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Revisit me: Flower colour evolution and bee discrimination

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Flower colour is valuable information to pollinators, like trichromatic bees, as it is an effective signal allowing a pollinator to distinguish profitable from unprofitable flowers. However, understanding the evolution of flower colouration in response to pollinator selection pressure is confounded by animal species (e.g. bees, butterflies, birds) having different visual capabilities. To compare different flower species' spectral signatures we have previously used spectral reflectance marker point frequencies as keys to interpreting the perceptual responses of different model pollinators (Shrestha et al. 2014). A marker point is a sudden change in reflectance likely to differentially modulate photoreceptors in a colour opponent process, and can be directly compared to delta-lambda/lambda wavelength discrimination data. Here we investigate the application of marker point analysis for comparing discrimination of similar flower colours by insect pollinators. We plot spectral loci of a dataset of Australian flowers in a Hexagon colour space, and correlate the spectral location and frequencies of respective marker points. All of our flower spectra can be conveniently classified by one, two or three marker points. Analyses considering individual flowers show an asymmetric distribution such that flowers with a single marker are most frequently confused with others having a single marker; whilst flowers with three marker points are more frequently confused with other flowers also having three. We also consider the phylogenetic structure of marker point patterns among the species in our data set to reveal how evolutionary history may affect adaptation to different pollinators. Shrestha et al. (2014) J Ecol 102, 126-13