

7. Attribute Measurement Scales [Print](#)

Chapter 2 focused upon measurement scales for spatial data, including map scale (expressed as a representative fraction), coordinate grids, and map projections (methods for transforming three dimensional to two dimensional measurement scales). You may know that the meter, the length standard established for the international metric system, was originally defined as one-ten-millionth of the distance from the equator to the North Pole. In virtually every country except the United States, the metric system has benefited science and commerce by replacing fractions with decimals, and by introducing an Earth-based standard of measurement.

Standardized scales are needed to measure non-spatial attributes as well as spatial features. Unlike positions and distances, however, **attributes** of locations on the Earth's surface are often not amenable to absolute measurement. In a 1946 article in *Science*, a psychologist named S. S. Stevens outlined a system of four **levels of measurement** meant to enable social scientists to systematically measure and analyze phenomena that cannot simply be counted. (In 1997, geographer Nicholas Chrisman pointed out that a total of nine levels of measurement are needed to account for the variety of geographic data.) The levels are important to specialists in geographic information because they provide guidance about the proper use of different statistical, analytical, and cartographic operations. In the following, we consider examples of Stevens' original four levels of measurement: **nominal, ordinal, interval, and ratio**.

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The Nature of Geographic Information

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