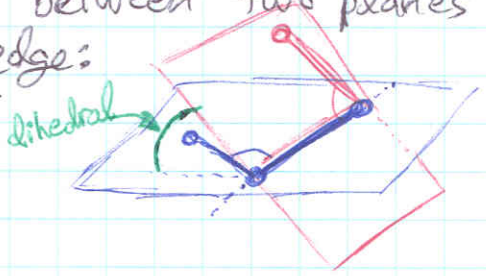
6.885
L15.3
Nov. 3, 2004

Fixed-angle linkages = angles between incident bars are fixed mechanically.

- protein is roughly a fixed-angle tree, especially "star"/"dentritic" polymers
- protein backbone is usually roughly a fixed-angle chain, usually open but occassionally closed
- folding of backbone without sidechains is considered a reasonably accurate model

Dihedral motion = motion of fixed-angle chain

- decomposable into "local dihedral motions"/"edge spins": rotate half of chain around an edge
  i.e. change dihedral angle between two planes spanned by that edge:



Locked proteins:

- locked chains with universal joints (in 3D)
  ⇒ locked chains with fixed-angle joints too
- locked chains suggest configuration space is hard to navigate — but nature seems to do it well
- is there something special about fixed-angle linkages arising from proteins that prevents locked chains?
  - bond lengths in backbone all roughly equal
    OPEN: locked equilateral chain in 3D? tree?
    - but locked equilateral fixed-angle chain exists
  - bond angles all obtuse & roughly equal
    OPEN: locked equilateral obtuse fixed-angle chain?
  - proteins are produced sequentially ⇒ later