

If a tree falls in the forest...



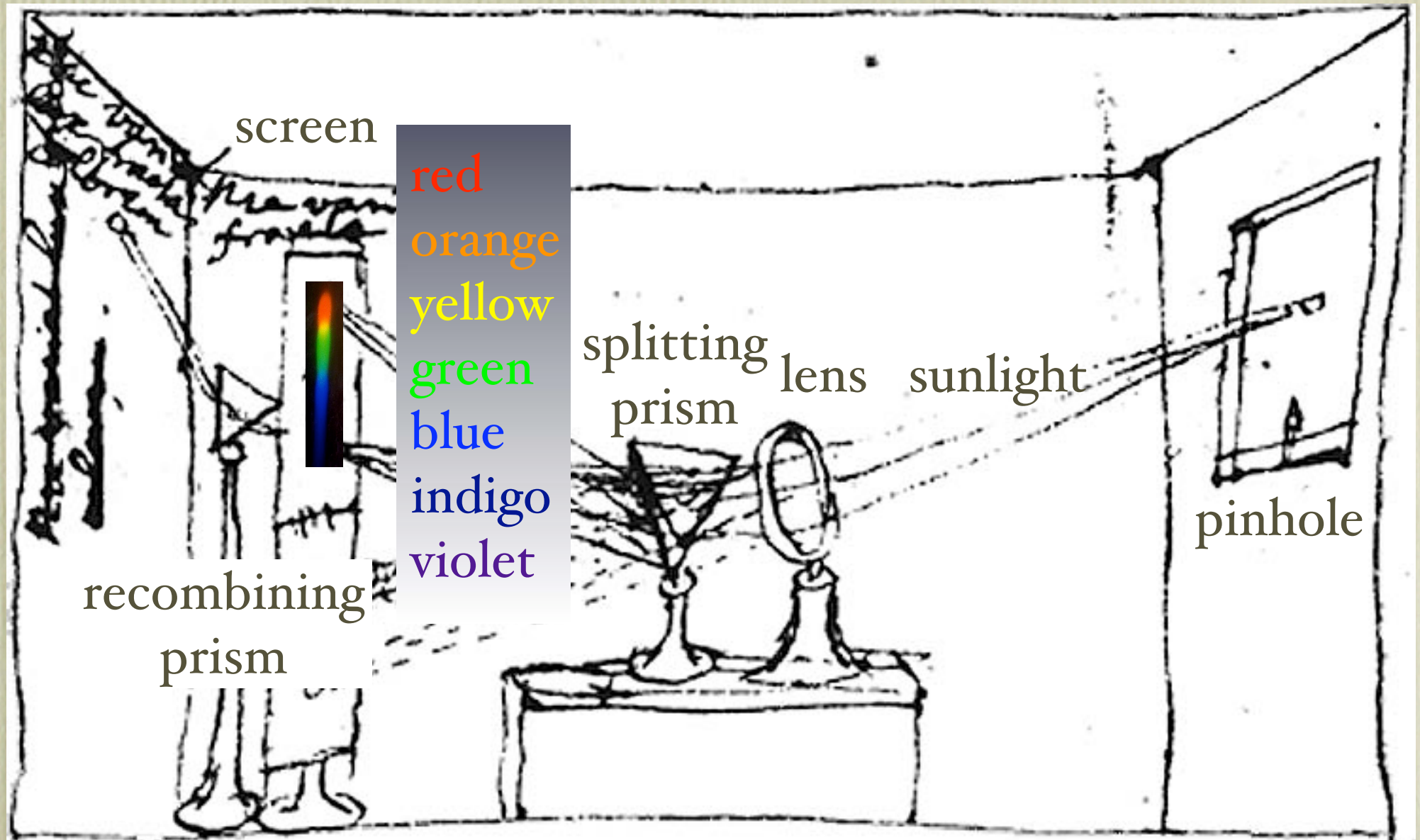
Space & time in visual & auditory perception

It all started with Newton...

