A conventional Receiver Operating Characteristic (ROC) methodology was used to analyze sequential MR images on an individual pixel basis. Pixel intensities on images collected during activation periods are deemed to belong to True Positives, whereas pixel intensities obtained during the control period are equivalent to False Positives. A plot of True Positive fraction versus False Positive fraction as the test threshold was varied, permitted the computation of an A_z parameter for each pixel in the set of congruent images. This approach was tested on data from our functional MRI images. These scans consisted of T2* weighted (TR 3500, TE 60) EPI images obtained at 1.5 Tesla on a G.E. Signa scanner. The robustness of this approach was evaluated by adding synthetic activation and/or noise to small rectangular areas on certain images. These images were then analyzed using a conventional Student's t-test as well as our ROC A_z analysis. In well-behaved date sets, the area under the ROC curve (A_z) correlated very well with the traditional t-statistic. Addition of spurious spike points in less than 10% of the images, and having 20% additional intensity, was sufficient to reduce the t-values to undetectable levels. By comparison, these spikes had *no* observable effect on the A_z data. This novel approach to the analysis of fMRI data using ROC methodology is independent of any assumptions about the statistical distribution of pixel data, and also yields robust results if the image sets contain spurious or anomalous data.