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TRAFFIC CONGESTION BEHIND A BOTTLENECK.

by

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In this report, we shall investigate a model of a traffic jam occurring on a single lane road which leads into a "bottleneck". McNeil studied a similar model in which the lead car stops instantly for a random number of seconds. His main result was one concerning the total delay to all cars involved in the jam. However, his results rely on the assumption of Poisson traffic, which is in conflict with the assumption of finite effective lengths of cars. Our model will take this length into account, and will encompass bottlenecks of varying degrees as well as variation among drivers in their "following behavior". Our main goals are twofold:

1) To view the dynamics of the traffic jam qualitatively in terms of the model assumptions.

2) To obtain explicit results concerning the stochastic backward motion of the "apparent bottleneck point", and the number of cars involved in the jam. This will be done for the general case where successive gaps between cars form a renewal process, and for two special cases where gaps are exponential and truncated exponential.