# Newton's statement of the case in dispute between Leibniz and himself

**Author:** Isaac Newton

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M$^{r}$ Newton published his Treatise of Quadratures in the year 1704. This Treatise was written long before, many things being cited out of it in his Letter of 24 Octob. 1676. It relates to the method of fluxions & that it might not be taken for a new piece M$^{r}$ Newton repeated what D$^{r}$ Wallis had published nine years before without being then contradicted, namely that this method was invented by degrees in the years 1665 & 1666. Hereupon the Editors of the Acta Lipsiensiam in Ianuary 1705, in the style of M$^{r}$ Leibnitz, in giving an Account of this book represented that M$^{r}$ Leibnitz was the first inventor of the method & that M$^{r}$ Newton had substituted fluxions for differences. And M$^{r}$ Keil in an Epistole published in the Philosophical Transactions for May & Iune 1708 retorted the accusation, saying: Fluxionum Arithmeticam sine omni dubio primus invenit D. Newtonus, ut cuilibet ejus Epistolas a Wallisio editas legenti facile constabit. Eadem tamen Arithmetica postea mutatis nomine & notationis modo a Domino Leibnitsio in Actis Eruditorum edita est. And this was the beginning of the present controversy.

M$^{r}$ Leibnitz understanding this in a stronger sense then M$^{r}$ Keill intended it, gave his reasons against it in a Letter to D$^{r}$ Sloan dated 4 March st. n. 1711, & moved that the R. Society would cause M$^{r}$ Keill to make a publick recantation. M$^{r}$ Keill chose rather to explain & defend what he had written. And M$^{r}$ Leibnitz in a second Letter to D$^{r}$ Sloan dated 29 Decem. 1711 instead of making good his accusation as he was bound to do that it might not be deemed a calumny, insisted only upon his own candor as if it would be injustice to question it, & said that the Acta Lipsiensia had given every man his due, & called M$^{r}$ Keill a Novice unacquainted with things past & one that acted without authority from M$^{r}$ Newton & a clamorous man, & desired that M$^{r}$ Newton himself would give his opinion in the matter. He knew that M$^{r}$ Newton had already given his opinion in the Introduction to the book of Quadratures but M$^{r}$ Newton must retract that opinion & allow that he had substituted fluxions for differences or not be quiet.

The Royal Society therefore having as much authoritiy over M$^{r}$ Leibnitz as over M$^{r}$ Keil & being now twice pressed by M$^{r}$ Leibnitz to interpose & seing no reason to condemn or censure M$^{r}$ Keil without inquiring into the matter; & that neither M$^{r}$ Newton nor M$^{r}$ Leibnitz (the only persons alive who knew & remembred any thing of what had passed in these matters 40 years ago) could be witnesses for or against M$^{r}$ Keill, appointed a numerous Committee to search old Letters & Papers & report their opinion upon what they found, & ordered the Letters & Papers with the Report of their Committee to be published. And by those Letters & Papers it appeared to the Committee that M$^{r}$ Newton had the Method in or before the year 1669, & it did not appear to them that M$^{r}$ Leibnitz had it before the year 1677

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For making himself the first inventor of the differential method he has represented that Mr Newton at first used the letter o in the vulgar manner for the given increment of x, which destroys the advantages of the differential method; but after the writing of his Principles, changed o into $\dot{x}$, substituting $\dot{x}$ for $dx$. It lies upon him to prove that Mr Newton ever changed o into $\dot{x}$ or used $\dot{x}$ for $dx$, or left off the use of the letter o. Mr Newton used the letter o in his Analysis written in or before the year 1669, & also in his book of Quadratures, & in his Principia Philosophiæ, & still uses it in the very same sense as at first. In his book of Quadratures he used it in conjunction with the symbol $\dot{x}$, & therefore did not use that symbol in its room. These symbols o & $\dot{x}$ are put for things of a different kind. The one is a moment, the other a fluxion or velocity as has been explained above. When the letter x is put for a quantity which flows uniformly the symbol $\dot{x}$ is an <256v> unit & the letter o a moment. Prickt letters never signify moments unless when they are multiplied by the moment o either exprest or understood to make them infinitely little, & then the rectangles are put for moments & $\dot{x}o$ & $dx$ signify the same moment.

Mr Newton doth not place his method in forms of symbols nor confine himself to any particular sort of symbols for fluents or fluxions. When he puts the Areas of Curves for fluents he usually puts the Ordinates for fluxions & denotes the fluxions by the symbools of the Ordinates, as in the Analysis. Where he puts lines for fluents he puts any symbols for the velocities of the points which describe the lines, that is, for the first fluxions, & any other symbols for the increase of those velocities, that is, for the second fluxions, as is frequently done in his Principia Philosophiæ. And where he puts the letters x, y, z for fluents, he denotes their fluxions either by other letters as p, q, r or AB, CD, EF, or by the same letters in other forms as X, Y, Z, or $\dot{x}$, $\dot{y}$, $\dot{z}$. And this is evident by his book of Quadratures where he represents fluxions by prickt letters in the first Proposition, by the Ordinates of Curves in the last Proposition & by other symbols in explaining the method & illustrating it with examples in the Introduction. Mr Leibnitz has no symbols of fluxions in his method & therefore Mr Newtons symbols of fluxions are the oldest in the kind. Mr Leibnitz began to use the symbols of moments or differences $dx$, $dy$, $dz$ in the year 1677: Mr Newton has represented moments by the rectangles under the fluxions & the moment o ever since the writing of his Analysis which was at least 45 years ago. Mr Leibnitz has used the symbols $\int x$, $\int y$, $\int z$ for the summ of Ordinates ever since the year 1686: Mr Newton represented the same thing in his Analysis 45 years ago by inscribing the Ordinate in a square or rectangle. All Mr Newtons symbols are the oldest in their several kinds by many years.

And whereas Mr Leibnitz has represented that the use of the letter o is vulgar & destroys the advantages of the Differential Method: on the contrary the method of fluxions as used by Mr Newton has the advantage of the differential in all respects. It is more elegant because in his calculus there is but one infinity little quantity represented by a symbol the symbol o. It is more natural & geometrical because founded upon the primæ quantitatum nascentium rationis which have a being in Geometry whilst indivisibles upon which the Differential method is founded have no being either in Geometry or in nature. There are rationes primæ quantitatum nascentium; but not quantitatis primæ nascentes. Nature generales quantities by continual flux or increase; & the ancient Geometers admitted such a generation of areas & solids when they drew one line into another by local motion to generate an area & the area into a line by local motion to generate a solid. But the summing up of indivisibles to compose an area or solid was never yet admitted into Geometry. Mr Newtons method is also of a greater use & certainty being adapted either to the ready finding out a Proposition or to the Demonstrating it: Mr Leibnitz's is only for finding it out. When the work succeeds not in finite equations Mr Newton has recourse to converging series & thereby his method becomes incomparably more universal then that of Mr Leibnitz which is confined to finite equations For he has a share in the method of infinite series. By the help of this Analysis Mr Newton found out most of the Propositions in his Principia Philosophiæ. But because the Ancients admitted nothing into Geometry before it was demonstrated synthetically, he demonstrated the Propositions synthetically that the systeme of the heavens might be founded upon good Geometry. And this makes it now difficult for unskillful men to see the Analysis by which those Propositions were found out.