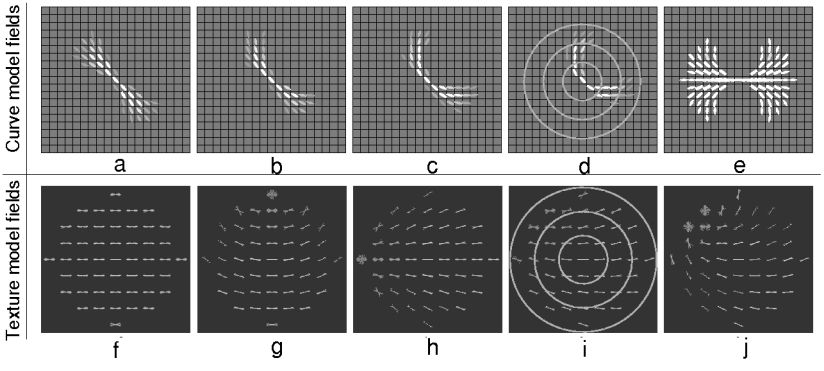

Figure 8: Illustration of connection fields for curves (top, based on co-circularity, Parent & Zucker, 1989) and textures (bottom, based on right helicoidal model, Ben-Shahar & Zucker, 2003b). Each position in these fields represents one orientation hypercolumn, while individual bars represent the orientation preference of singe neurons, all of which are connected to the central cell in each field. Multiple bars at any given point represent multiple neurons in the same hypercolumn that are connected to the central cell, a result of the dilation of the compatible structure due to broad RF tuning (see the caption of Figure 7). All fields assume that orientation tuning is quantizied to 10 degrees and their radius of influence is set to four to five nonoverlapping hypercolumns to reflect a 6 to 8 mm cortical range of horizontal connections (Gilbert & Wiesel, 1989) and hypercolumn diamater of 1.5 mm (to account for ocular dominance domains). (a–d) Examples of co-circularity projection fields (Parent & Zucker, 1989) for cells with orientation preference of 150 degrees (center bars) and different values of curvature tuning based on the implementation by Iverson (1994). (a) $\kappa = 0.0$ (curvature in units of pixels^{-1}). (b) $\kappa = 0.08$. (c) $\kappa = 0.16$. (d) $\kappa = 0.24$. (e) The union of all projection fields of all cells with same orientation preference (0 degrees in this case) but different curvature tuning. Note the similarity to the shcematic association field in Figure 6b. (f–j) Examples of the texture flow projection fields (Ben-Shahar & Zucker, 2003b) for cells with horizontal orientation preference (center bars) and different curvature tuning. Note the intrinsic dependency on curvatures and the qualitatively different connectivity patterns that they induce. (f)$(\kappa_T, \kappa_N) = (0.0, 0.0)$. (g) $(\kappa_T, \kappa_N) = (0.2, 0.0)$. (h) $(\kappa_T, \kappa_N) = (0.0, 0.2)$. (i) $(\kappa_T, \kappa_N) = (0.1, 0.1)$. (j) $(\kappa_T, \kappa_N) = (0.2, 0.2)$. Note that while the majority of connections link cells of roughly similar orientation, some connect cells of large orientation differences. The fields shown are just a few examples sampled from the models, both of which contain similar (rotated) connection fields for each of the possible orientation preferences in the central hypercolumn. The circles superimposed on *d* and *i* are used to characterize retinotopic distance zones for the predictions made in Figure 15.