# Between Shannon and Hamming: Coding for limited adversaries

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**Abstract**

As we come towards the 70th anniversary of the landmark papers of Shannon and Hamming, theoretical models of communication have had an astounding impact on our lives. Information theory and Coding theory have made great advances; for many point-to-point channels we have codes that can achieve reliable communication at rates approaching capacity. However, the value of the capacity depends strongly on the way in which noise is modeled in the channel. Traditional studies of communication have taken one of two extremes. Shannon-theoretic models are inherently average-case in which channel noise is governed by a memoryless stochastic process whereas Hamming-theoretic models take a worst-case, adversarial, view of the noise. We can unify these two perspectives by assuming there are three parties in the communication problem: the transmitter, the receiver, and a jammer. Depending on the knowledge of or constraints on the jammer, we can recover the Shannon or Hamming model.

Both the Shannon model and that of Hamming have set the foundations for modern communication technologies and have found rich applications in other fields as well. However, several settings call for the study of channels that fall between Shannon and Hamming. The major difference between these two extremes is in how the jammer's action can depend on the transmitted codeword; a dependent jammer corresponds to the Hamming model while an independent one corresponds to that of Shannon.

In this talk, I will survey a collection of results on the study of channels that fall between Shannon and Hamming. The talk will be based on works that are joint with: Z. Chen, B. K. Dey, I. Haviv, S. Jaggi, Tongxin Li, A. D. Sarwate, and C. Wang.