Assignment 0

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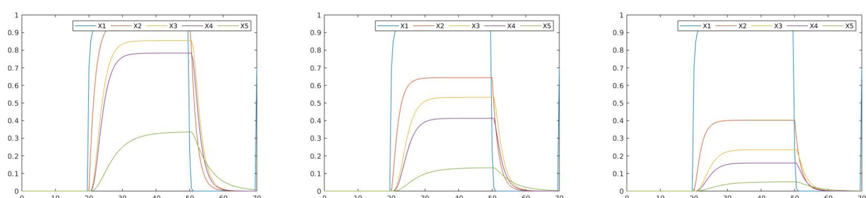
1. In Figure 3 tissue damage, pain, winces, groans and escaping are denoted by X_1, ..., X_5 respectively. The intensities chance over time and are invoked by a stepmod function generating input for the tissue damage state X_1 at $t = 20$.

   In every subfigure the progress is shown for different values of the pain threshold τ_{pain}. It demonstrates for lower τ the value of by X_2, ..., X_5 overall while be higher, for higher τ the max value will be lower. In other words, a higher pain threshold will result in lower intensities for all other states.



(a) $\tau_{pain} = 0.2$ (b) $\tau_{pain} = 0.8$ (c) $\tau_{pain} = 1.0$

Figure 1: Responses for tissue damage X_1, pain X_2, winces X_3, groans X_4 and escaping X_5 over time for different values of τ_{pain}.

2. In the figures we see the escape state X_5 response being lower than the other states which can be explained by different values in the role matrices. In the connection weight matrix M_{cwv} we see the weight of the connection between X_2 and X_5 being set to 0.7, opposed to other connection weights being set to a higher value of 1.0. Also, the escape threshold $\tau_{escape} = 0.8$ in M_{cfpv} results in a lower response, as shown in 3 for the pain threshold τ_{pain}.

   Finally, in M_{sv} we see a relative low value for the speed of X_5. This will however not have any influence on the intensity but rather on the steepness of the curve.

3. For this experiment we change the value of the weight between X_2 and X_5, the speed of X_5 and the threshold τ_{escape} in order to get a strong

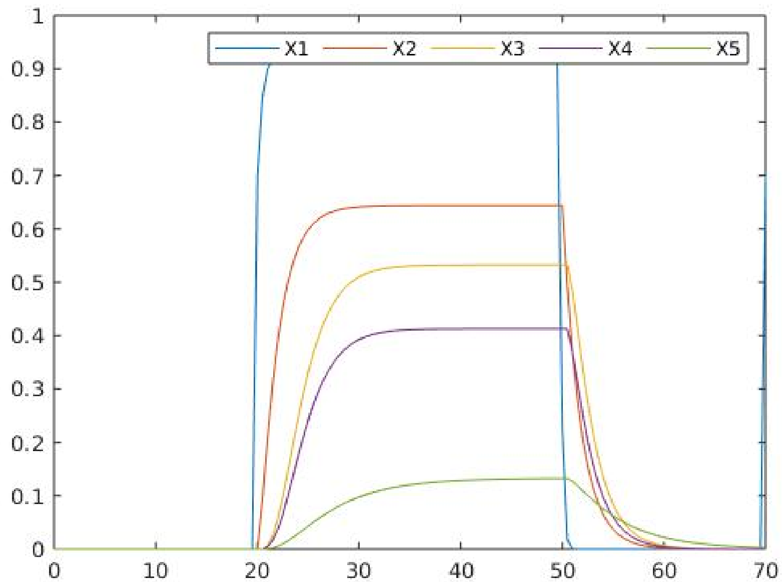
response rate for X_5. The figure of the corresponding initial run is shown in Figure 2a.

We start with increasing the weight from 0.7 to 1.0 (Figure 2b) as we know it serves as a multiplier for the incoming state. The result is shown in Figure 2b.

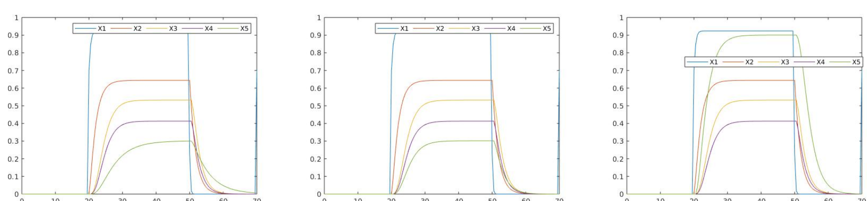
Next we increase the speed value to 0.4 (Figure 2c) which results in a more steep and faster growth of the response rate of X_5. We choose to keep this value under the value of the speed factors of the other states since escaping is typically the latest in this set of reactions.

At last, we lower the threshold to 0.1 (Figure 2d) in order for the response rate to approach 1.0. A threshold of 0.0 would result in the intensity actually reaching 1.0 but we assume a threshold of 0.0 is humanly impossible.

4. To make the escaping negatively affects the tissue damage we set the connection weight between them to a negative value. The result for -0.2 is shown Figure 3a showing that X_1 drops as X_5 rises. For a weight of -0.7 we can clearly see in Figure 3b that the drop of X_1 also has an impact on X_2, X_3 and X_4 as they are all (positively) connected.



(a) weight = 0.7, speed = 0.2 and threshold = 0.8

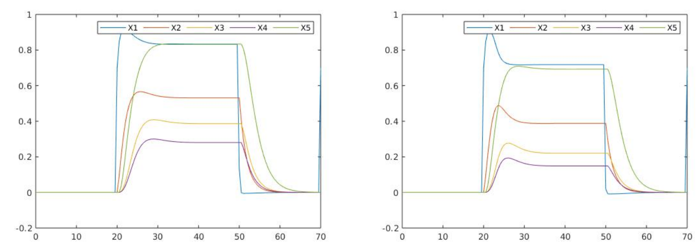


(b) weight = 1.0, speed = 0.2 and threshold = 0.8

(c) weight = 1.0, speed = 1.0 and threshold = 0.8

(d) weight = 1.0, speed = 1.0 and threshold = 0.1

Figure 2: Responses for tissue damage X_1, pain X_2, winces X_3, groans X_4 and escaping X_5 over time for different parameters.



(a) Connection weight between X_5 and X_2 is -0.2.

(b) Connection weight between X_5 and X_2 is -0.7.

Figure 3: Responses for tissue damage X_1, pain X_2, winces X_3, groans X_4 and escaping X_5 over time for different values of connection weight between X_1 and X_5.