Isaac Newton (1642–1727)

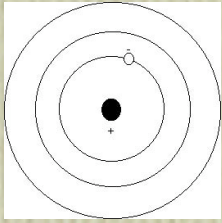


1672: experiments on optics

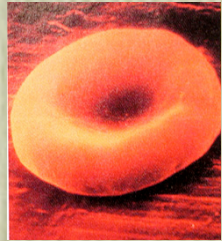




The electromagnetic spectrum



radius of
hydrogen atom



red blood cell

1 inch

1 yard



height of
Mt. Everest



diameter of earth

wavelength in meters

radius of
hydrogen atom

red blood cell

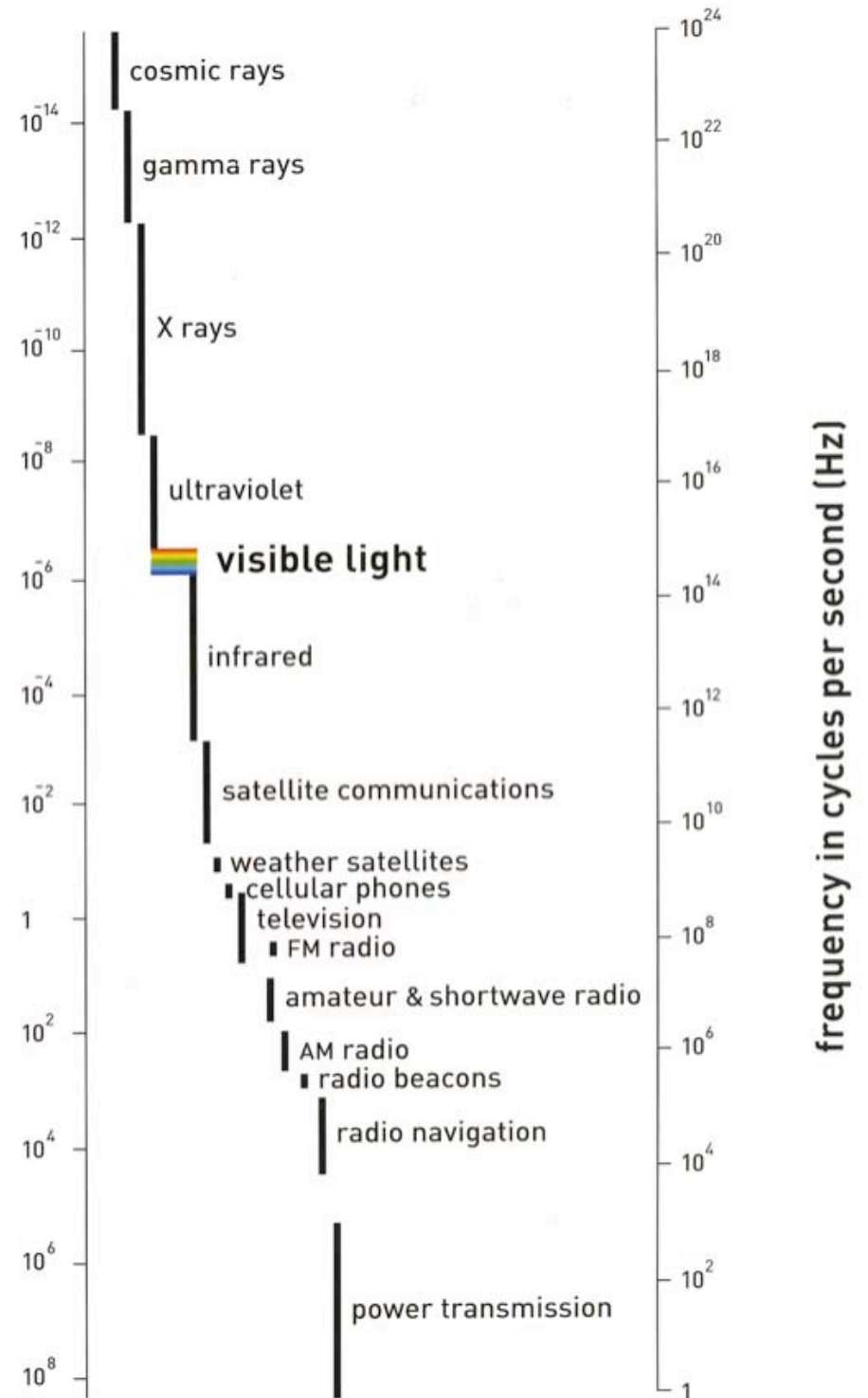
1 inch

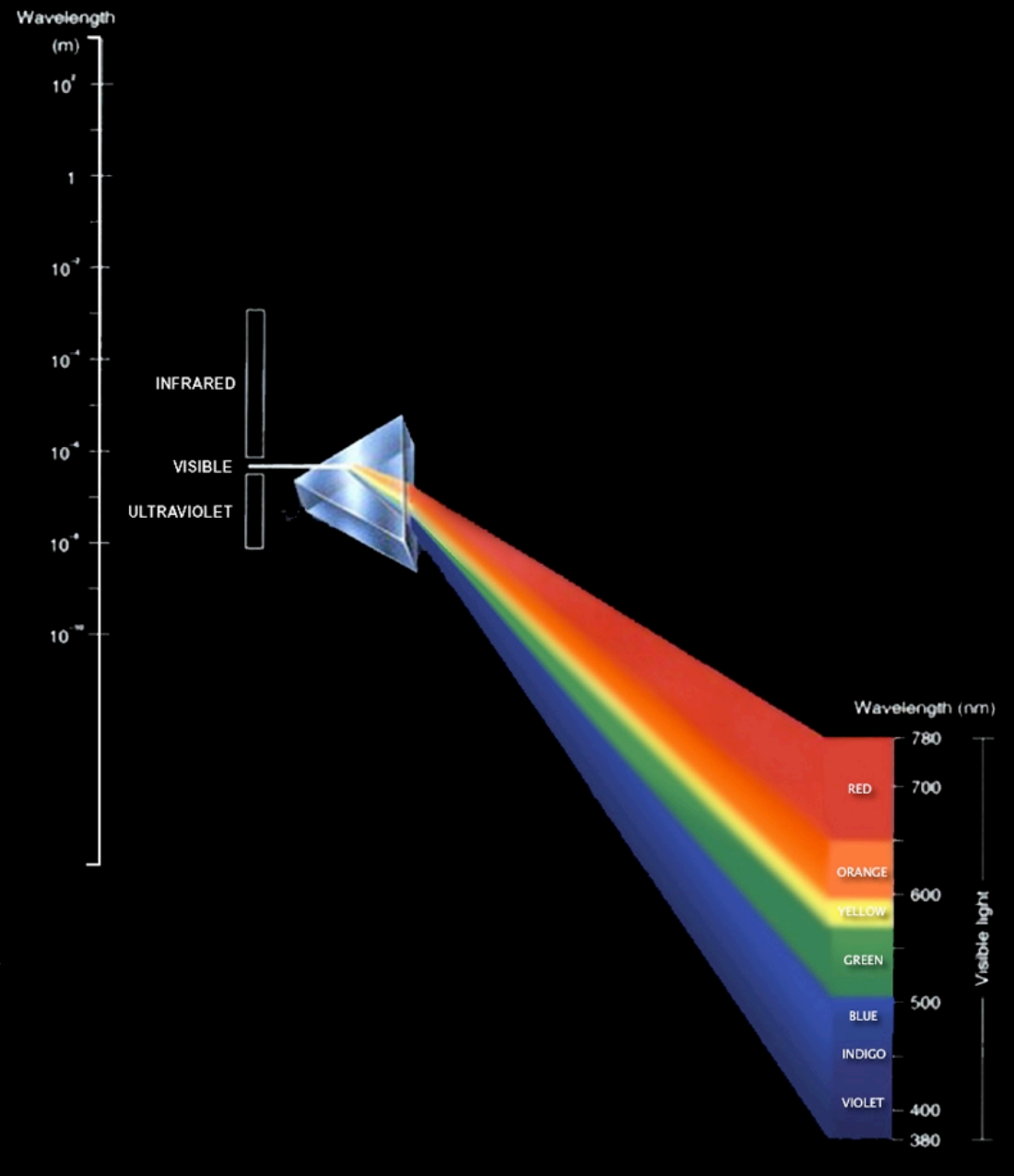
1 yard

1 mile

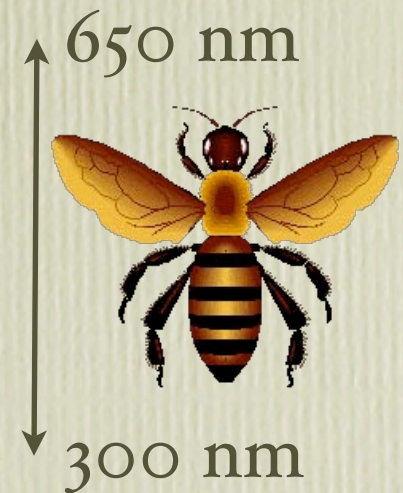
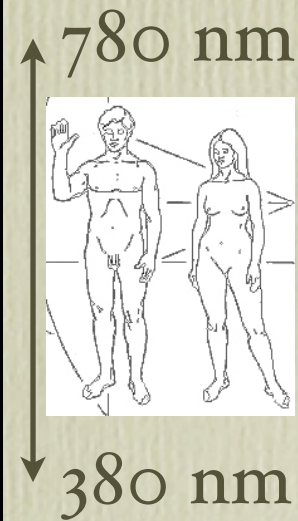
height of
Mt. Everest

