

MESA WORKSHOP

PART 2

10 TIPS

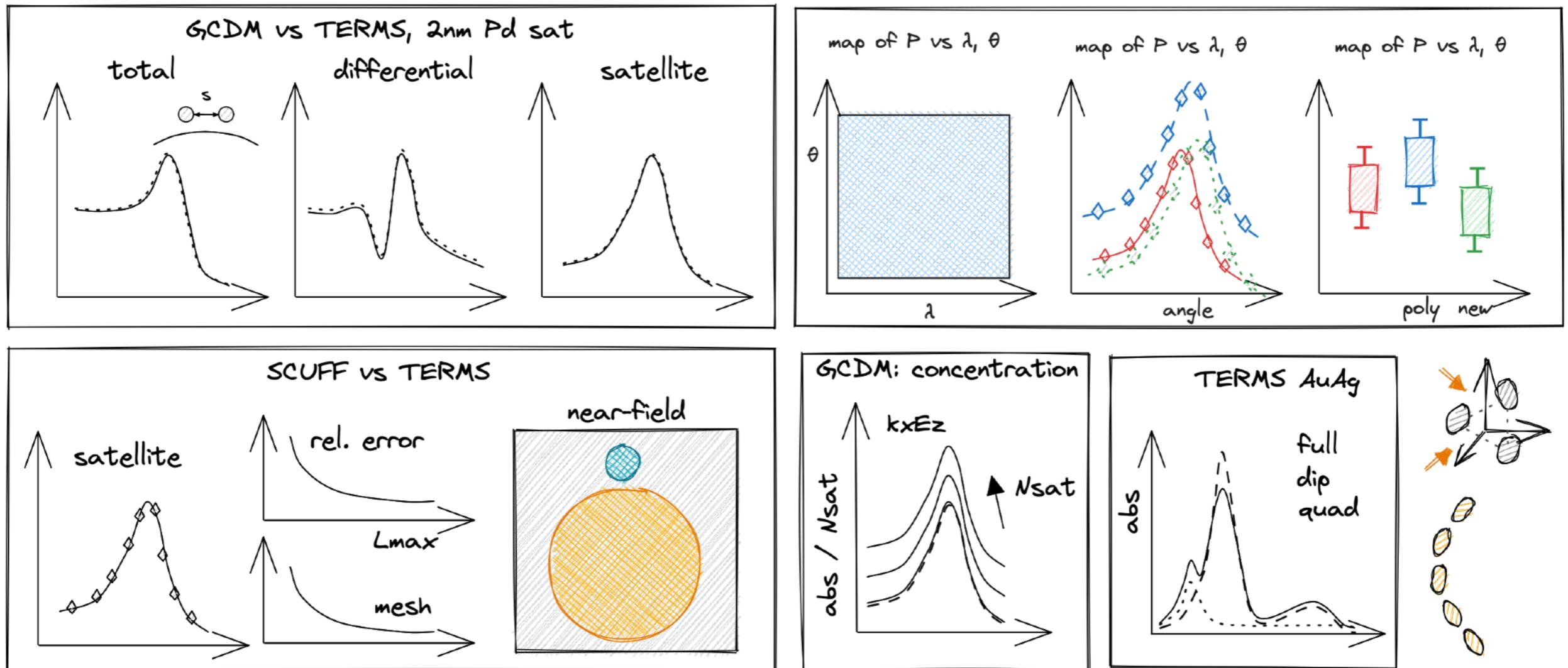


KEY POINTS

- ▶ **SHOW THE DATA ‘AS NATURE INTENDED’**
 - Maximise data-to-ink ratio (*no chart junk*)
 - Sort and organise (*meaningful order*)
 - Consider transformations (*log, difference, ...*)

- ▶ **HELP THE READER**
 - Proximity of things to compare
 - Axes aligned to ease comparisons
 - Deliberate use of colour and labels

TIP #0 | SKETCH YOUR IDEAS



TIP #1 | AVOID RESCALING IMAGES

therefore deduce the modified intrinsic surface polarizability of RH700 (see Supplementary Section IV for details), as shown in Fig 2c. However, the oscillator strength for this modified transition appeared at first 5.3 times smaller than that of the original spectrum. Although we cannot exclude this possibility, it is more likely that the oscillator strength is unchanged and that the magnified the actual absorption enhancement is smaller than predicted by the same factor (~5.3). In fact, electromagnetic theory predicts that for a silver sphere with a radius of 30 nm, the average absorption should be enhanced by a factor of $M_{\text{ext}} \approx 0.4$ at 660 nm, but this implicitly assumes an isotropic polarizable dipole. Most dyes, however (including RH700), have a strongly unsymmetrical transition dipole moment along the *in-conjugated* backbone of the molecule. Because the local electric field is primarily perpendicular to the metal surface (with only $M_{\text{ext}} \approx 0.17$ for the parallel component at 660 nm), the observed enhancement in absorption will be strongly dependent on the preferential orientation of the adsorbed dye. This effect is similar to surface-selective rules in surface-enhanced spectroscopy²¹. The observed reduced absorption enhancement can therefore be attributed to an adsorption orientation preferentially flat (or at a small angle) on the surface, which is expected for dyes with such an aromatic backbone. In this context, the assumption of a conserved oscillator strength appears the most natural, and the deduced modified absorbance is shown in Fig 2c along with that of RH700 in water. This surface absorbance represents the absorption spectrum of the isolated adsorbed dye molecule.

10

To tackle this problem we used a UV-vis absorption set-up with the sample centrally located inside an integrating sphere (Fig. 12a see Methods and Supplementary Section 11 for details). This particular configuration has only been used on rare occasions and modify for the characterization of *resovite*^{11,12}. The integrating sphere eliminates the influence of scattering with a direct measurement of absorbance rather than extinction. In our configuration, it also increases the effective path length to ~24 nm (Supplementary Section 11). With appropriate precautions (see Methods) we achieved accurate referencing of the dye-nanoparticle solution absorbance spectrum against an identical nanoparticle-only solution, with $\pm 1\%$.

Figure 2 highlights some of the observations that are made possible by this novel approach. Figure 2b shows the differential absorbance spectra of the dye Rhodamine 700 (Rh-700) adsorbed on silver nanoparticles at three different concentrations (5, 12 and 24 mM). The reference absorbance spectrum of this dye in water (shown in gray) exhibits a main resonance at 642 nm with a shoulder

Figure 2 highlights some of the observations that are made possible by this novel approach. Figure 2b shows the differential absorbance spectra of the dye Rhodamine 700 (Rh700) absorbed.

1

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Textwidth: 6.50127in

Include the figures without rescaling.

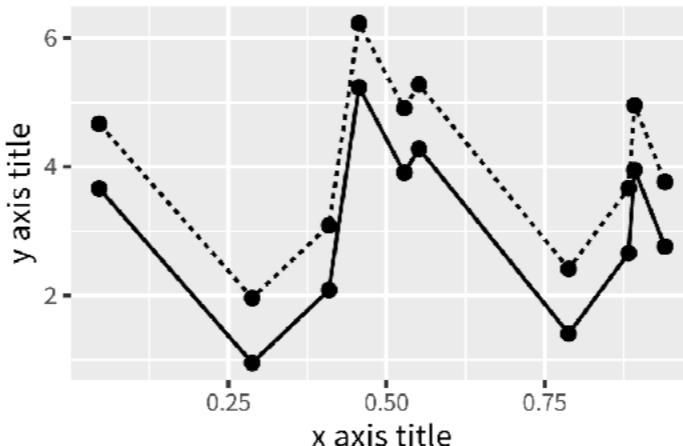


Figure 1: Nunc sed pede. Praesent vitae lectus. Praesent neque justo, vehicula eget, interdum id, facilisis et, nibh. Phasellus at purus et libero lacinia dictum. Fusce aliquet. Nulla eu ante placerat leo semper dictum.

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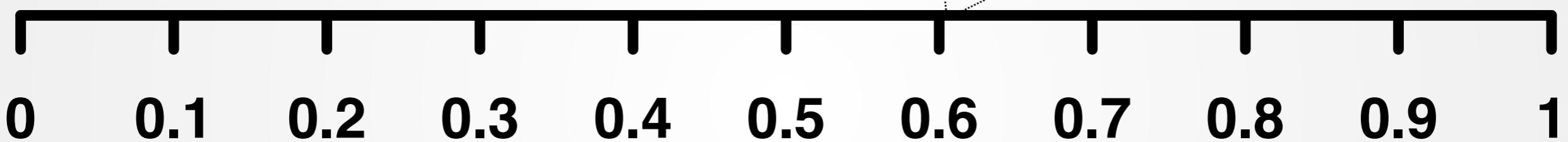
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TIP #2 | FILE FORMATS

