Statistical machine translation has been proven to be a successful approach to this ancient problem. From a linguistic point of view, current methods are very simplistic, based on the mapping on small text chunks according to huge probabilistic mapping tables. While this works fairly well for languages with similar syntactic structure (such as French-English, and even Arabic-English), it does have systematic problems with language pairs such as German-English and Japanese-English. There is a rich literature of developing syntax-based (or grammar-based) approaches in statistical machine translation. This talk will motivate some of this work on the example of German-English translation, and highlight the technical challenges involved in using grammars.