Since estimates of curvature at point $\vec{\mathbf{q}}$ hold in a neighborhood containing the tangent, the discrete continuation for a curve is commonly obtained by approximating it locally by its osculating circle (do Carmo, 1976) and quantizing. This relationship, which is based on the constancy of curvature around $\vec{\mathbf{q}}$, is known as *co-circularity* (Parent & Zucker, 1989; Zucker, Dobbins, & Iverson, 1989; Sigman, Cecchi, Gilbert, & Magnasco, 2001; Geisler, Perry, Super, & Gallogly, 2001), and in $\mathbb{R}^2 \times S^1$ it takes the form of a helix (see Figures 7a and 7b). Different estimates of curvature give rise to different helices whose points define both the spatial position and the local orientation of nearby RFs that are compatible with the estimate at $\vec{\mathbf{q}}$ (see Figure 7c). Together, these compatible cells induce a curvature-based field of long-range horizontal connections (see Figures 7a through 7c and 8a through 8d). While different curvatures induce different projection fields, the “sum” over curvatures gives an association field (see Figure 8e) reminiscent of recent psychophysical findings (Field et al., 1993). Note, however, that as a psychophysical entity, the association field is not necessarily a one-to-one reflection of connectivity patterns in the visual cortex. In fact, representing a “cognitive union” across displays of different continuations, the association field is unlikely to characterize any single cell.

Similar considerations can be applied toward the local approximation of