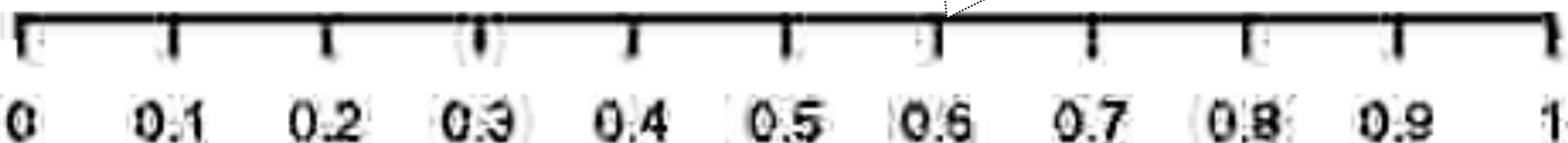
- ▶ **VECTOR FORMAT**

.eps, .svg, **.pdf**

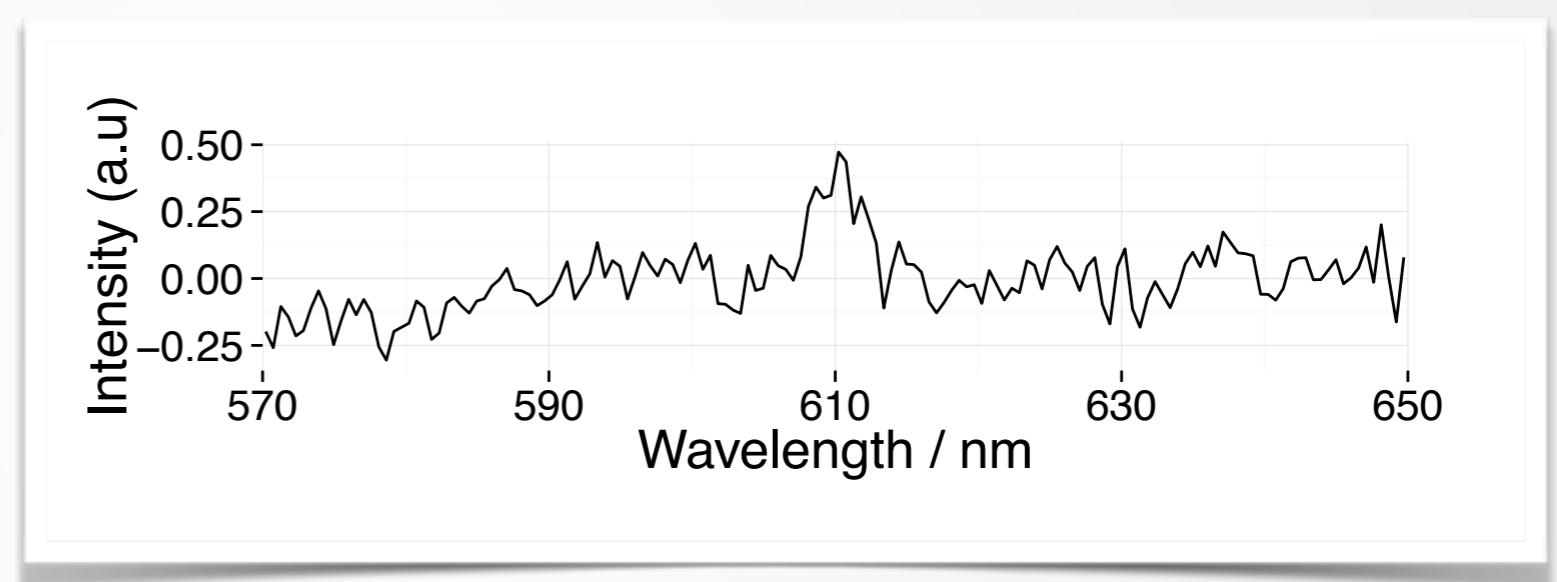
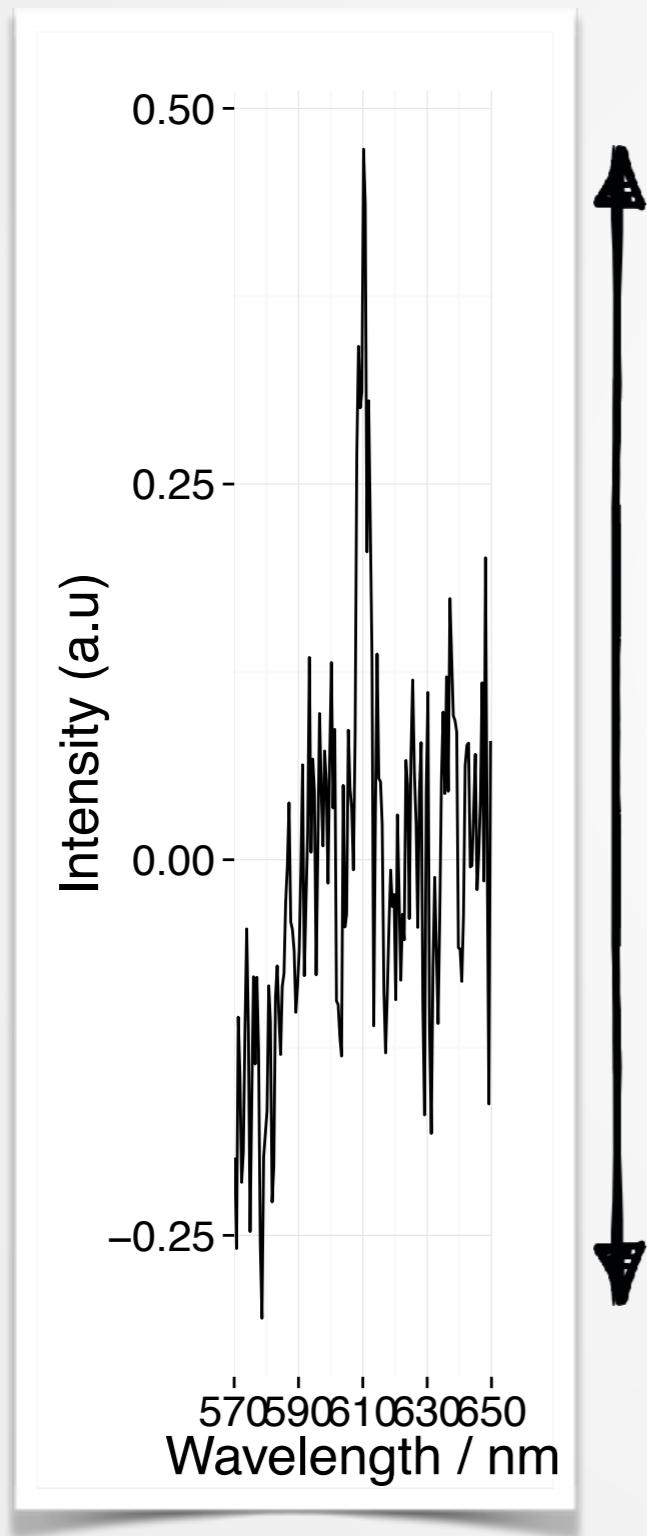


