TWO EXAMPLES FROM HISTORY: MAPPING DIAGRAMS TO VISUALIZE RELATIONS AND FUNCTIONS.

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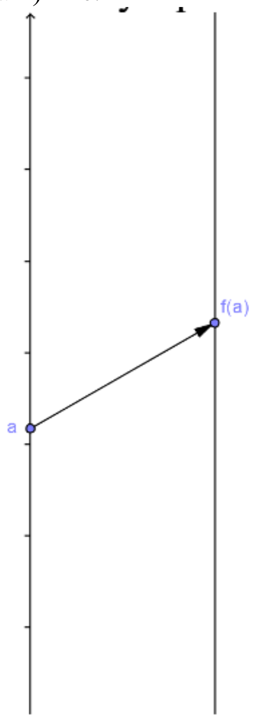
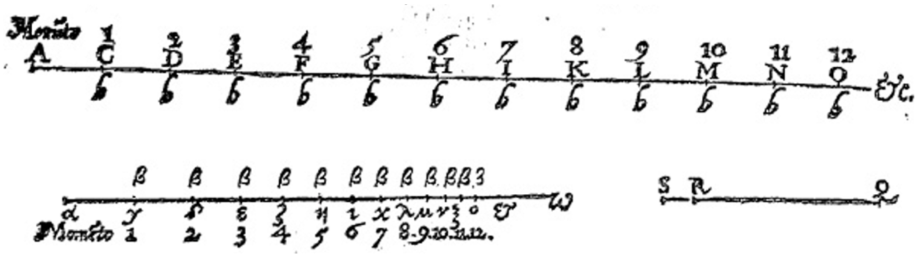
A mapping diagram for a function, *f*, is a figure consisting of two parallel number lines (or axes) and a set of arrows between these lines. Points on one (source or input) line represent numbers from the domain of *f*, the source (controlling or independent) variable values. Points on the other (target or output) line represent numbers from the co-domain of *f*, the target (controlled or dependent) variable values. An arrow in the diagram has its tail on a point on the source (domain), representing a selected number, *a*. The head of the arrow points to the function value, *f* (*a*), for the number *a*, represented by a point on the target (co- domain) line.



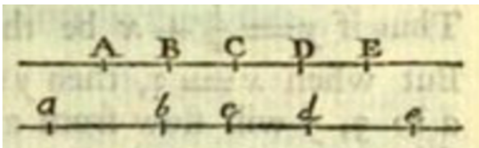
Mapping diagrams are also described as function diagrams, arrow diagrams, dynagraphs, parallel coordinate graphs, or cographs. They visualize functions and relations as an alternative to cartesian graphs.

The history of mapping diagrams predates Descartes' work *La Géométrie* (1637) which introduced numbers and equations to the analysis of geometry. Though originally an appendage to his *Discourse on Method*, this mathematical work eventually became the basis for current coordinate geometry and the graphical representation of functions.

Published in 1614, Napier's work, *Mirifici logarithmorum canonis descriptio* (*A Description of the Wonderful Table of Logarithms*) used mapping diagrams as key visualizations for the introduction to logarithms. His diagrams did not use arrows to indicate the corresponding points. Instead, Napier used alphabetic labels to connect a point moving on one axis with its position increasing arithmetically to a second point moving on a parallel line segment with its position decreasing geometrically with respect to the segment's endpoint.



Later in history mapping diagrams were used by Isaac Newton in his *Treatise of the Method of Fluxions* (published posthumously in 1736) to visualize his solution of the problem of finding the relation of two quantities, given an equation involving their fluxions.



The author will explain and connect these two examples (using GeoGebra) to featuring mapping diagrams in contemporary approaches to logarithms and differential equations, illustrating how this history can be integrated into current pedagogy.