In Equation 4.2.3 we described how the expected observed MEP size is modeled as a rectified-logistic function $\mathcal{F}(x)$ of stimulation intensity x. More generally, $\mathcal{F}$ is called the *activation* function which transforms a linear combination of the input $-b(x-a)$, and links it to the expected MEP size $\mathbb{E}(y \mid x, \Omega)$, where $\mathcal{F}$ is parametrized by Ω.

There are various choices available for the activation function. The most common choice is the Sigmoid (Logistic-4) [cite papers], followed by Rectified Linear Unit (ReLU) [McIntosh 2023], given in Eqns. 4.7.2, 4.7.3 respectively. Additionally, Logistic-5 (Eqn. 4.7.1) [Pitcher 2003 (find better one)] is also available which is a more generalized version of Logistic-4 and contains an extra parameter v to control near which asymptote the maximum growth occurs.

$$\text{Logistic-5} \qquad a, b, v, L, H > 0 \quad x \mapsto L + \frac{H}{\left\{1 + (2^v - 1)\, e^{-b(x-a)}\right\}^{1/v}} \tag{4.7.1}$$

$$\text{Logistic-4} \qquad a, b, L, H > 0 \quad x \mapsto L + \frac{H}{1 + e^{-b(x-a)}} \tag{4.7.2}$$

$$\text{Rectified-linear} \qquad a, b, L > 0 \quad x \mapsto L + \max\left\{0, b\,(x-a)\right\} \tag{4.7.3}$$

Note here in Eqns. 4.7.1 - 4.7.2, parameter a models the S_{50} stimulation intensity, required to produce response midway between the offset (L) and maximal response ($L+H$). In Eqn. 4.7.3, a models the threshold required to produce minimal response above offset (L)

In section 5.5, we use the same observation model from Eqn. 4.2.2 - 4.2.4 except we vary the activation function and use Bayesian leave-one-out (LOO) cross validation [Aki Vehtari paper] to compare how well they describe datasets of sections 4.4 - 4.6.