

Adam Brazier – Imperial College, London  
Broken Promises and Quantum Algorithms:

In the black-box model, promise problems are the only ones that admit a quantum exponential speedup over the best classical algorithm in terms of query complexity. The most prominent example of this is the Deutsch-Jozsa algorithm. More recently, Wim van Dam put forward an algorithm for unstructured problems (ie, those without a promise). We consider the Deutsch-Jozsa algorithm with a less restrictive (or 'broken') promise and study the transition to an unstructured problem. We compare this to the success of van Dam's algorithm. These are both compared with a standard classical sampling algorithm. The Deutsch-Jozsa algorithm is surprisingly good as the problem becomes less structured and is always better than the van Dam algorithm for low numbers of queries.