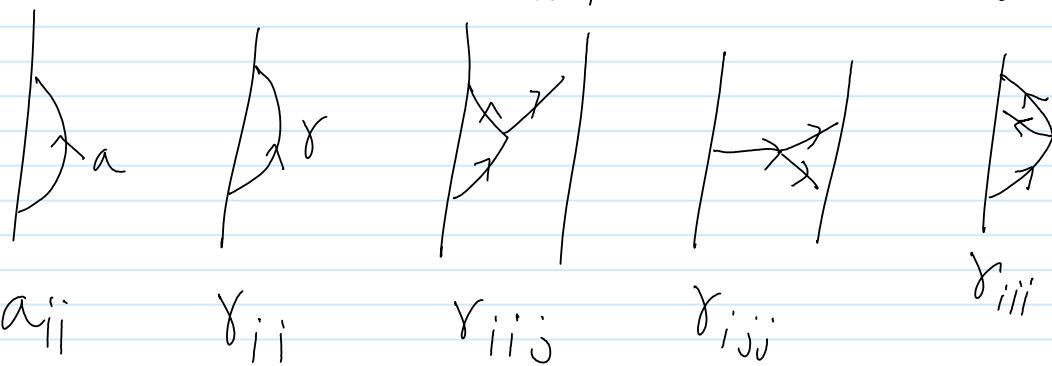


The missing primitives

June-02-15 4:44 AM

Convention: head above tails.



Are these enough?

$$\begin{array}{c} j \\ \swarrow \\ k \end{array} \begin{array}{c} l \\ \nearrow \\ k \end{array} = \begin{array}{c} b \\ \downarrow \\ \text{---} \end{array} - \begin{array}{c} b \\ \nearrow \\ \text{---} \end{array} - \begin{array}{c} b \\ \uparrow \\ \text{---} \end{array} - \begin{array}{c} \gamma \\ \downarrow \\ \text{---} \end{array}$$

$$[a_{jk}, a_{jl}] = c_l a_{jk} - c_k a_{jl} =: \gamma_{jkl},$$

$$[a_{jk}, a_{ik}] = b_i a_{jk} - b_j a_{ik},$$

$$[a_{jk}, a_{kl}] = b_j a_{kl} - b_k a_{jl} - \gamma_{jkl},$$

$$a_{j_1 j_2} - a_{j_2 j_1} = \begin{array}{c} j_1 \\ \nearrow \\ a_{jj} \end{array} - \begin{array}{c} j_2 \\ \nearrow \\ a_{jj} \end{array} = \begin{array}{c} \leftarrow \rightleftharpoons \\ \downarrow \end{array} =$$

$$= - \begin{array}{c} b \leftarrow \\ \rightarrow \end{array} + \begin{array}{c} b \\ \rightarrow \leftarrow \\ \rightarrow \end{array} + \begin{array}{c} b \\ \leftarrow \rightarrow \\ \rightarrow \end{array} = \begin{array}{c} \rightarrow b \\ + \end{array} \begin{array}{c} \leftarrow c \\ + \end{array}$$

$$\text{so } a_{j_1 j_2} = a_{jj} + b_j + c_j$$

it seems that all is well if $b_j + c_j$ is added to the game, but $b_j + c_j$ is not co-homogeneous.

$$\begin{array}{c} \rightarrow \\ \rightarrow \end{array} - \begin{array}{c} \times \\ \rightarrow \end{array} = \gamma_{j_1 j_2} - \gamma_{j_2 j_1} =$$

$$= C_{j_2} a_{j_1 k} - C_k a_{j_1 j_2} - C_{j_1} a_{j_2 k} + C_k a_{j_2 j_1} =$$

$$= [a_{jk}, C_j] - C_k (b_j + c_j) = -\gamma_{jk} - b_j C_k = -f a_{jk}$$

$$[a_{jk}, a_{kj}] = \begin{array}{c} \uparrow \uparrow \\ \leftarrow \rightarrow \\ j \quad k \end{array} - \begin{array}{c} \uparrow \uparrow \\ \rightarrow \leftarrow \\ j \quad k \end{array} = \underbrace{\begin{array}{c} \uparrow \leftarrow \\ \leftarrow \rightarrow \\ j \quad k \end{array}}_{[\] \text{ on } k} - \underbrace{\begin{array}{c} \uparrow \uparrow \\ \times \rightarrow \\ j \quad k \end{array}}_{[\ j \text{ on } j]} + \underbrace{\begin{array}{c} \uparrow \uparrow \\ \leftarrow \times \\ j \quad k \end{array}}_{[\ k \text{ on } j]}$$

$$\begin{aligned} \textcircled{1} &= b_j \alpha_{kj} - b_k \alpha_{jj} - \gamma_{jkj} = \\ &= b_j \alpha_{kj} - b_k \alpha_{jj} - b_k(b_j + c_j) - \gamma_{jkj} \\ &= \underline{b_j \alpha_{kj}} - \underline{b_k \alpha_{jj}} - b_k(\cancel{b_j} + \cancel{c_j}) - \underline{\gamma_{jkj}} + \underline{\gamma_{jk}} + \cancel{b_j c_k} \end{aligned}$$

$$\begin{aligned} \textcircled{2} &= -b_k \alpha_{jk} + b_j \alpha_{kk} + \gamma_{kjk} \\ &= \cancel{-b_k \alpha_{jk}} + \underline{b_j \alpha_{kk}} + b_j(\cancel{b_k} + \cancel{c_k}) + \underline{\gamma_{kjk}} - \underline{\gamma_{kj}} - \cancel{b_k c_j} \end{aligned}$$

So over all,

$$\begin{aligned} [\alpha_{jk}, \alpha_{kj}] &= \textcircled{1} + \textcircled{2} = \\ &= b_j \alpha_{kj} - b_k \alpha_{jk} + b_j \alpha_{kk} - b_k \alpha_{jj} + \gamma_{kjk} - \gamma_{jkj} \\ &\quad + \gamma_{jk} - \gamma_{kj} - 2b_k c_j + 2b_j c_k \end{aligned}$$

Redo at a-c level!