Complexity impairs efficiency in the periphery

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SU M M A R Y: Pelli, Burns, Farell & Moore (2003) show that efficiency $E = f^{-1}(l/E)$ for identifying letters is inversely proportional to their perimetric complexity (perimeter squared over "ink" area), suggesting that complexity is proportional to the number of features in a letter. Here we report a much larger effect of complexity in the periphery. For complex letters, efficiency drops tenfold as eccentricity is increased from 0 to 16 deg. Efficiency as a function of eccentricity for identifying simple and complex letters (individual data for three observers). For simple letters peripheral efficiency is half that in the fovea, but for complex letters peripheral efficiency is one tenth that of foveal efficiency.

DATA. Efficiency as a function of eccentricity for identifying simple and complex letters (individual data for three observers). For simple letters peripheral efficiency is half that in the fovea, but for complex letters peripheral efficiency is one tenth that of foveal efficiency.

DEMO. Upper row: Two "snake" letters, one made of colinear gabor patches (left), the other made of orthogonal gabor patches (right). Fixate on the central square and try to identify the letters. It is easy on the left, but very hard on the right. Lower row: Two letters of different fonts, SLOAN (left) and Kuenstler (right). Fixate on the central square and try to identify the letters. It is easy on the left, but very hard on the right.

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