diameter of earth

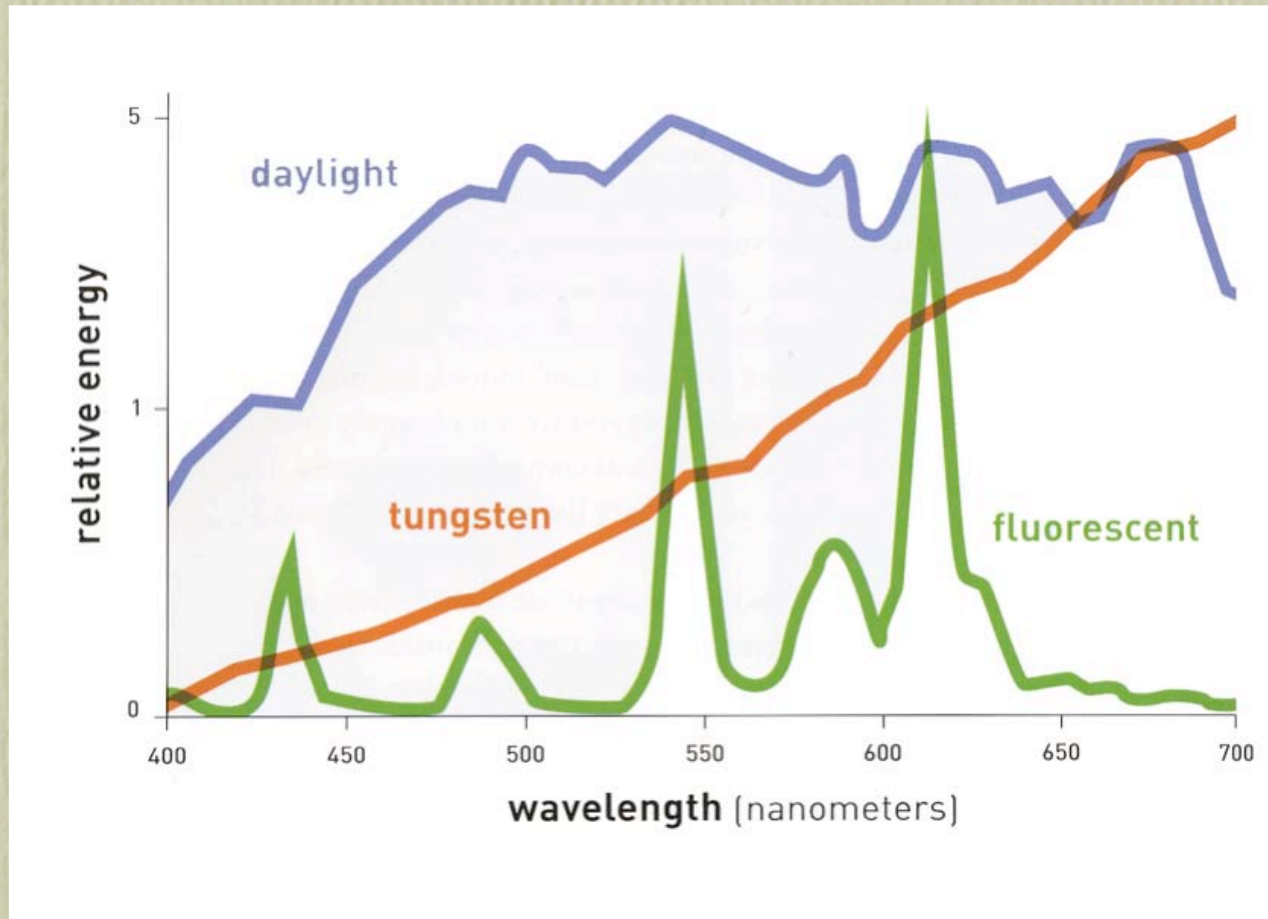




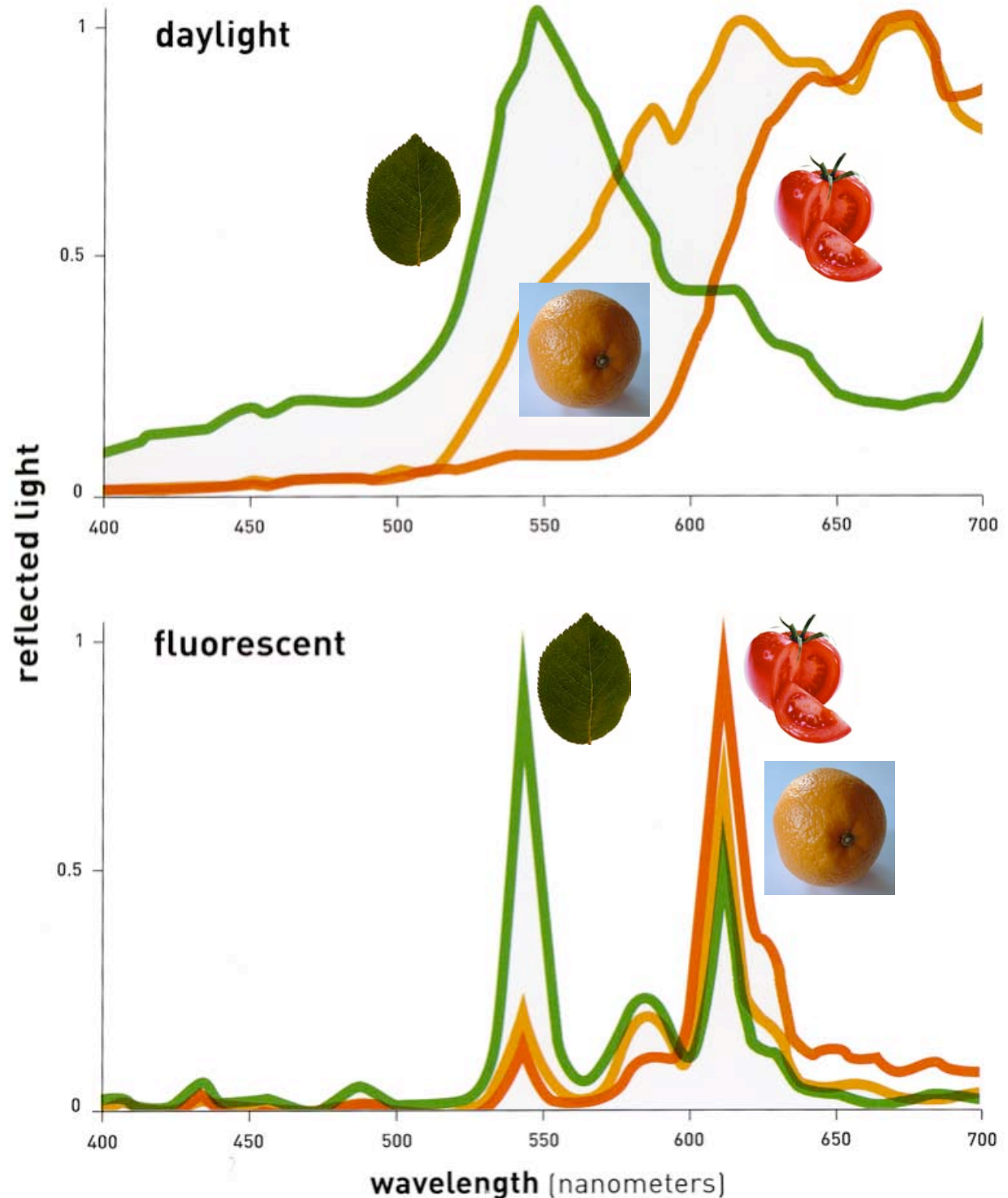
1 nanometer (nm)
 $=10^{-9}$
 $=$ one billionth meter



Spectra for three sources



The reflected light that enters our eyes from objects when they're lit by different sources can be very different



But their colors are unchanged!

