

In the first place, we may observe that the leading thought which suggested and animated all Kepler's attempts was true, and we may add, sagacious and philosophical; namely, that there must be *some* numerical or geometrical relations among the times, distances, and velocities of the revolving bodies of the solar system. This settled and constant conviction of an important truth regulated all the conjectures, apparently so capricious and fanciful, which he made and examined, respecting particular relations in the system.

In the next place, we may venture to say, that advances in knowledge are not commonly made without the previous exercise of some boldness and license in guessing. The discovery of new truths requires, undoubtedly, minds careful and scrupulous in examining what is suggested; but it requires, no less, such as are quick and fertile in suggesting. What is Invention, except the talent of rapidly calling before us many possibilities, and selecting the appropriate one? It is true, that when we have rejected all the inadmissible suppositions, they are quickly forgotten by most persons; and few think it necessary to dwell on these discarded hypotheses, and on the process by which they were condemned, as Kepler has done. But all who discover truths must have reasoned upon many errors, to obtain each truth; every accepted doctrine must have been one selected out of many candidates. In making many conjectures, which on trial proved erroneous, Kepler was no more fanciful or unphilosophical than other discoverers have been. Discovery is not a "cautious" or "rigorous" process, in the sense of abstaining from such suppositions. But there are great differences in different cases, in the facility with which guesses are proved to be errors, and in the degree of attention with which the error and the proof are afterwards dwelt on. Kepler certainly was remarkable for the labor which he gave to such self-refutations, and for the candor and copiousness with which he narrated them; his works are in this way extremely curious and amusing; and are a very instructive exhibition of the mental process of discovery. But in this respect, I venture to believe, they exhibit to us the usual process (somewhat caricatured) of inventive minds: they rather exemplify the *rule* of genius than (as has generally been hitherto taught) the *exception*. We may add, that if many of Kepler's guesses now appear fanciful and absurd, because time and observation have refuted them, others, which were at the time equally gratuitous, have been confirmed by succeeding discoveries in a manner which makes them appear marvellously sagacious; as, for instance, his assertion of the rotation of