- ▶ **RASTER FORMAT**

.jpg, .tiff, **.png**



TIP #3 | ASPECT RATIO

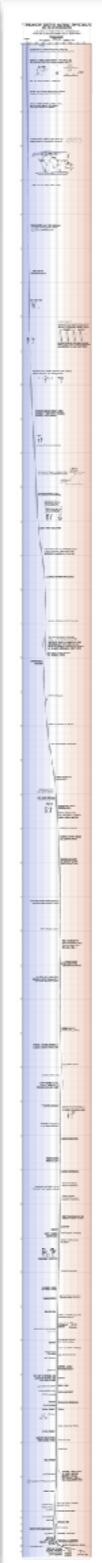


Try

- "banking" at 45°
- standard ratios, eg 6x4

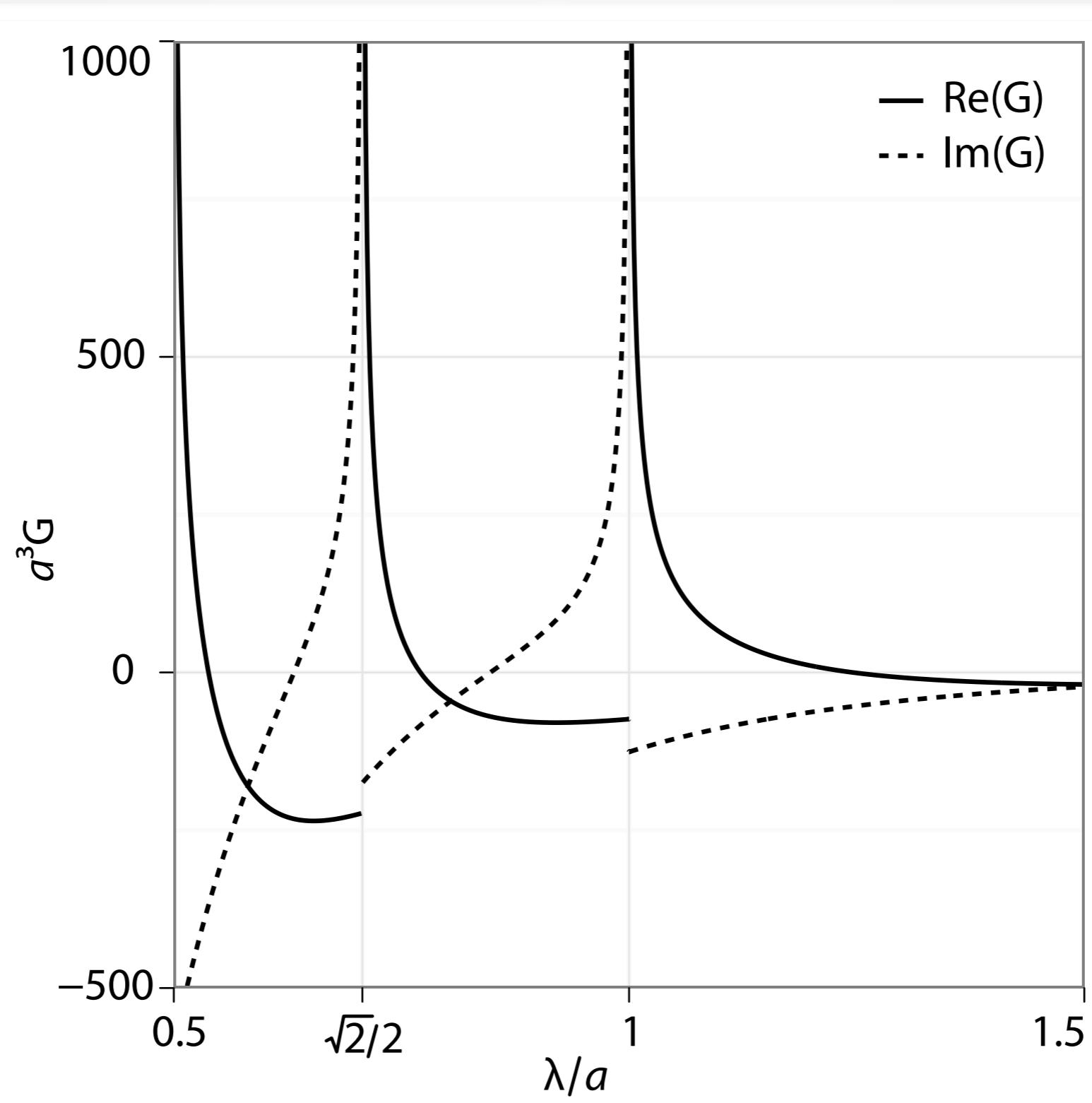
TIP #3 | ASPECT RATIO

<https://xkcd.com/1732/>

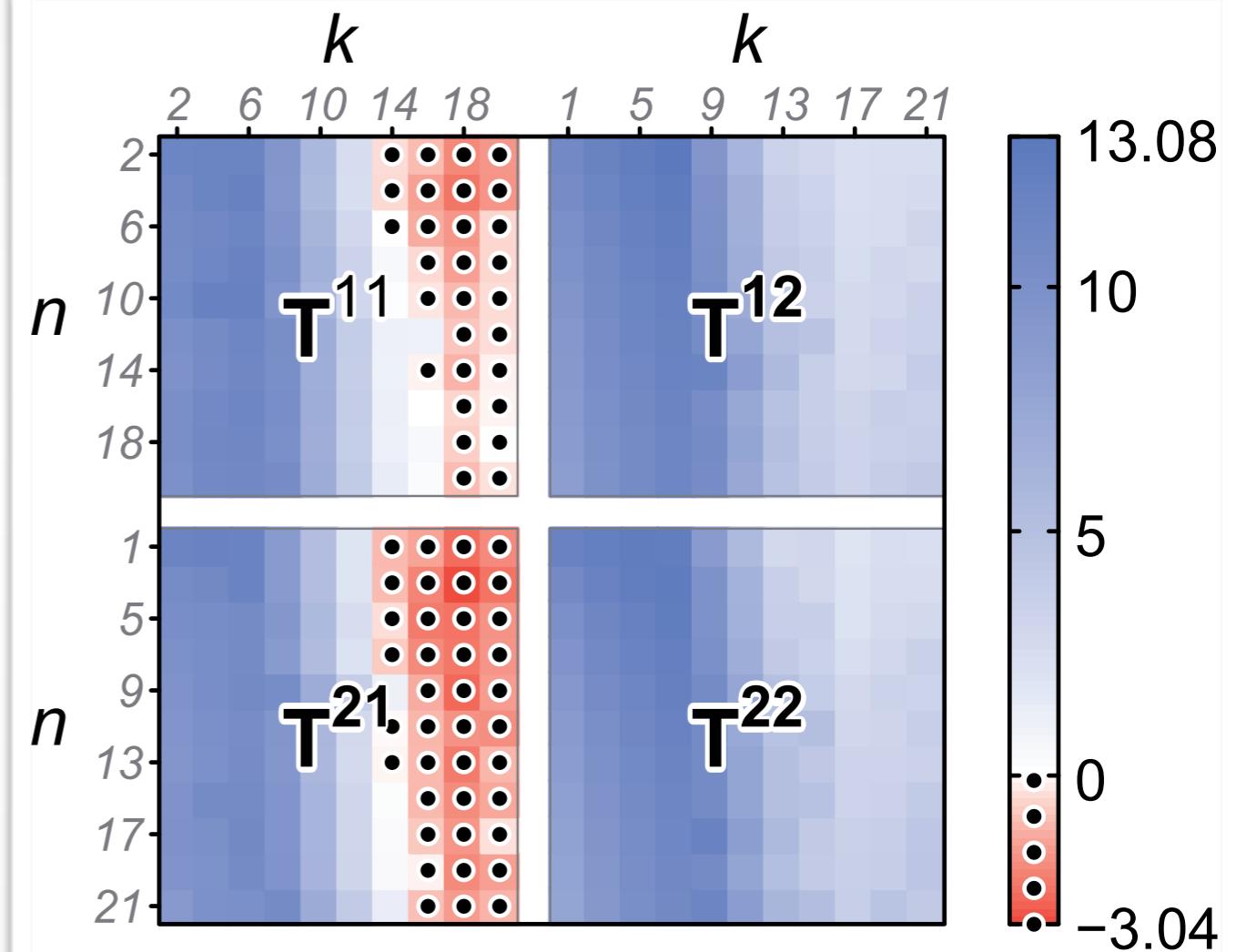
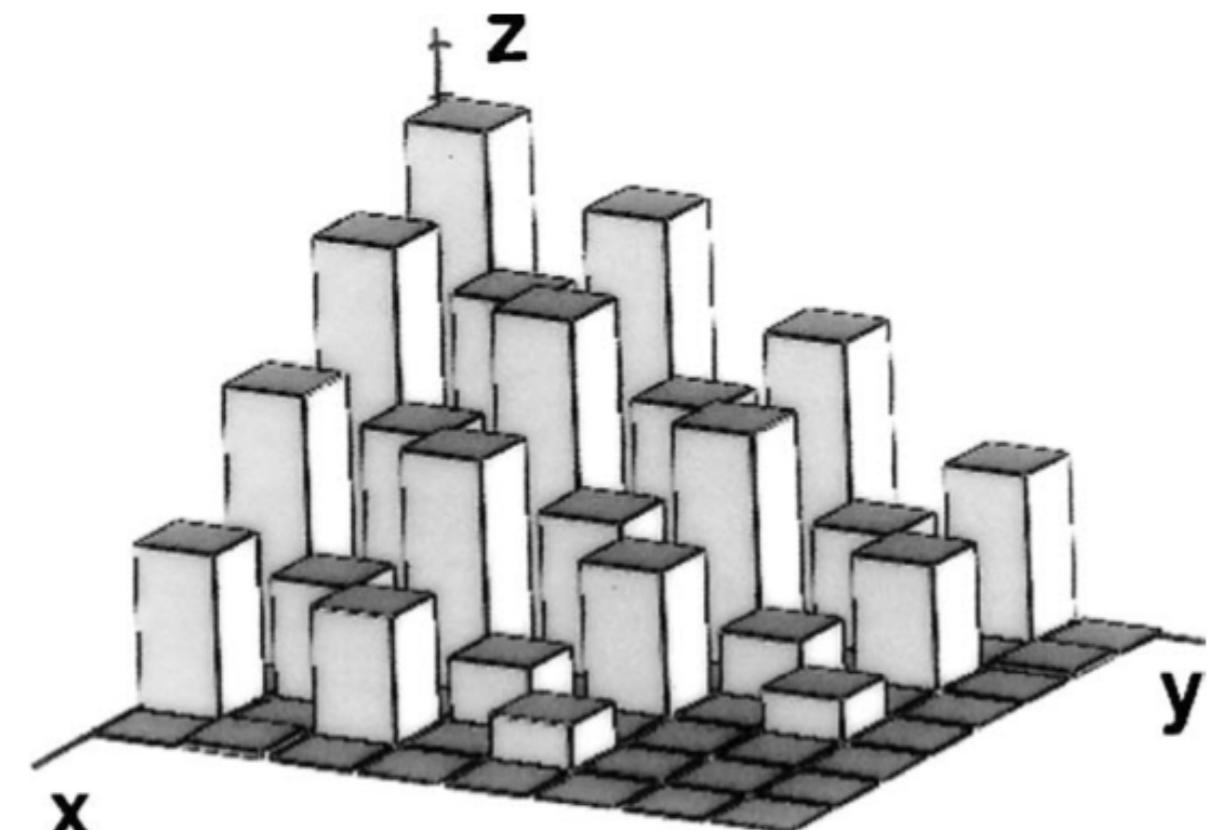


