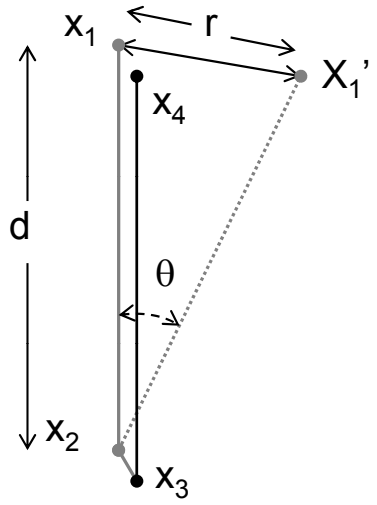
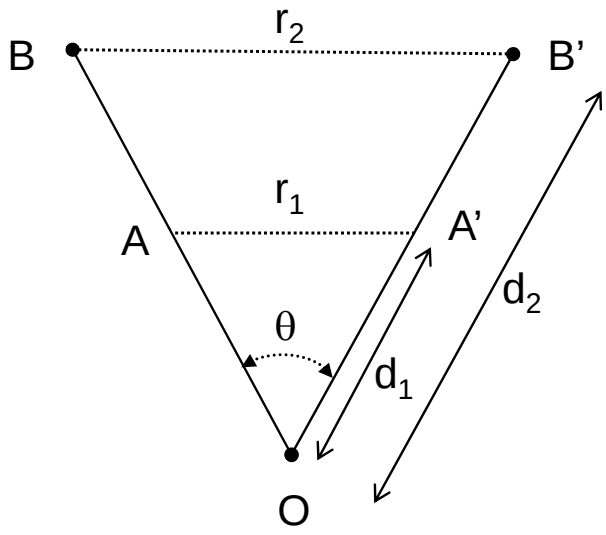
SUPPLEMENTARY MATERIAL



Supplementary Fig. (1). Schematic diagram, illustrating relationship between rotation angle and distance. The point (or an atom) x_1 moves by r to x_1' as a result of θ torsion angle in an x_1-x_2-x_3-x_4 molecular system. Essential formulae, length of the chord, $r = d\sqrt{2(1-\cos\theta)}$, ($x_1$-$x_1$') arc length $= \frac{d\theta\partial}{180}$, where θ is in degree and d is the bond length x_1-x_2.



Supplementary Fig. (2). Schematic illustration of ideal hinge-motion about O. As discussed in the text, two hypothetical points A and B move to different extents during hinge-bending. Applying the formula of length of the chord (Fig. **1**), the relative movement is governed by the following relation: $\frac{BB'}{AA'} = \frac{d_2}{d_1}$.

As an example, if OB is a part of an α-helix, the relative movements of points A and B would be governed by the following equation: $\frac{d_2}{d_1} = \frac{(n2*1.5)}{(n1*1.5)}$

An ideal α-helix has 3.6 residues per turn, and pitch is of 5.4 Å, then 5.4/3.6 = 1.5Å is a rise per residue. n1, n2 are residue numbers counting from O. So if A and B are 5 and 25 residues apart from O, then their movements differ by five times in hinge-motion.