

one of the data may become enormously magnified in the final result to be compared with observation. Thus, in the case of an eclipse of the sun, when the moon enters very obliquely upon the sun's disc, a trifling error in the diameter of either the sun or moon may make a great one in the time when the eclipse shall be announced to commence. It ought to be remarked, that these are, of all others, the conjunctures where observations are most available for the determination of data; for, by the same rule that a small change in the data will, in such cases, produce a great one in the thing to be observed; so, *vice versâ*, any moderate amount of error, committed in an observation undertaken for ascertaining its value, can produce but a very trifling one in the *reverse* calculation from which the data come to be determined by observation. This remark extends to every description of physical data in every department of science, and is never to be overlooked when the object in view is the determination of data with the last degree of precision.

(227.) But how, it may be asked, are we to ascertain *by* observation, data more precise than observation itself? How are we to conclude the value of that which we do not see, with greater certainty than that of quantities which we actually see and measure? It is the number of observations which may be brought to bear on the determination of data that enables us to do this. Whatever error we may commit in a single determination, it is highly improbable that we should always err the same way, so that, when we come to take an average of a great number of determinations (unless there be some constant cause which gives a bias one way or the other), we cannot fail, at length, to obtain a very near approximation to the truth, and even allowing a bias, to come much nearer to it than can fairly be expected from any single observation, liable to be influenced by the same bias.

(228.) This useful and valuable property of the average of a great many observations, that it brings us nearer to the truth than any single observation can be