Subject:
Sometimes entropy is introduced as a measure of the irreversibility of a process. In this way it is possible to get a certain intuitive idea of the entropy which otherwise has the reputation of being an abstract and obscure quantity.

Deficiencies:
1. When introducing entropy as a measure of irreversibility, the question gets easily out of sight what happens with the entropy after it has been produced. A related question is what is the effect of that entropy whose origin we do not know. The entropy of the universe is constant in very good approximation. The entropy production which we observe in our immediate surroundings seems important to us but it is insignificant on a cosmic scale. Even on a terrestrial scale the produced entropy plays only a minor role in the total entropy balance. The entropy contained within the terrestrial globe is a about a million times that which is produced in a year at the Earth’s surface (essentially by the absorption of the sunlight). For whom knows entropy only as a measure of the irreversibility of a process this entropy does not mean much.

2. We encounter entropy in the equation
\[ P = T \cdot I_S \]
(1)
The equation tells us that every entropy current is accompanied by an energy current. It has the same structure as the familiar relation
\[ P = U \cdot I \]
Equation (1) is useful for the description of heat engines. Their working principle is easy to understand: Entropy is flowing through the engine; the entropy current at the inlet is equal to that at the outlet. Inside of the engine the entropy goes from high to low temperature thereby doing work, i.e. the engine emits energy by means of the output shaft. For the description of the working principle of the engine we need the entropy. Since the process is reversible the interpretation of entropy as a measure of irreversibility is of little help.

3. When looking for a measure of irreversibility, entropy is not really a good choice. Imagine we want to compare the irreversibility of processes going on in systems A and B. What we want to compare is not states but processes. Therefore, a statement about the entropy of A and B is not useful. It is better to consider the entropy production rate of A and B. However, if the production rate is greater in A than in B, we cannot conclude that process A is “more irreversible”. If system A is much larger than B, it can be that the process of B is “more irreversible”. Thus, in order to get a more convenient measure of irreversibility we should relate the entropy production rate to the size of the system. A better measures would be the molar entropy production rate.
Origin:
The lack of an intuitive idea of the entropy that is stored in a system and the intention to add to the statistical interpretation a phenomenological interpretation.

Disposal:
When entropy is interpreted as the heat content (“heat” in the colloquial sense of the word) the molar entropy production rate is a trivial byproduct.

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