (RGB).

To get a better mental picture, use The custom color section of a word processing program & play with the RGB color percentages & see what colors appear as you adjust the colors in the LIGHT.

## **Lighting Sources & Their Effect On Identifying Color In Teeth**

When we are choosing lighting there are three things to establish **Kelvin, Lumens, CRI**. **1** - The Kelvin level provided needs to be a minimum 5000K and preferably 5500 Kelvin. 5500 Kelvin is the standard set by the international society' of light for high noon. 5000 Kelvin is the most readily available Kelvin level. 5000 Kelvin is early morning light, 6am . 5500 is approximately high noon. **2** - **CRI** , **Color Rendering Index**. 100 CRI is perfect daylight. **3** - **Lumen level**, lumens are the intensity of the light. When we examined available lighting we found the CRI (color rendering index) needs to be 92 CRI or above & the lumens need to be from 550 (550 lumen hand held light will be adequate in a 12" working distance) to 2500 in a ceiling fixture.

The first qualification I used for the lighting was a Lumen level of 2200 / 2500, (above 2500 there seems to be a glare to the light) then I checked the power distribution graphs to check the CRI (spectral color content of each brand) & then the Kelvin level. The 93 CRI Vi-Tek93 has a higher lumen out put & works with a 40 watt fixture. This light gives you a better contrast of the surface & is still full spectrum.

The specific brands I examined were Sylvania / Osram 5000, GE 5000K, (no good) Durotest 5500 K, (no good) Ott 5500 K & Phillips 5000K lighting (no good). Out of all the bulbs available to you, only one is good for taking & communicating shades of teeth. When ever you are selecting lighting you must check the technical literature & look at the power curve graphs. These power curve graphs will show you what spectral color is in the light & what level the spectral color is in relationship to daylight.

Vi-tek-93 - 93 CRI 5500k - about \$16.00 4 foot tube from H&H lighting Elmwood, IL 1-800-637-3853

**The term "color corrected" has been reduced to a meaningless marketing term, all sorts of lighting is represented as color corrected. What you really need to know about a light is if it is full spectrum & if it is full spectrum are the color levels above or below that of daylight, then you need to know the CRI which you will see in the following graphs, Our investigation shows the light can't be below 92 CRI and the lumen level shouldn't be above 2250 The study of technical sheets has shown Lumen levels above 2500 tend to have too much green & glare into the translucent objects obliterating the low saturation warm spectral colors in the translucent objects - Natural teeth!**

This material covered in detail in Our book "Color in Dentistry" available on CD \$75.00