The visual system
discounts the illuminant;
also known as
color constancy.

Does something similar
happen with
the perception of sound?



The sounds that enter our ears from sources when they're heard in different environments can be very different

The sounds that enter our ears from sources when they're heard in different environments can be very different



But the sound of the speaker is
unchanged!

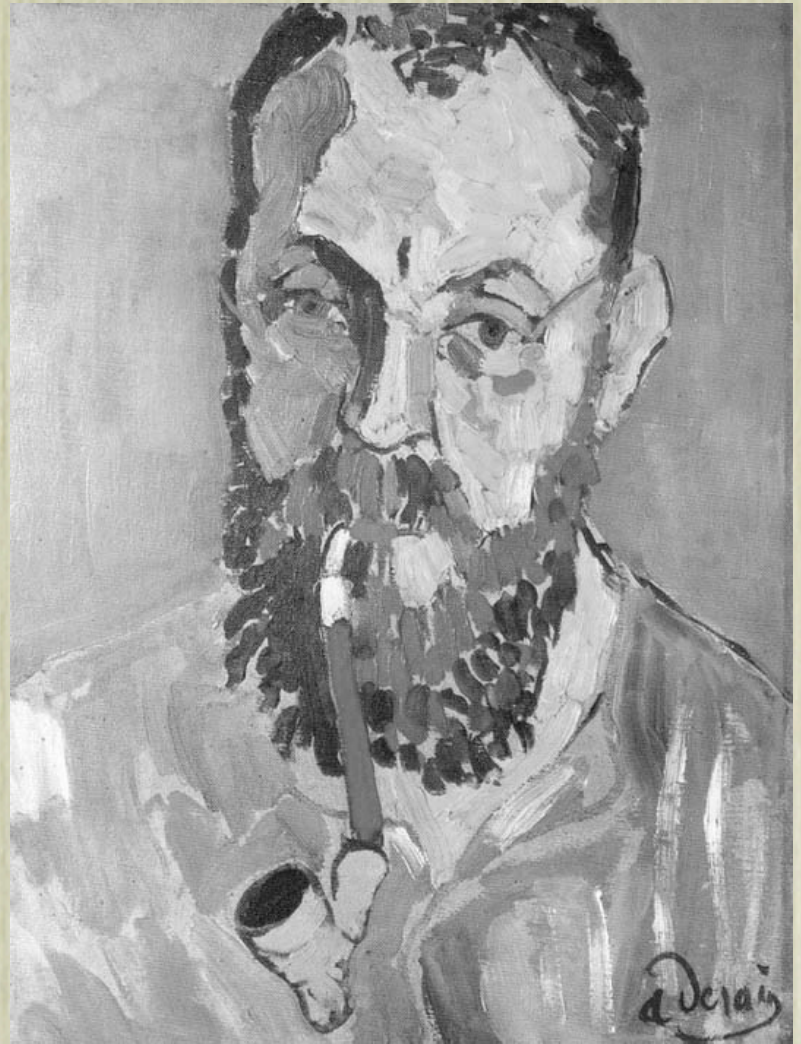
The auditory system
discounts reverberation;
also known as
source constancy.

	sources	surfaces
auditory perception	“voices” contain the message	echoes from surfaces are discounted
visual perception	the illuminant is discounted	we are interested in bodies

Two questions

- How important is color to visual perception?
- How important is space to auditory perception?

Derain: *Matisse*



Auditory space perception in the service of visual orientation

Summary

	space	time	other
auditory perception	in the service of vision	we perceive sources modulated in time	we perceive sounds modulated in frequency
visual perception	we perceive bodies extended in space	we perceive bodies extended in time	color important for some functions

It all started with Newton...

- Newton (and Kant and many philosophers after him) thought that space and time are the inescapable scaffolding for understanding reality.
- Recall that *all* science begins a scientist's perception of something.
- I have shown why understanding perception, and particularly auditory perception, shows that this axiom may be misleading.

(slide added after my talk)

Thanks

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