

The Force of Gravity which thus produces deflection and curvature in the path of a body thrown *obliquely*, constantly increases the velocity of a body when it falls *vertically* downwards. The universality of this increase was obvious, both from reasoning and in fact; the law of it could only be discovered by closer consideration; and the full analysis of the problem required a distinct measure of the quantity of Accelerating Force. Galileo, who first solved this problem, began by viewing it as a question of fact, but conjectured the solution by taking for granted that the rule must be the simplest possible. "Bodies," he says,<sup>7</sup> "will fall in the most simple way, because Natural Motions are always the most simple. When a stone falls, if we consider the matter attentively, we shall find that there is no addition, no increase, of the velocity more simple than that which is always added in the same manner," that is, when equal additions take place in equal times; "which we shall easily understand if we attend to the close connection of motion and time." From this Law, thus assumed, he deduced that the spaces described from the beginning of the motion must be as the squares of the times; and, again, assuming that the laws of descent for balls rolling down inclined planes, must be the same as for bodies falling freely, he verified this conclusion by experiment.

It will, perhaps, occur to the reader that this argument, from the simplicity of the assumed law, is somewhat insecure. It is not always easy for us to discern what that greatest simplicity is, which nature adopts in her laws. Accordingly, Galileo was led wrong by this way of viewing the subject before he was led right. He at first supposed, that the Velocity which the body had acquired at any point must be proportional to the *Space* described from the point where the motion began. This false law is as simple in its enunciation as the true law, that the Velocity is proportional to the *Time*: it had been asserted as the true law by M. Varro (*De Motu Tractatus*, Genevæ, 1584), and by Baliani, a gentleman of Genoa, who published it in 1638. It was, however, soon rejected by Galileo, though it was afterwards taken up and defended by Casræus, one of Galileo's opponents. It so happens, indeed, that the false law is not only at variance with fact, but with itself: it involves a mathematical self-contradiction. This circumstance, however, was accidental: it would be easy to state laws of the increase of velocity which should be simple, and yet false in fact, though quite possible in their own nature.

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<sup>7</sup> *Dial. Sc.* iv. p. 91.