We consider information measures from statistical information theory in the next section.

3.2. Information and Entropy

The good news: Computers allow us to work 100% *faster.*
The bad news: They generate 300% *more work.*
Unknown

The term entropy and its denotation by the letter S were introduced by Rudolf Julius Emanuel Clausius (1822–1888) in 1864 in his work on the foundations of classical thermodynamics, where he formulated the second law of thermodynamics in the form that the entropy of a closed system cannot decrease. Later the concept of thermodynamic entropy was clarified and grounded by Ludwig Eduard Boltzmann (1844–1906). The famous formula for thermodynamic entropy is

$$S = k \cdot \ln W \tag{3.2.1}$$

where W is the thermodynamic probability that the system is in the state with the entropy S.

It is interesting that similar expression was introduced in the statistical information theory. The main question asked by the statistical information theory is "How much information do we get when we receive a message m that an experiment H had an outcome D or that some event E happened?" Harry Nyquist (1889–1976), Ralph Vinton Lyon Hartley (1888–1970) and Claude Elwood Shannon (1916–2001) studied a specific kind of communication, namely, communication in technical systems, assuming that the only purpose of technical communication is to reproduce the input data pattern in the receiver. That is why the event of the most interest to them was which symbol came in the process of message transmission and whether this symbol was not distorted in the process of transmission. Thus, the goal of statistical information theory is to measure *transmission information*.

The answer of Hartley (1928) to this question is based on the number n of possible outcomes of the experiment H or on the number n of