Gist Perception and Holistic Processing in Rapidly Presented Mammograms.

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The "gist" perception required for radiology diagnosis resembles the non-analytic, holistic processing that is often associated with face recognition. In a previous study, we (Chin, Tanaka, Evans & Wolfe) tested the holistic perception of mammograms using an inversion task in a mixed design of upright and inverted faces. Experienced (> 5 years of experience) but not residents (< 5 years of experience) demonstrated an inversion effect for bilateral mammograms presented at 1000ms, suggesting that holistic perception develops over time and with training. However, the relationship between "gist" and holistic processing remains unclear given the long exposure of this experiment (1000ms). In the current experiment, we employed both brief (250 ms) and longer (1000 ms) exposure durations blocked by orientation (upright, inverted). Twenty-one expert radiologists and residents made "normal" or "abnormal" discriminations of upright or inverted craniocaudal single breast mammograms; half of the images were "normal" and half of the images contained subtle cancerous abnormalities. Results seem to show an interaction between radiology experience, presentation time and image orientation. All radiologists performed well above chance in the 250ms condition and showed equal discrimination performance for upright and inverted mammograms. This is consistent with the evidence in radiology that global gist processing is not strongly dependent on structure. In the 1000ms condition, the more experienced radiologists demonstrated a significant increase in overall performance and demonstrated a reliable inversion effect. We suggest that the increased discrimination in the 1000 ms condition was due to sensitivity to orientation-dependent structural information in the mammogram that is acquired with expertise.