two dimensions—however complicated or irregular that motion might appear to be—could be mathematically represented or calculated by the superposition or addition of a larger or smaller number of simple periodic motions; as it were analysed and dissected into these simple movements, just as any number can be looked upon as made up by the addition of others—say of prime numbers. Now, it was also known that sounds were produced by wave-like tremors of the air set going by the vibrations of strings or other sounding musical instruments; further, that definite musical notes were absorbed or transmitted by neighbouring sounding bodies according as these were in or out of tune with the vibrating source of sound. This is the well-known phenomenon of resonance. Ohm[1] had applied Fourier's mathematical analysis to the explanation of the partial notes, the ground tone and the harmonic overtones (or upper partial tones), of which musical[2] sounds are made up. Helmholtz invented a

[1] Geo. S. Ohm, the same to whom we are indebted for the well-known law which obtains in electric currents, published in 1843 a paper in Poggendorf's 'Annalen' (reprinted in 'Gesammelte Abhandlungen,' 1892, p. 575), "On the definition of a tone and the theory of the siren," in which he applied the mathematical methods introduced by Fourier in his 'Théorie analytique de la Chaleur' (1822); as he had already done in his earlier work on the galvanic current (1827). In fact, Ohm was one of the first to recognise the value of Fourier's conceptions in contradistinction from Laplace's, which were bound up with certain hypothetical notions as to the molecular constitution of bodies. See the introduction to his treatise on the galvanic current ('Ges. Werke,' p. 63).

[2] Cagniard de la Tour had invented (1819) and Seebeck the younger had improved (1841) the first mechanical counter for the frequencies of musical sounds, the siren; and the latter as well as Duhamel had studied the composition of such sounds out of their elements or simple notes. A suggestion had been thrown out as to the part played by the upper partial tones which accompanied the ground tone. Helmholtz treats first of this subject in a lecture (1857), reprinted in 'Vorträge und Reden,' vol. i. p. 79, dealing with "the psychological causes of musical harmony."