Crowding and binding: Not all feature-dimensions behave equally

How does the visual system integrates features into a coherent object is still a mystery. This question has been addressed with various experimental approaches and theoretical frameworks. Here I shed new light on this process by investigating and linking two distinct cases that demonstrate a breakdown of object recognition – crowding and illusory conjunction. Crowding refers to the failure to identify a peripheral item when it is presented along nearby items. The nature of crowding and the stage at which it occurs are still under debate. Crowding is either due to pooling/averaging of nearby features, or confusion between target and distractor objects. In the first study, we used a dual estimation report (orientation & color or orientation & spatial frequency) which enable us to assess the processing of each feature and to characterize the nature of errors both within and across feature-dimensions. Crowding leads to the swapping of color and orientation but averaging of SF. Whereas orientation and color crowding are independent, orientation and SF are interdependent. Our results link crowding with feature binding and suggest more integration between orientation and SF than between orientation and color. Further, we show, using different protocols, that the integration between orientation and color can be improved with training. I will discuss a new binding/integration model.