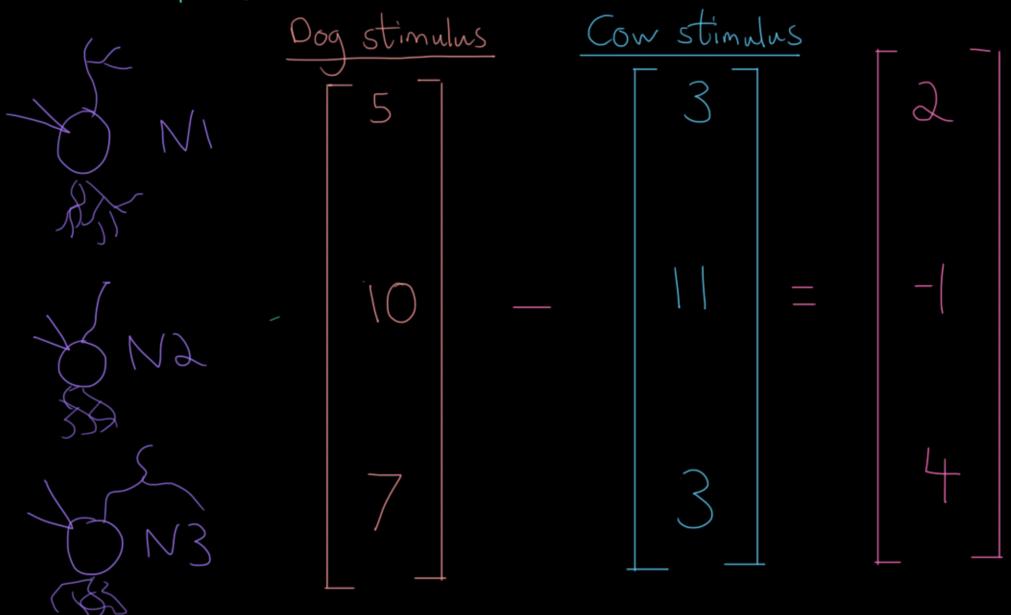# Why learn linear algebra?

- Central to most areas of math and many applications
- Underlies much of computational/theoretical neuroscience
- Lots of data in neuro for which vectors/matrices are useful structures

$$N1 \quad N2 \quad N3 \quad \cdot \quad \begin{bmatrix} 5 \\ 10 \\ 7 \end{bmatrix} - \begin{bmatrix} 3 \\ 11 \\ 3 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 4 \end{bmatrix}$$

Dog stimulus   Cow stimulus

Vector

Ordered list of numbers

$$\bar{x} = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \leftarrow 1^{st} \text{ component}$$

$Dim = 2$

Arrow

Hard to visualize

$$\bar{y} = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{bmatrix}$$

$Dim = N$

$$\bar{x} = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Column vector

$$\bar{z} = \begin{bmatrix} z_1, & z_2 \end{bmatrix}$$

Row vector