Olzak and Thomas postulated "cigar" channels, which integrate across a wide range of frequency and a narrow range of orientation, and "donut" channels, which integrate across all orientations and a narrow range of frequency. Majaj et al. (2002) used critical band masking to measure the radial frequency tuning of the channel that observers use to identify letters, and always found the same one- or two-octave bandwidth: no cigar. We did similar critical band masking experiments, but restricting orientation, instead of radial frequency, of the noise spectrum. With a grating signal, we reveal a channel tuned to the grating orientation, as expected. With a letter signal, we reveal a channel that is equally sensitive to all orientations: a donut. It is a first, not second, order channel, as shown by the fact that the threshold energy elevation sums linearly across orientations. Thus, the letter identification channel is a donut.

**Caption for figures**

**COLUMNS.** Three kinds of stimuli, with appropriate tasks. Column 1 - one grating: is its frequency \( f \) or \( 2f \)? Column 2 - two orthogonal gratings superimposed: do they have the same frequency? Each can be \( f \) or \( 2f \). Column 3 - a letter, either 1 of 8 identification or two-interval-forced-choice detection.

**ROW 1.** If the tuning displayed in Row 1 represents the orientation-dependent gain of a single filter, we expect data that agree. We measured threshold for two complementary bands of noise, 0 to \( \theta \) (plotted as X's) and \( \theta \) to 180 (plotted as O's). These two noises sum to be white noise 0 to 180, and that threshold is plotted as a horizontal black line (—). The sum of the two elevations is plotted as a dashed line (---). The prediction succeeds, noise is additive, for one grating and one letter. As expected, noise is not additive for two orthogonal gratings.

**ROW 2.** A polar plot of the same data. For one grating and one letter, the results are within the yellow 90% confidence interval of the prediction. This shows that there is one channel that integrates frequency but not orientation, weighted by the Bayes rule. For two gratings, the prediction fails, as expected, confirming that the observer uses more than one channel to see two orthogonal gratings.