TIP #4 | DATA-TO-INK RATIO —

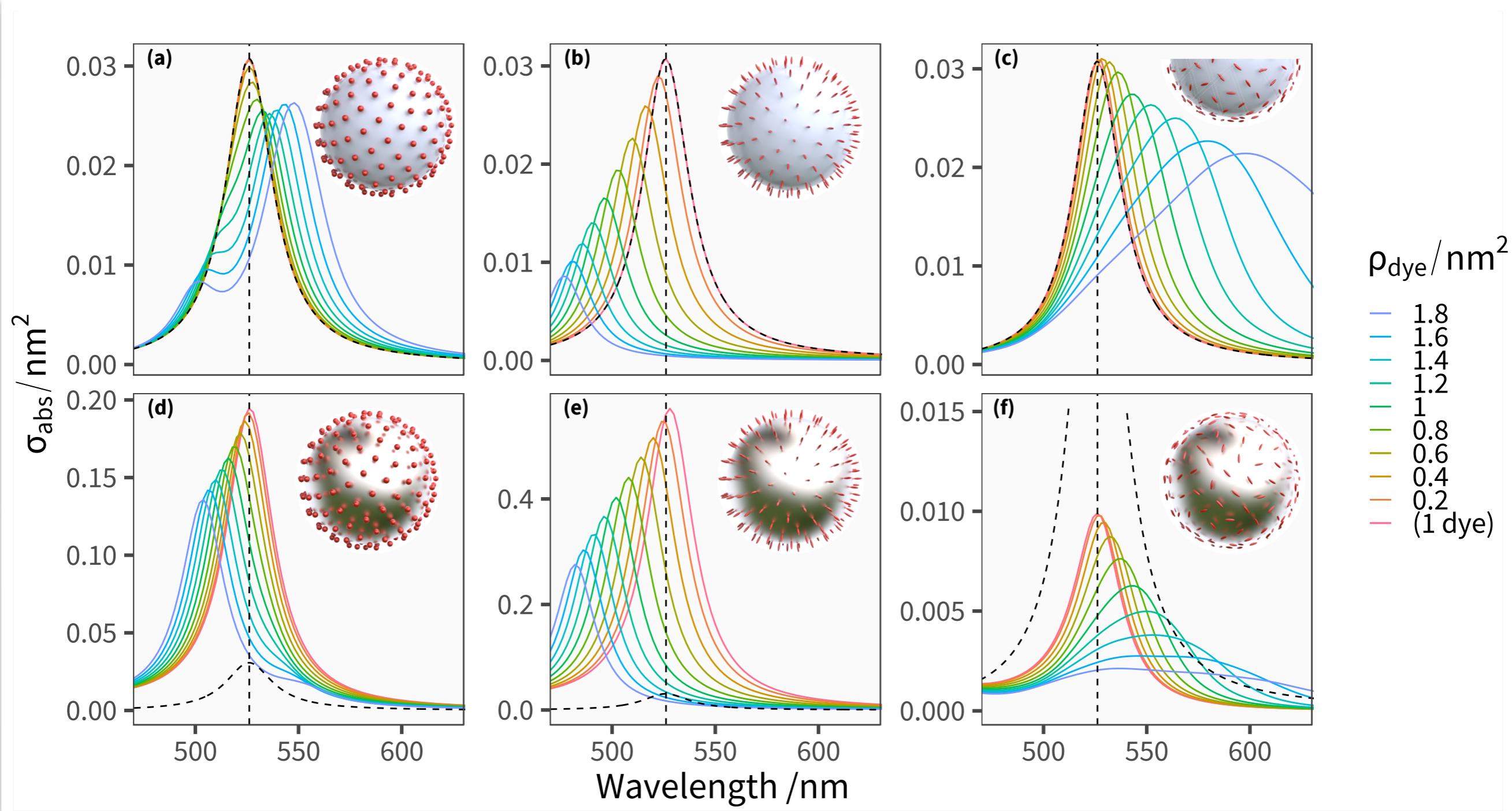
IS MORE



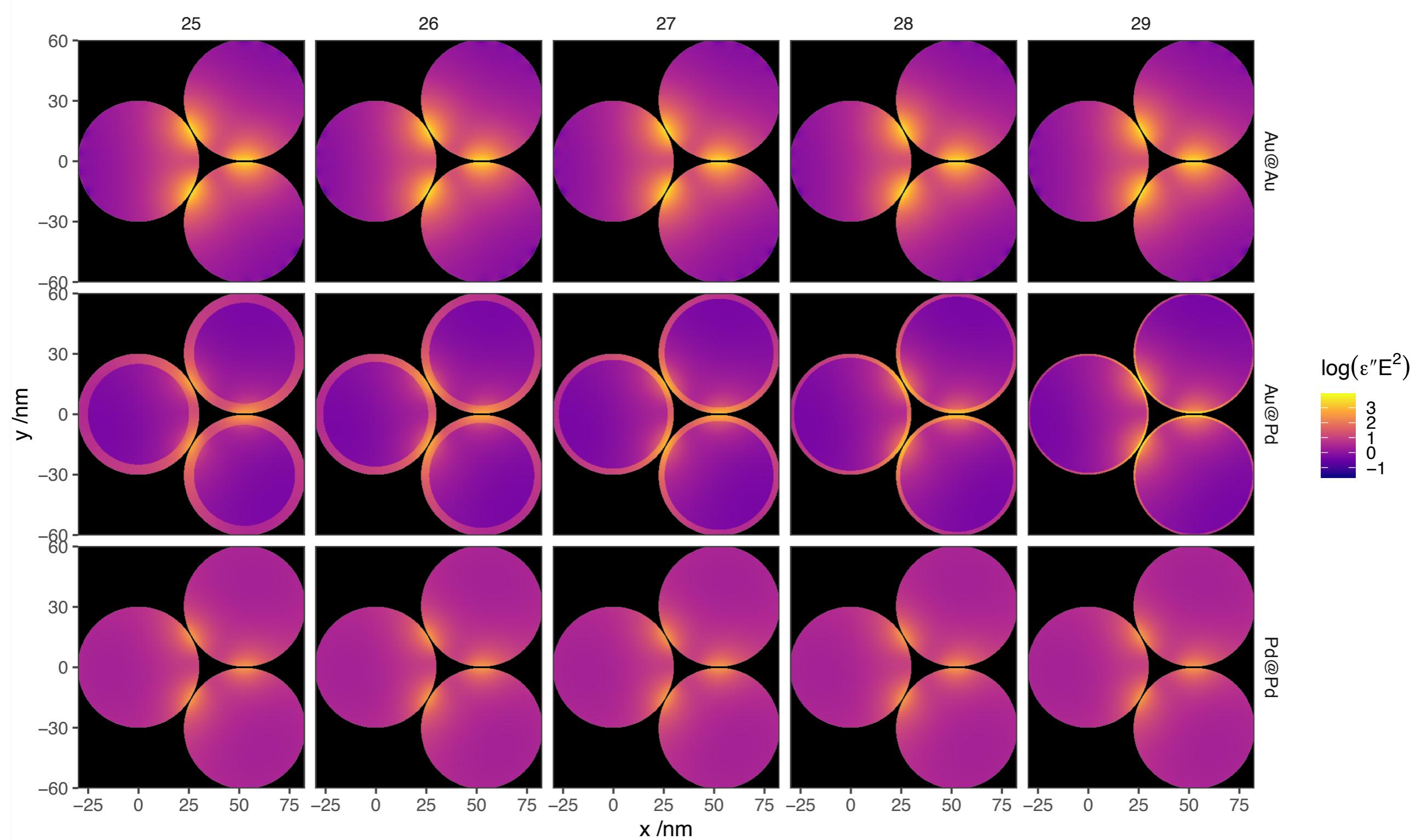
TIP #5 | FAKE 3D IS OFTEN DETRIMENTAL



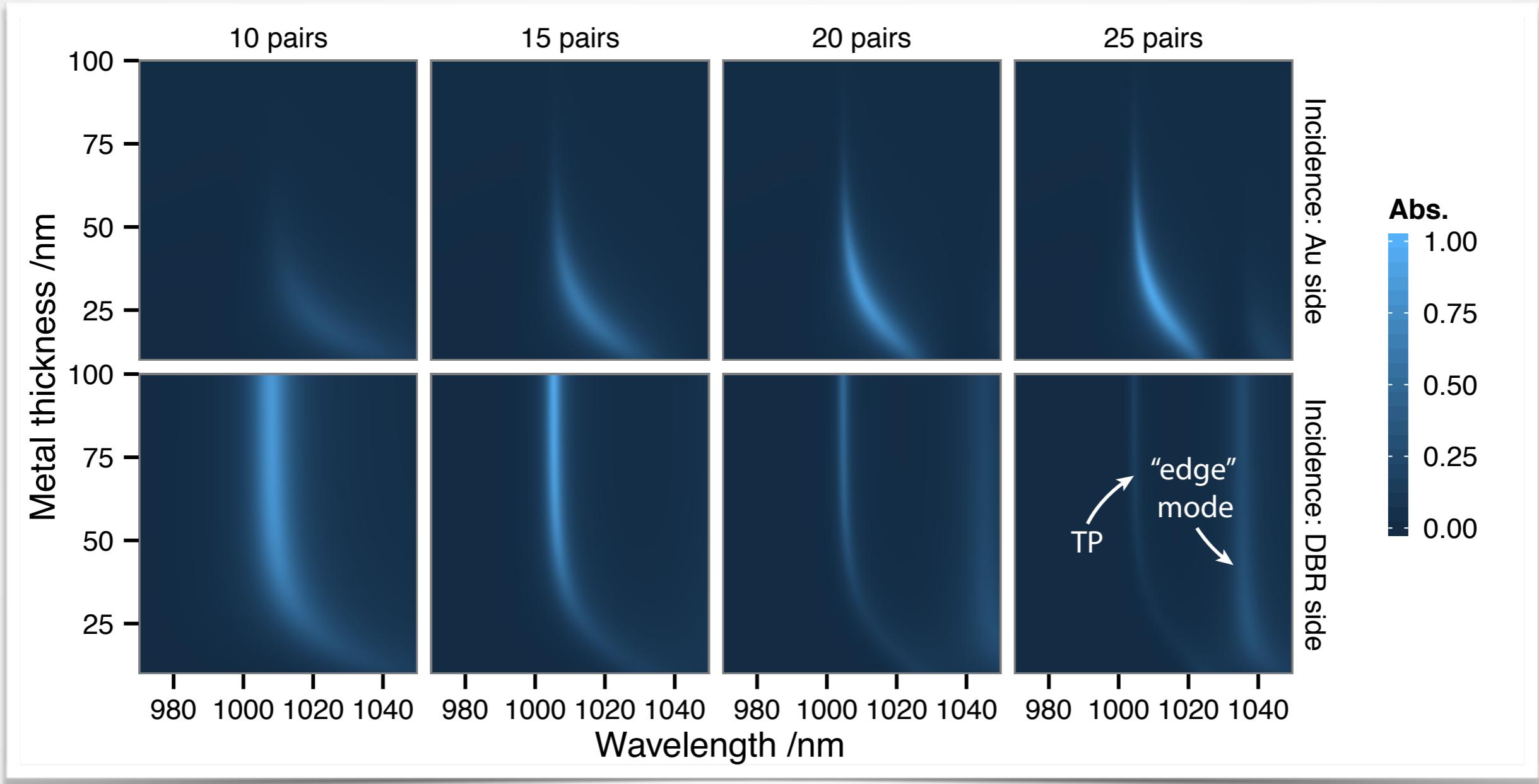
TIP #6 | SMALL MULTIPLES



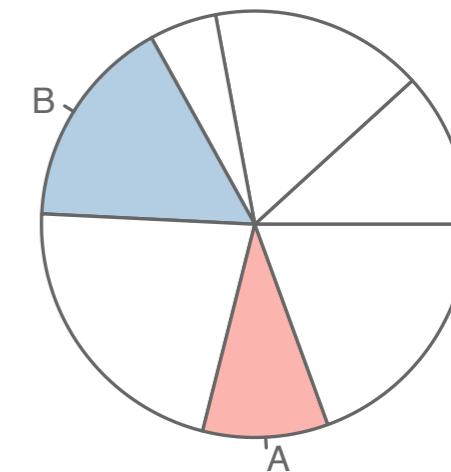
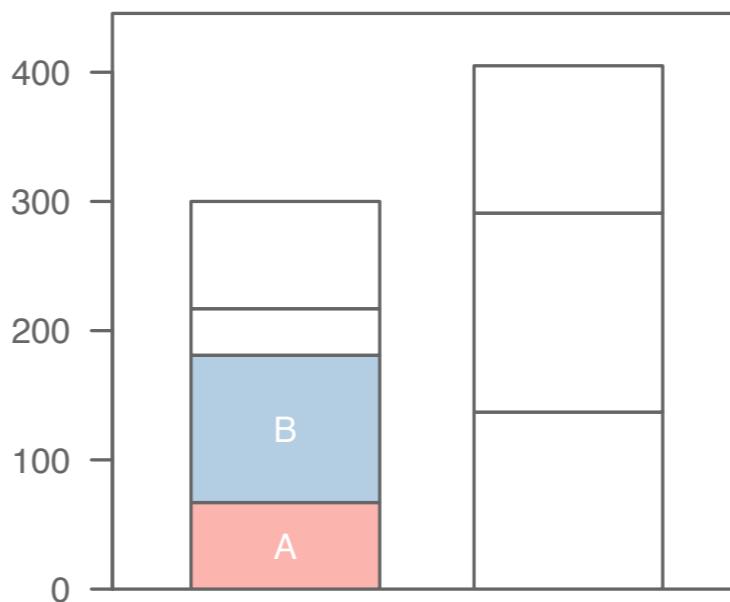
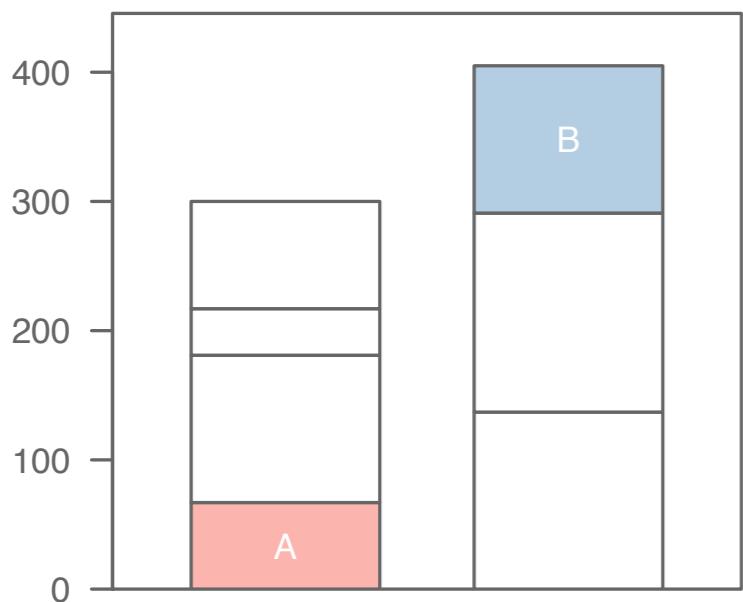
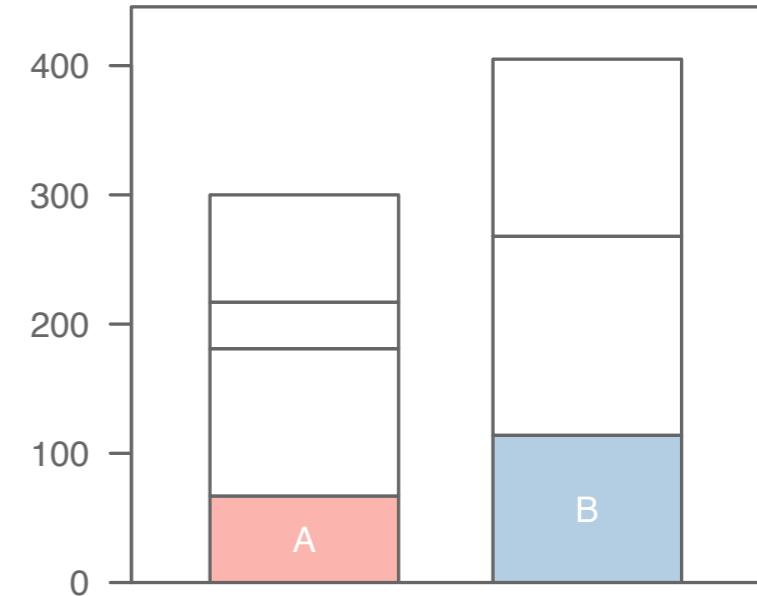
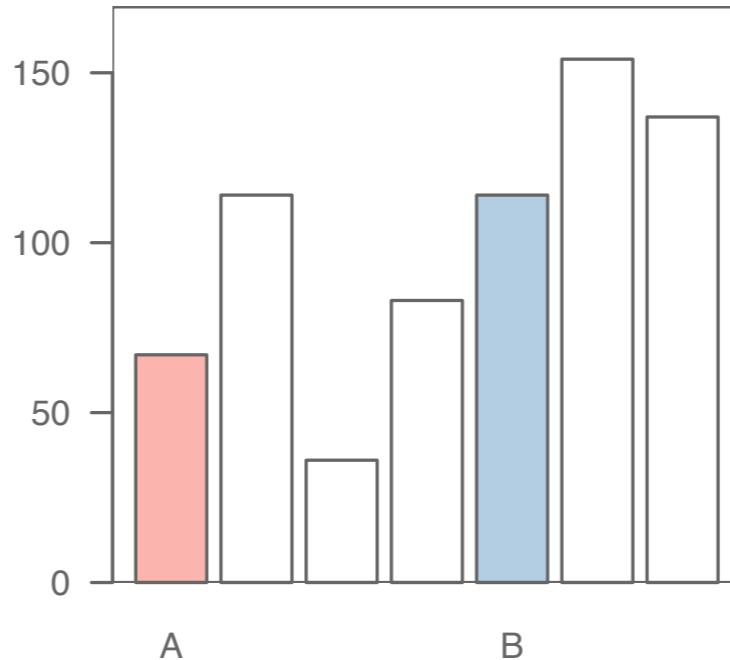
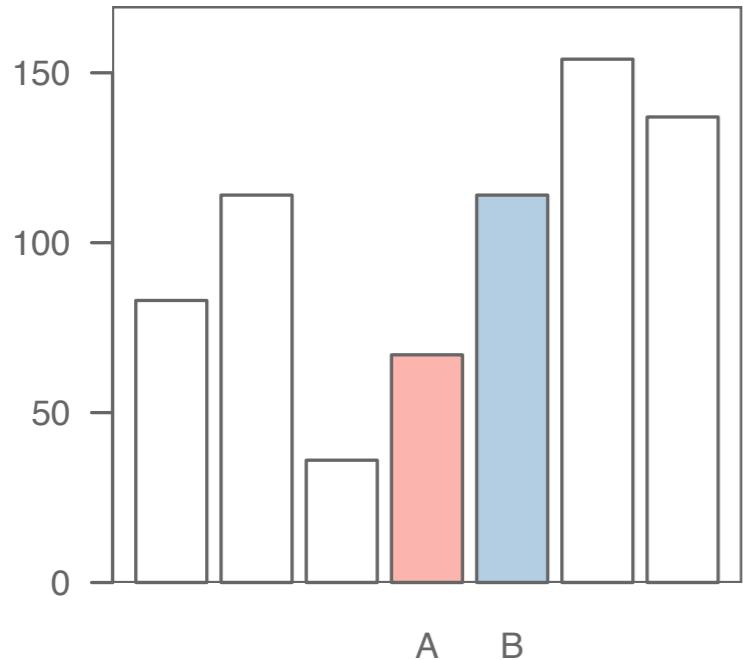
TIP #6 | SMALL MULTIPLES



