In this paper, the author defined three criteria for detecting edges and proved the validity of these criteria via mathematical forms. These criteria include low error rate detection, good edge localization, as well as having only one response to a single edge.

The author first considered one-dimensional formulation to facilitate the analysis to generate the three major criteria as mentioned above. In an optimal detector, the edge is marked at maxima in the gradient magnitude of a Gaussian-smoothed image. Then they determined that intermaximum spacing scales with the operator width, which could be used to fix noise maxima.

In doing so, they first demonstrated that they can find optimal detectors by numerical optimization. This idea is then implemented in designing a detector for step edges, and the results are proved by mathematical forms. This operator is further approximated using the first derivative of Gaussian. Before this point, these steps were quite similar to the methods proposed by Marr-Hildreth. Next, the author proposed hysteresis thresholding that upgraded the above method. He proposed the use of two thresholds, one as the low threshold, and the other as the high threshold. They proved that using a single threshold makes edge detectors susceptible to streaking, which could lead to broken edge contours.

Last, they applied the above criteria to two dimensions by adding edge direction to the formulas. They also showed that locally straight edge contours combined with highly directional operators yield good results than operators with a circular support. These methods combined, form an efficient way in generating efficient directional masks at several orientations, and thus, good edge detectors.