An unambiguous descriptor of rotations is the matrix that links two sets of Cartesian coordinates of each point of a rotated object, those before and after rotation. However, the matrix elements are mutually dependent and hardly interpretable in a straightforward way. To overcome these difficulties, crystallographic and cryo-EM software usually refers to polar (a single rotation about an axis in a general orientation) or to Euler angles (three consecutive rotations about the chosen coordinate axes). Different software uses different sets of parameters as: both polar and Euler angles may be defined with respect to different coordinate axes; Euler angles may be defined with respect to both fixed and rotating axes; positive rotation direction may be chosen in opposite ways; one can consider the object rotating with respect to a fixed coordinate system or vice versa.

All these possible parametrizations of rigid-body rotations can be interactively illustrated with the program py_convrot. It deals with all kinds of Euler angles, including all choices of rotation axes and rotation directions, and with all possible choices of polar angles. Using a kind of ‘lego’, a user can build their own rotation convention and view its action using an interactive Demo. An extended Help describes details of these parameterizations. Available Tables explain all possible interpretations of the rotation matrices in terms of various parameters and vice versa. The program can be used both as a teaching and as a practical tool converting one set of rotation parameters to another.