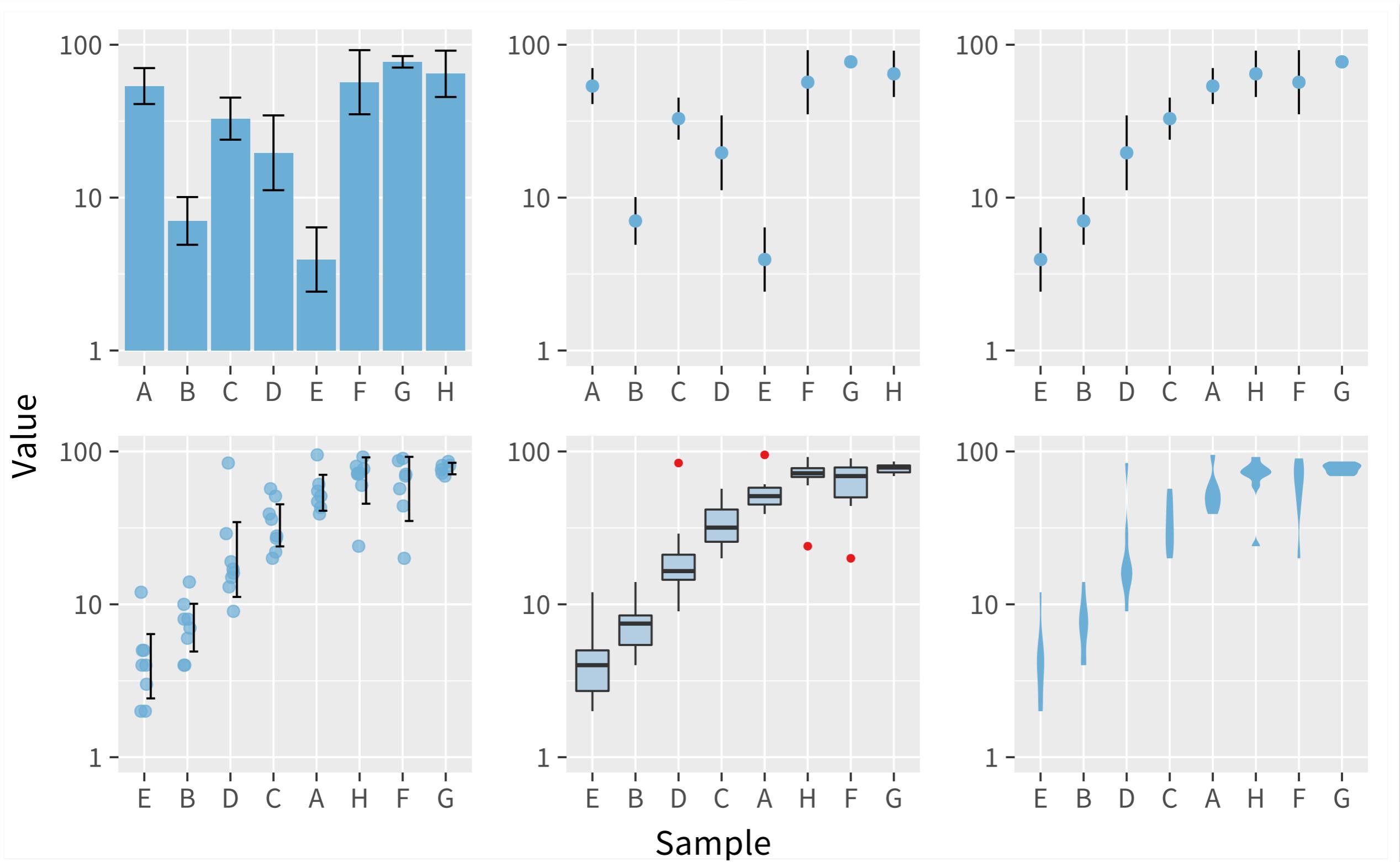
TIP #6 | SMALL MULTIPLES



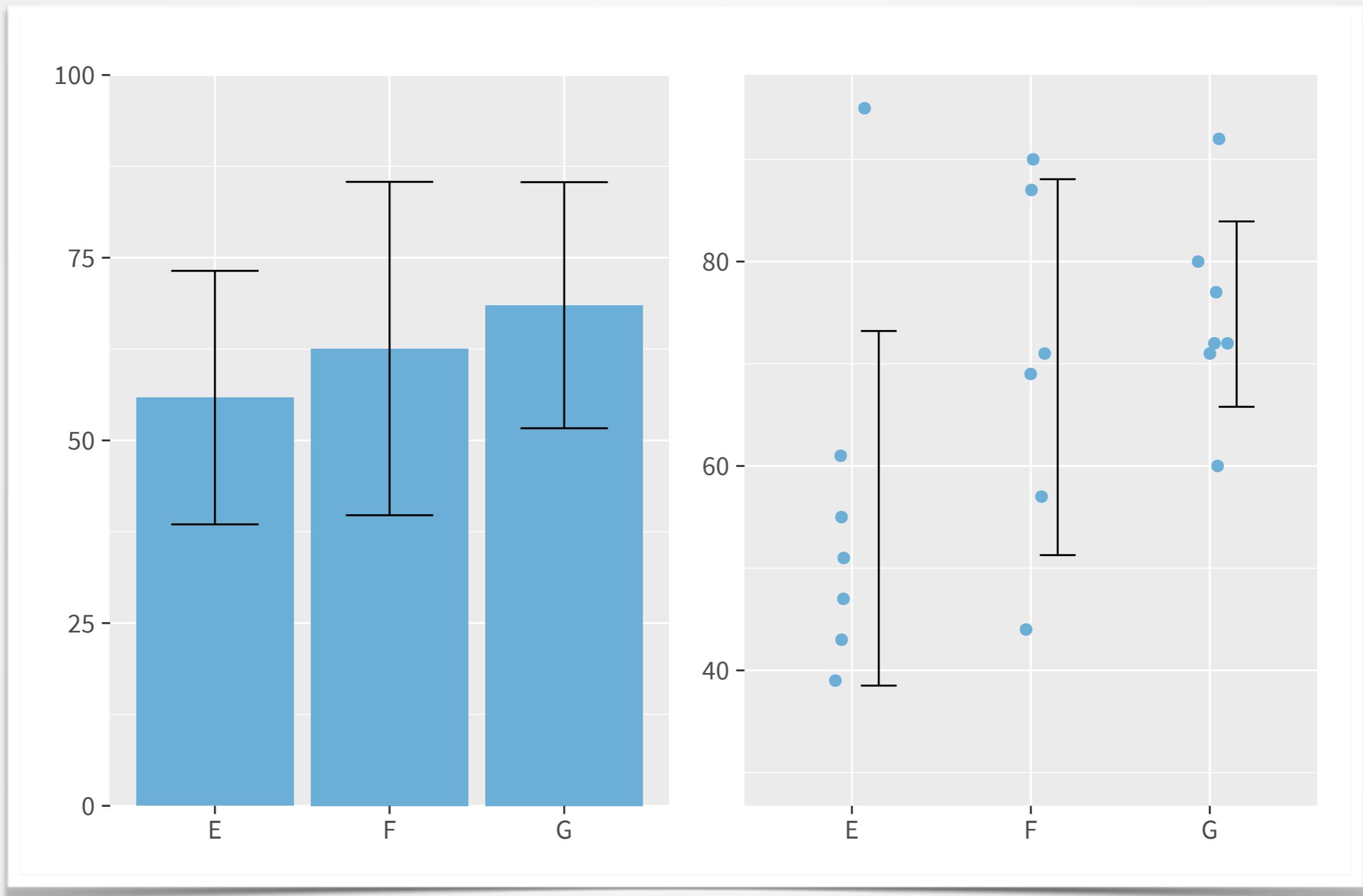
TIP #7 | MAKE IMPORTANT COMPARISONS EASIER



