

—*i.e.*, of its availability to do work.<sup>1</sup> The infinitesimally small motions of an immense crowd may be exerted in such a way as to total up to a finite movement perceptible to our senses and accessible to our handling, or they may so mutually annul each other as to present in their finite sum and aggregate the appearance of rest and inaction, however turbulent their behaviour might appear to an observer gifted with powers of perception millions of times more delicate than ours. Lord Kelvin introduced the conception of the availability of energy,<sup>2</sup> Clausius that of entropy (or energy which is hidden away), to measure this condition of any natural system. Has the statistical view any conception to put at the base of this remarkable property of natural phenomena? It has, and we must assign to Clerk - Maxwell<sup>3</sup> the

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Lord  
Kelvin.

<sup>1</sup> See *supra*, chap. vii. p. 128, &c.

<sup>2</sup> Or of "motivity" (*i.e.*, "energy for motive power"), this being "the possession, the waste of which is called dissipation." See *supra*, chap. vii. p. 168; also Thomson (Lord Kelvin), 'Popular Addresses,' vol. i. p. 141.

<sup>3</sup> The contributions of Clerk-Maxwell to this topic are notably two, independently of the larger view which he took of statistical, as compared with historical, knowledge, of which I treat farther on in this chapter. First, in the concluding remarks of his treatise on the 'Theory of Heat' ("On the Limitation of the Second Law of Thermodynamics") he introduced his famous conception of a "sorting demon," the meaning of which fanciful device was, to impress upon the student of the dynamical theory of heat, first, the fact that the

loss of availability of the energy of molecular motion is owing to the coarseness of our senses; and second, that the restoration of differences of temperature, or of availability of energy, is simply a matter of arrangement or order, not of an increase of the intrinsic energy of the system. The subject has been frequently referred to, notably by Lord Kelvin, who says ("On the Sorting Demon of Clerk-Maxwell," Royal Institution, February 1879. Reprinted in 'Popular Lectures and Addresses,' vol. i. p. 137, &c.): "Dissipation of energy follows in nature from the fortuitous course of atoms. The lost motivity is essentially not restorable otherwise than by an agency dealing with individual atoms; and the mode of dealing with the atoms to restore motivity is essentially a process of assortment, sending this way all of one kind or class, that way all of another kind or class"