Human communication is full of nonliteral language, ranging from metaphor to irony and hyperbole. How are people able to go beyond the literal meaning of an utterance to infer the speaker’s intended meaning? We present a computational model that understands nonliteral uses of number words such as hyperbole (e.g. “That watch cost ten thousand dollars.”) We show that our model predicts humans’ interpretation of hyperbole and its rhetorical effects with high accuracy. Our model integrates background knowledge, principles of communication, and communicative goals to explain the computational basis of nonliteral language understanding. This framework sheds light on the nature of communication, marking a significant advancement in the flexibility and richness of formal models of language understanding.