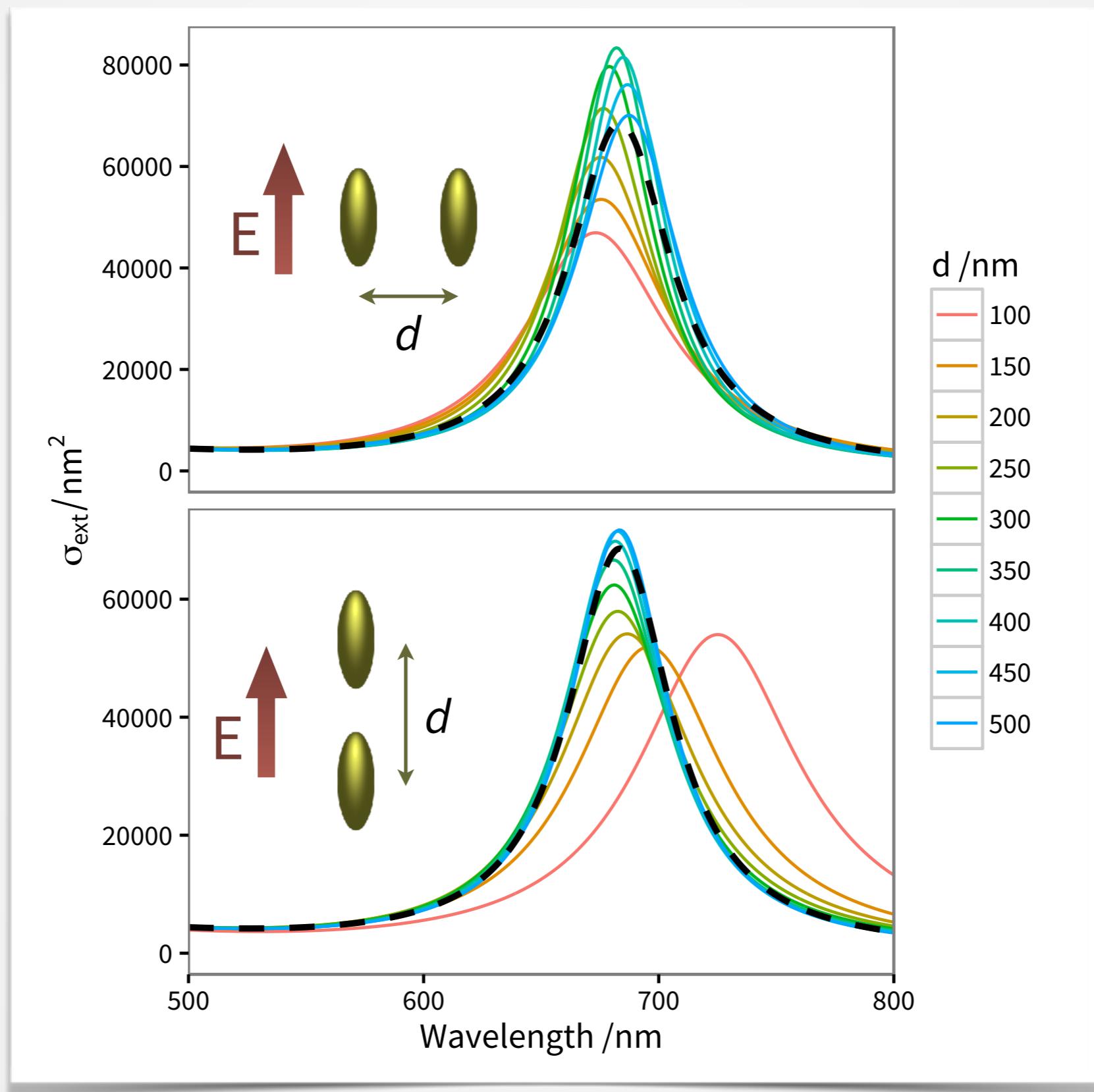
TIP #8 | DYNAMITE PLOT ALTERNATIVES



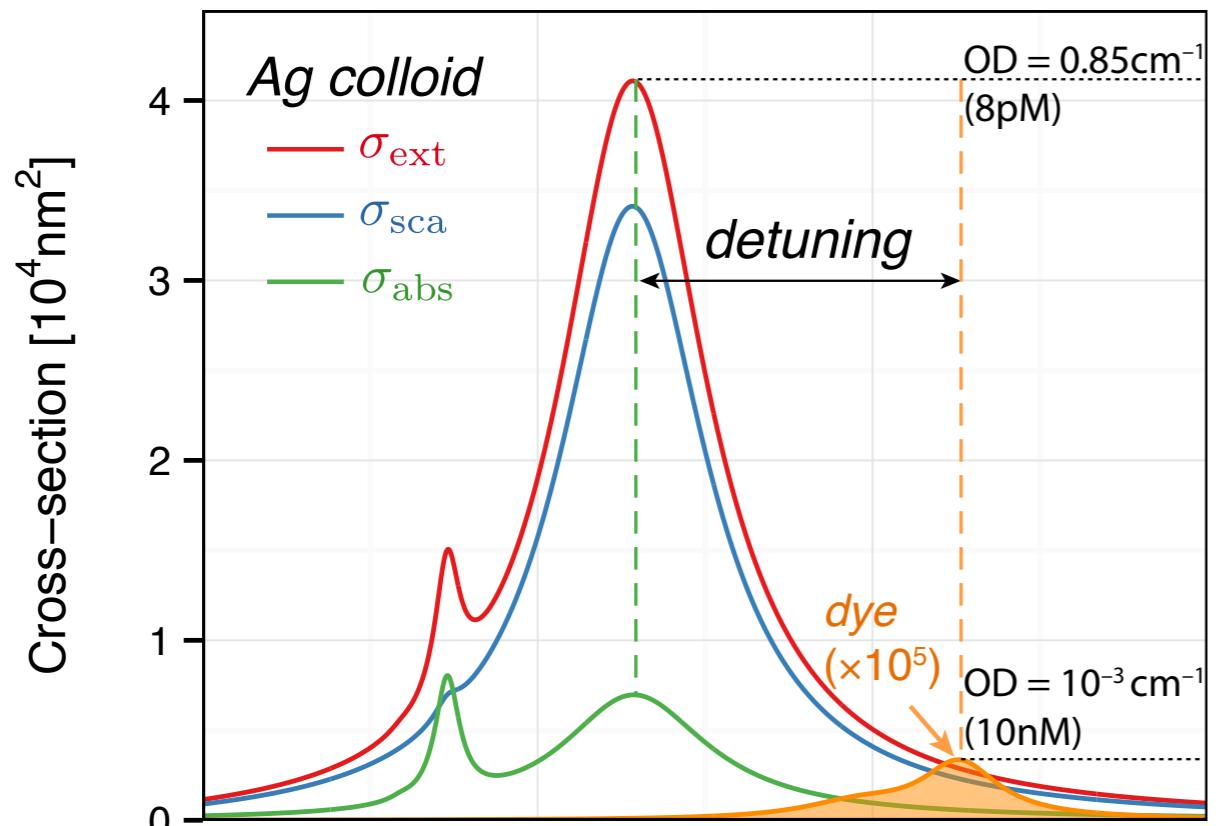
ALWAYS INCLUDE 0? IT DEPENDS



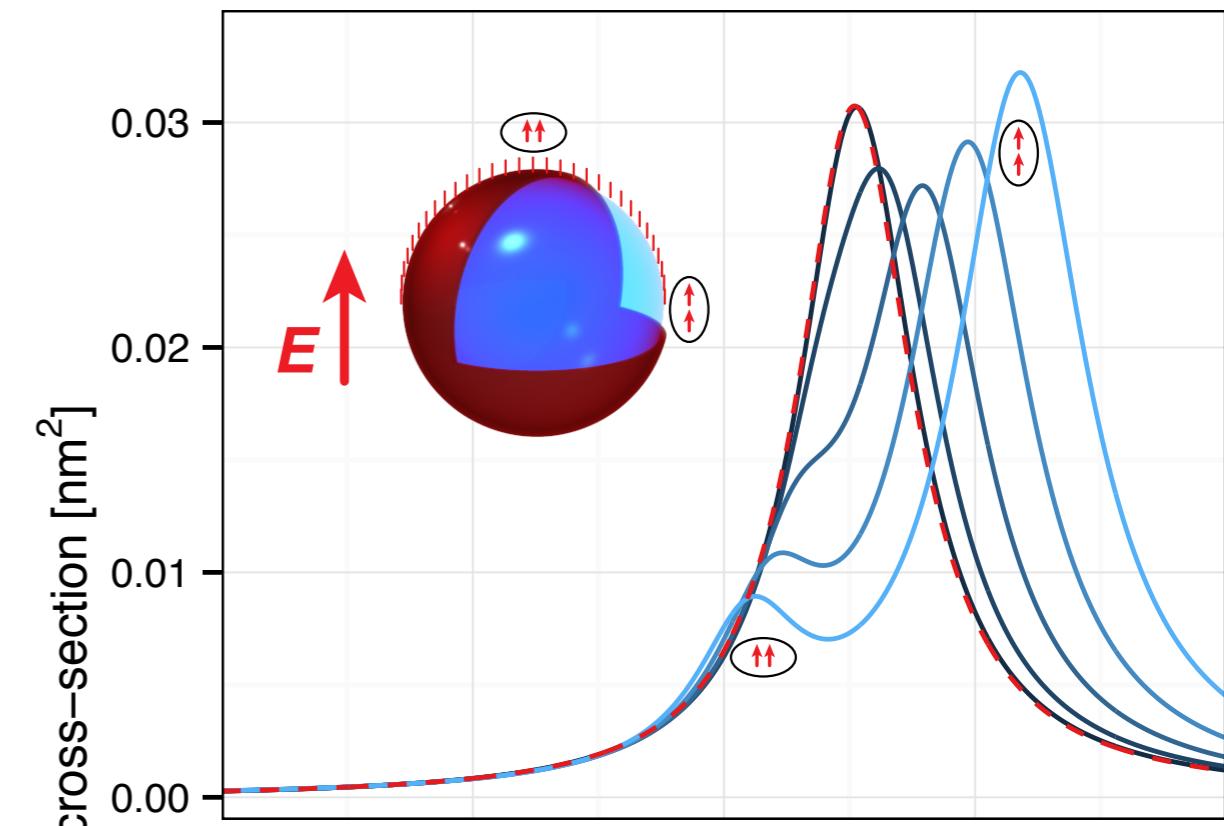
TIP #9 | CONTEXTUAL ANNOTATIONS



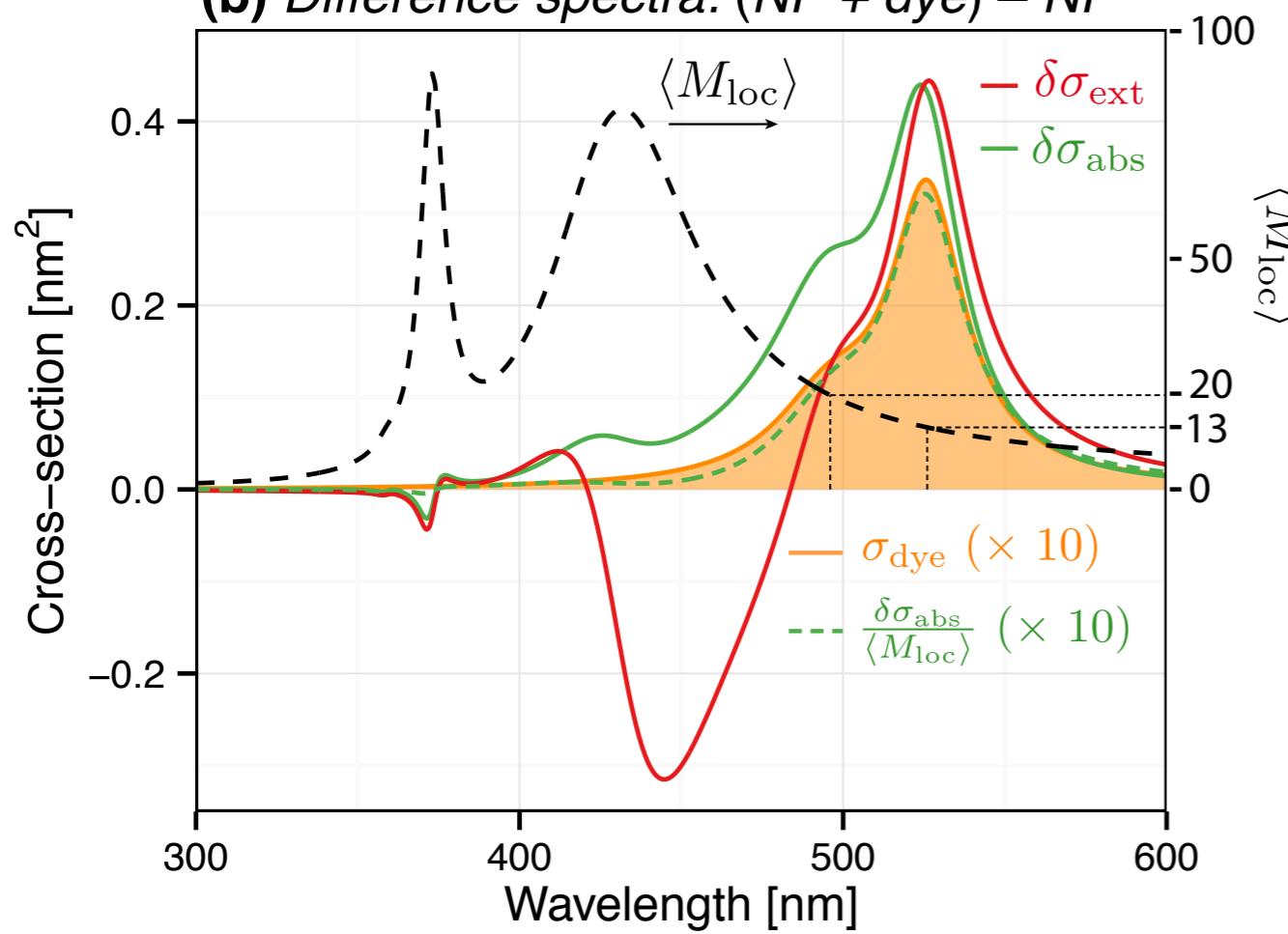
(a) Bare components



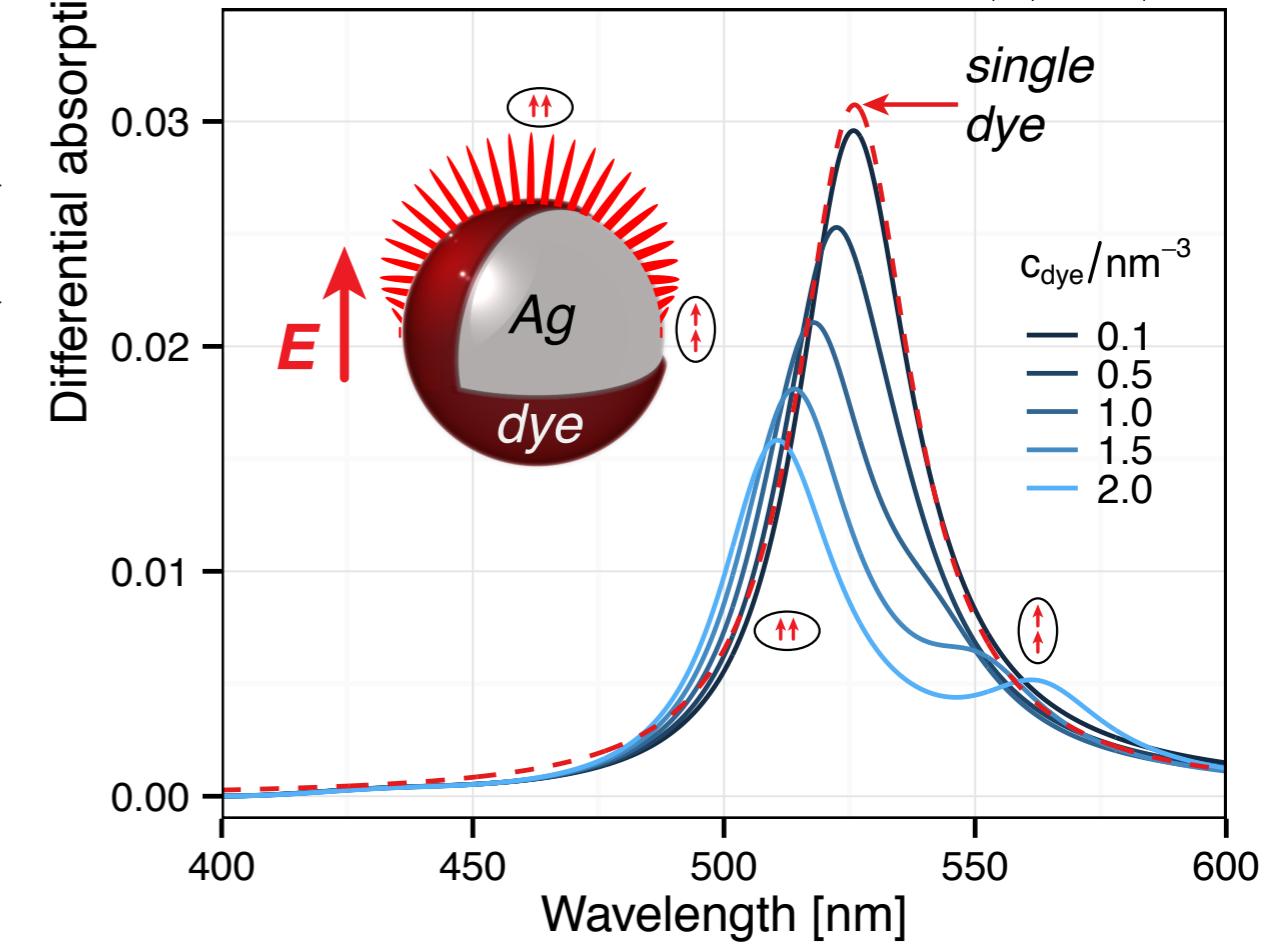
(c) Hollow dye shell ($\delta\sigma_{\text{abs}}$)



(b) Difference spectra: $(NP + \text{dye}) - NP$



(d) Dye layer on colloid ($\delta\sigma_{\text{abs}}/\langle M_{\text{loc}} \rangle$)



TIP #10 | USING COLOURS

- ▶ **USE COLOUR TO SYMBOLISE**

Be logical & follow conventions

- ▶ **USE COLOUR TO PRIORITISE INFORMATION**

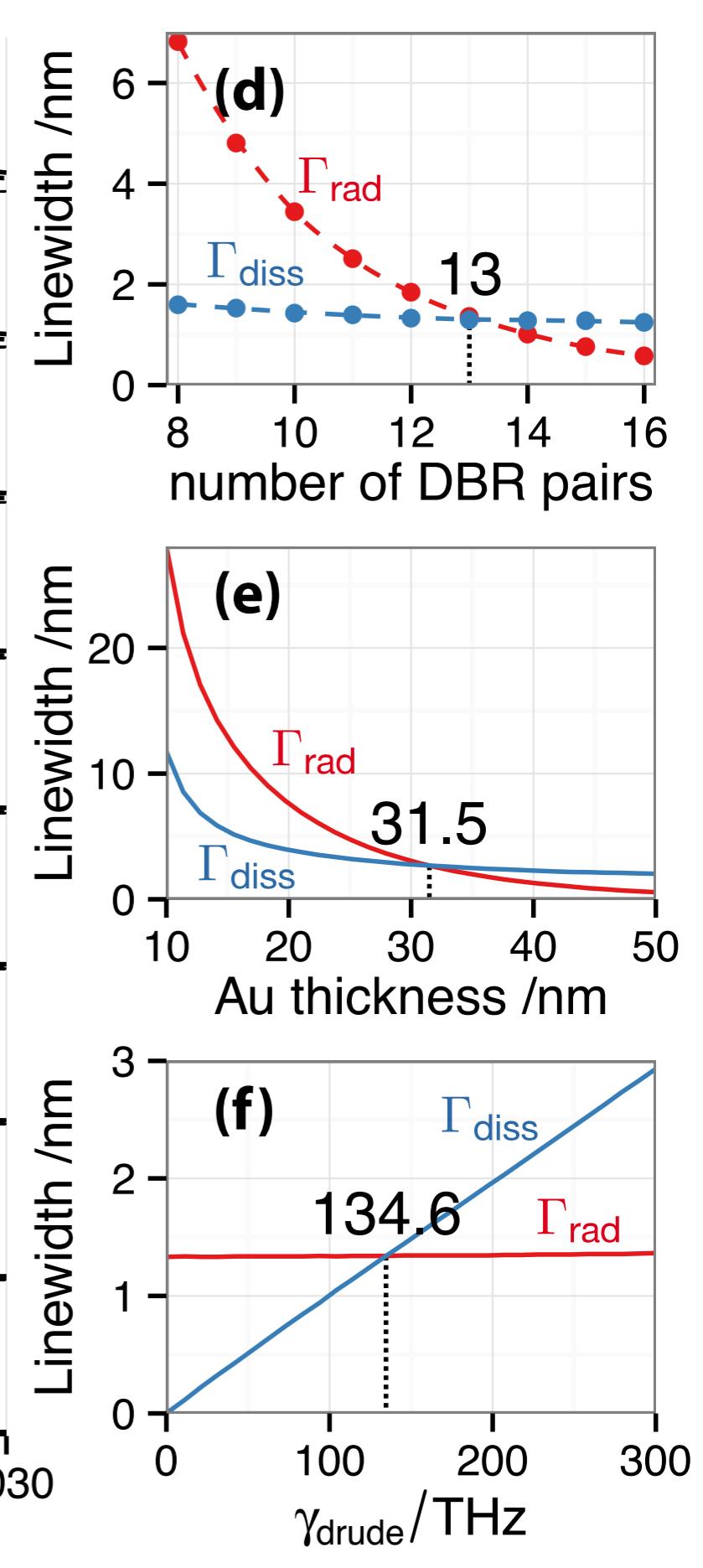
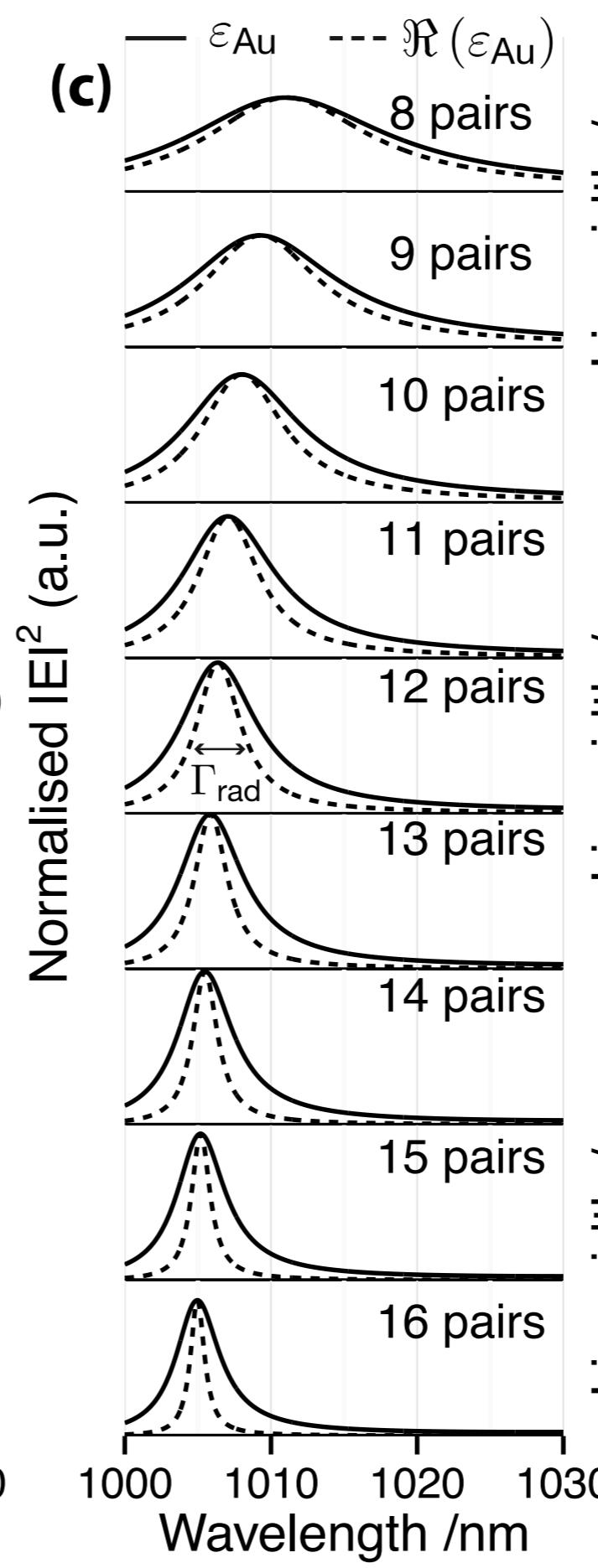
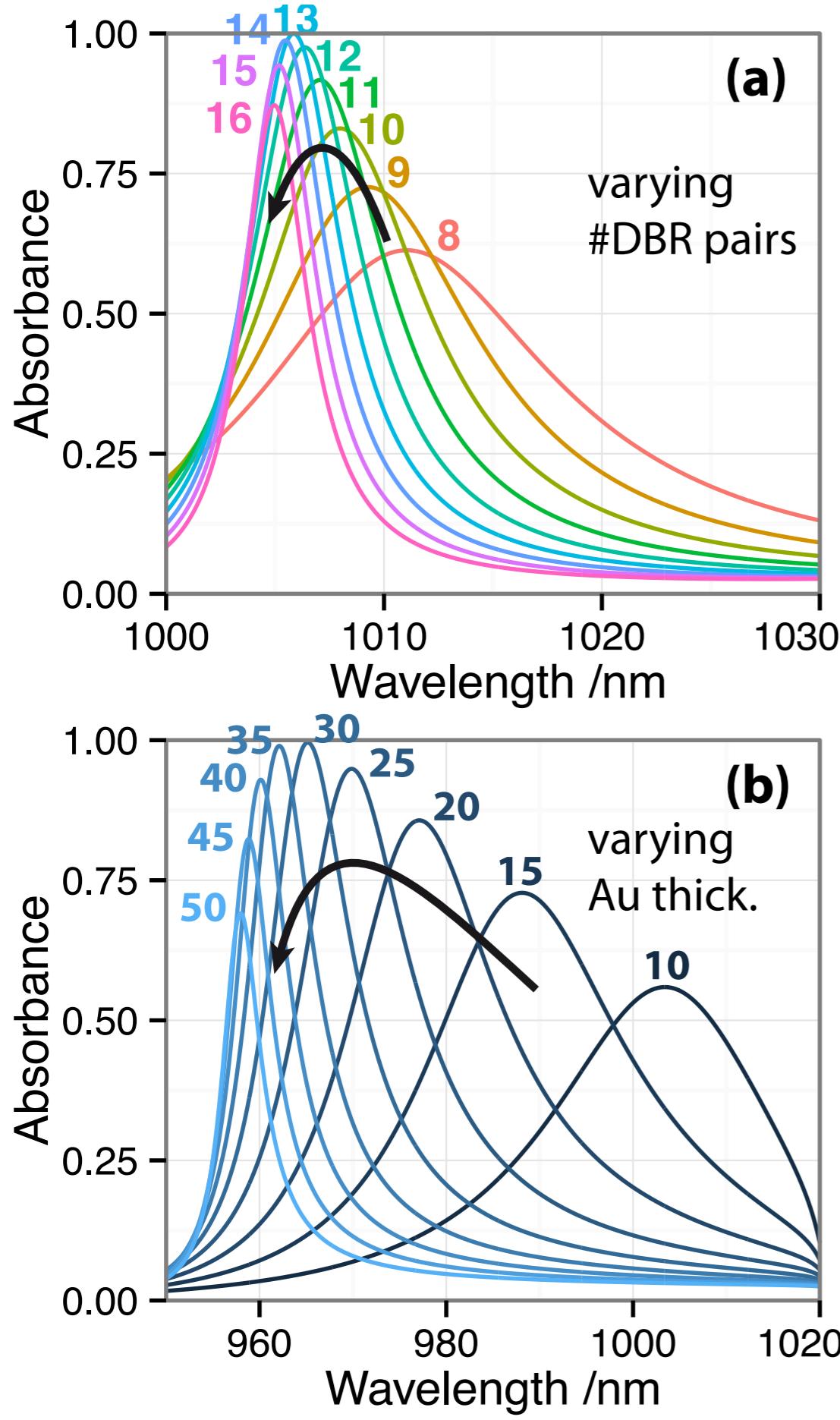
Smaller areas brighter, larger areas lighter

- ▶ **USE COLOUR TO IDENTIFY A RECURRING THEME**

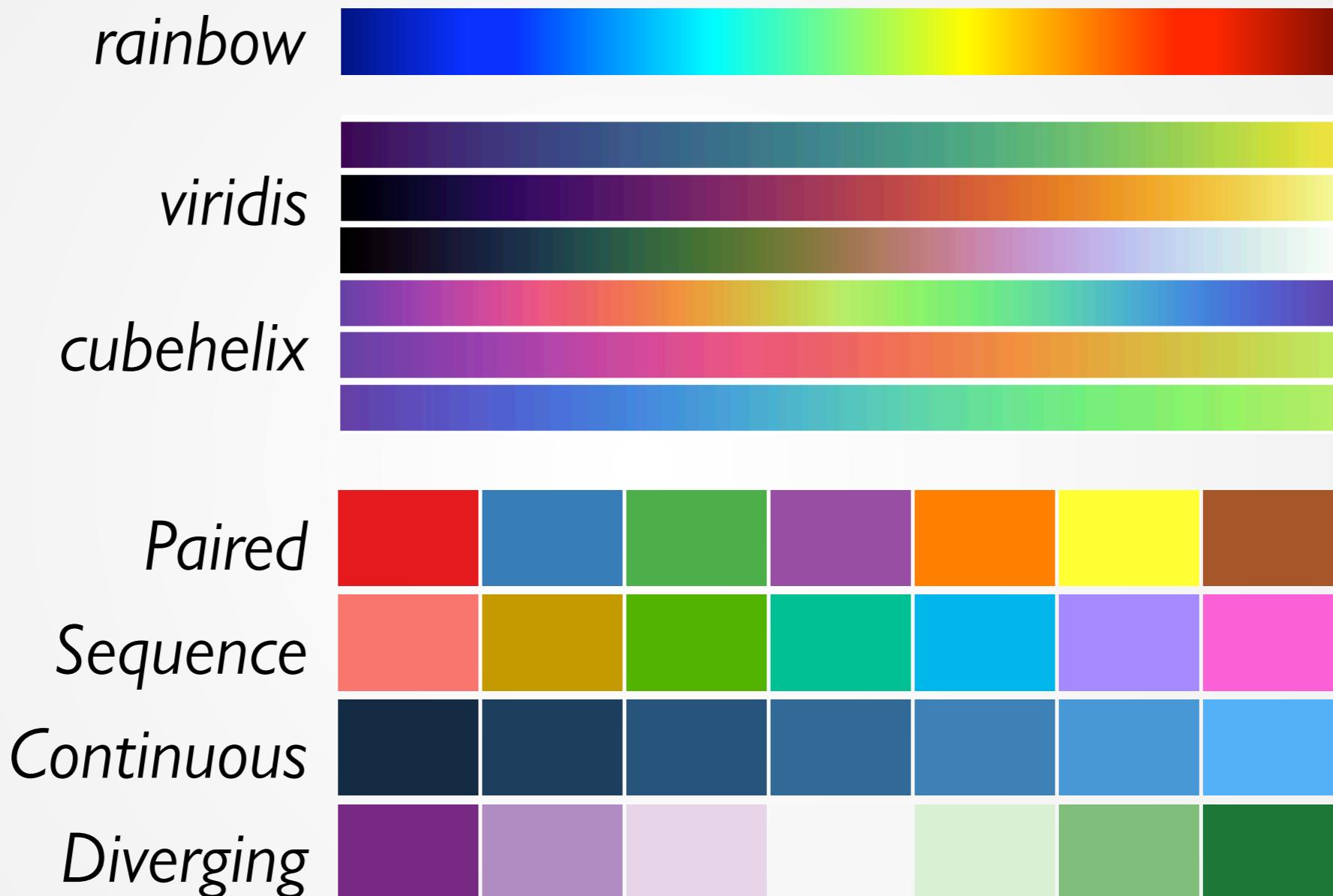
Be consistent

Use colour to explain, never just to
decorate. Do not make something
pretty for the sake of prettiness or
because colour is available.

-Jan White



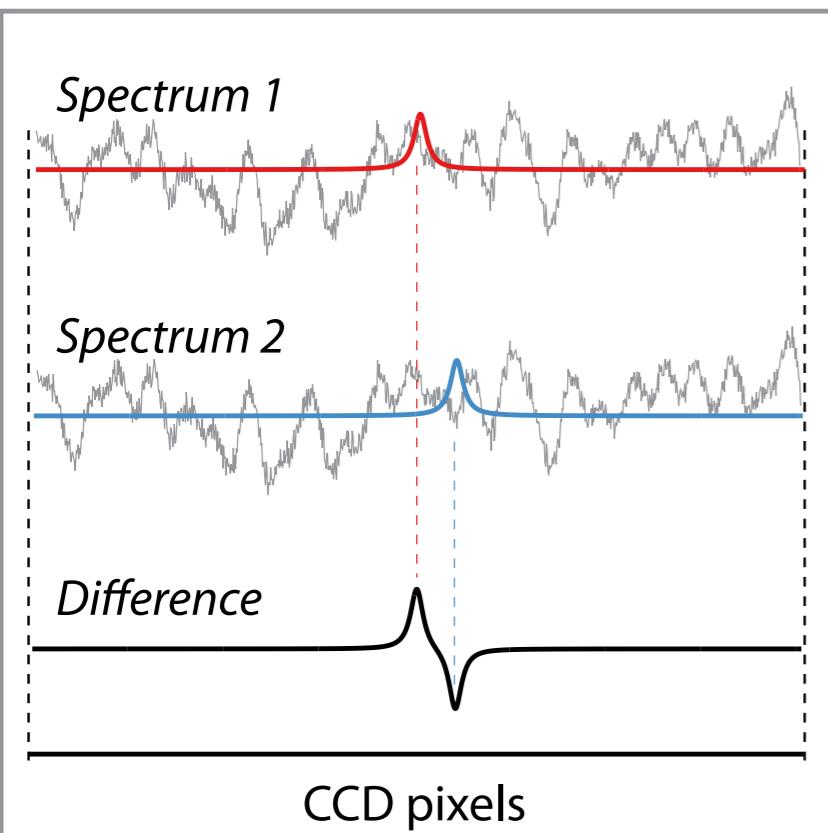
CHOOSING COLOUR PALETTES



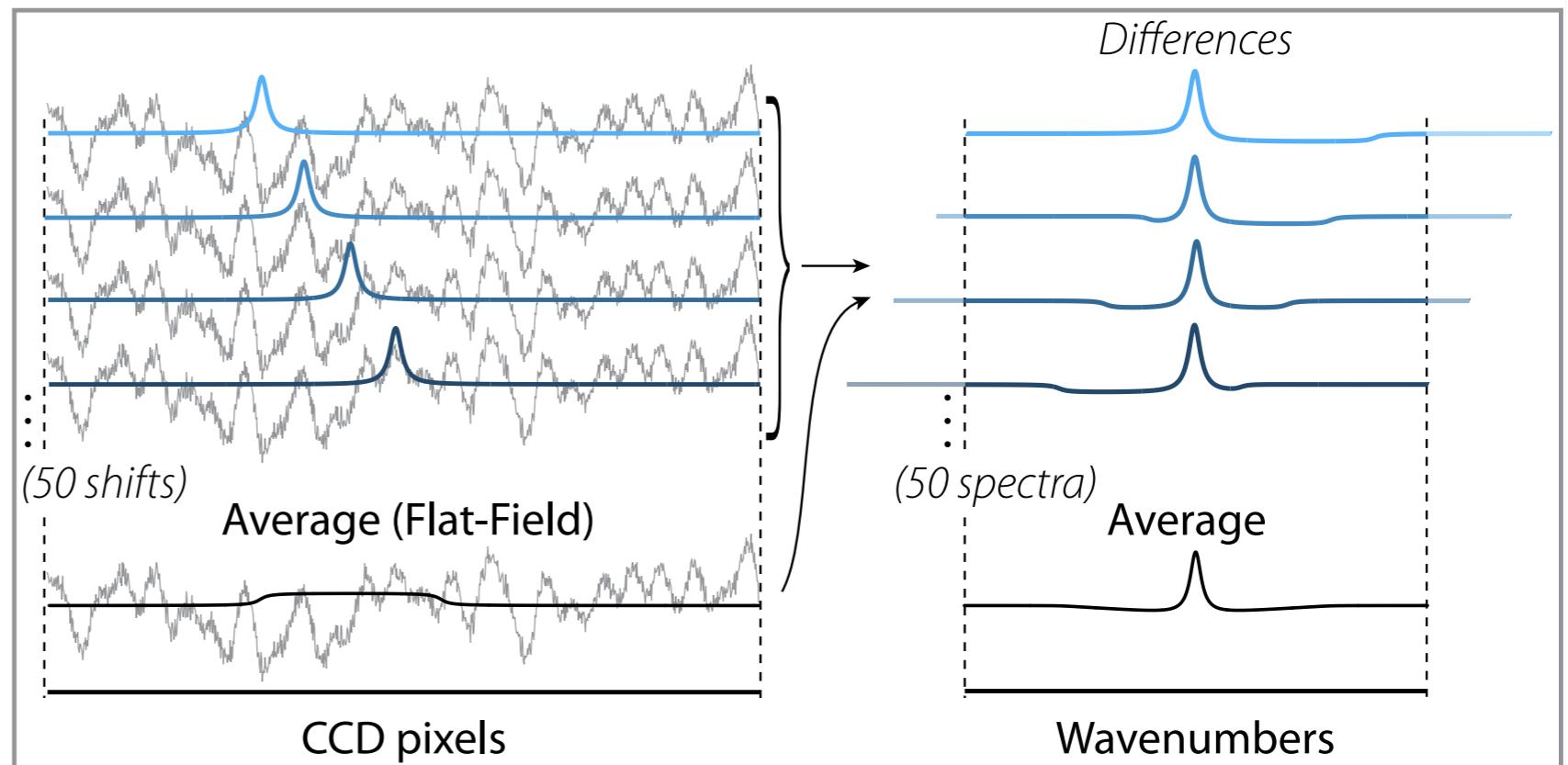
Note: ~8% of males, 0.5% of females, are **COLOUR BLIND**

COLOUR HELPS IDENTIFY, FOCUS, ORGANISE

Subtracted-Shifted RS



flat-field-corrected Continuously-Shifted RS



COLOUR AND CONTEXT

