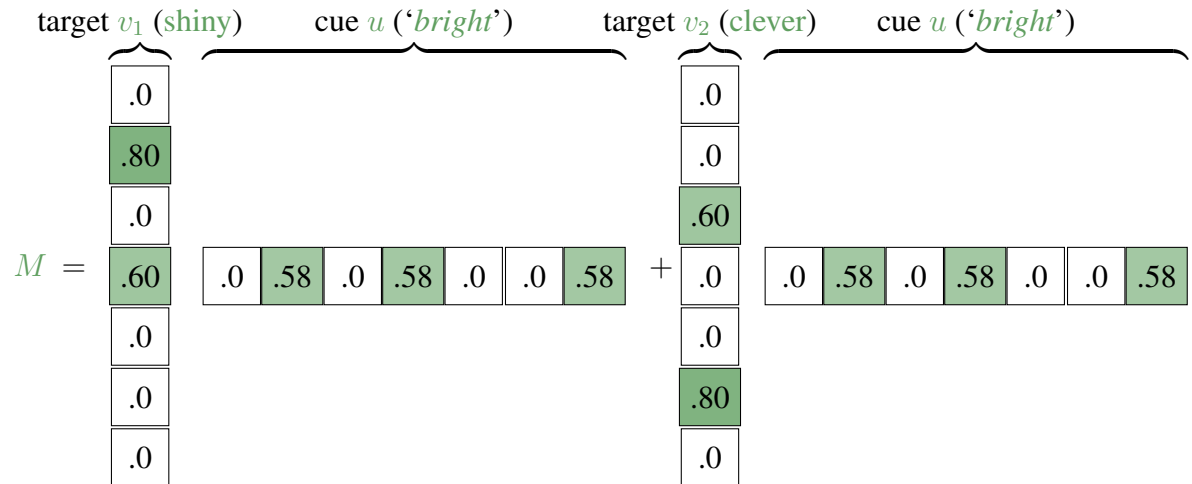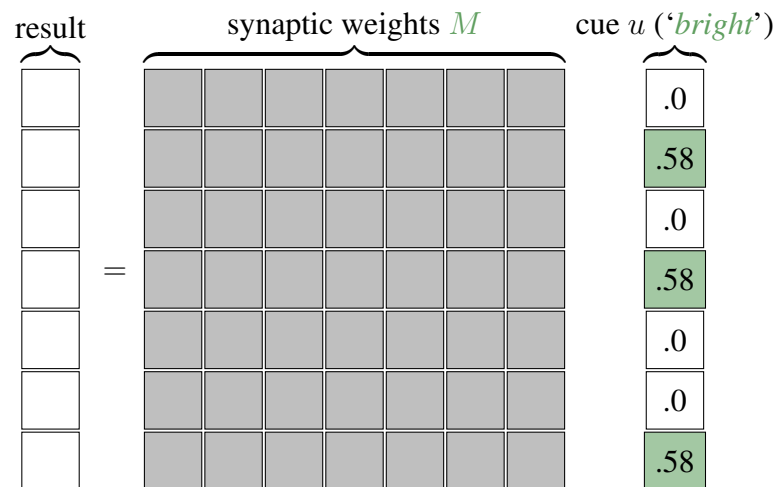# LING3701/PSYCH3371: Problem Set 3
Due via Carmen dropbox at 11:59 PM 6/23.

1. (a) [7 pts.] If associative memory M is made from one cue u and two targets v_1 and v_2:

target v_1 (shiny)   cue u ('*bright*')   target v_2 (clever)   cue u ('*bright*')

M =

.0						
.80						
.0						
.60	.0	.58	.0	.58	.0	.0	.58
.0						
.0						
.0						

+

.0						
.0						
.60						
.0	.0	.58	.0	.58	.0	.0	.58
.0						
.80						
.0						

what is the result of cueing M with u? (HINT: You don't need to calculate the matrix!)

result   synaptic weights M cue u ('*bright*')

cue values:
.0
.58
.0
.58
.0
.0
.58

(b) [3 pts.] Describe the result in terms of v_1 and v_2.

2. (a) [7 pts.] If associative memory M is made from cues u_1 and u_2 and targets v_1 and v_2:

target v_1 (light)   cue u_1 (shiny)   target v_2 (student)   cue u_2 (clever)

$$M = \begin{bmatrix} .0 \\ .80 \\ .60 \\ .0 \\ .0 \\ .0 \\ .0 \end{bmatrix} \begin{bmatrix} .0 & .80 & .0 & .60 & .0 & .0 & .0 \end{bmatrix} + \begin{bmatrix} .0 \\ .0 \\ .0 \\ .60 \\ .0 \\ .80 \\ .0 \end{bmatrix} \begin{bmatrix} .0 & .0 & .60 & .0 & .0 & .80 & .0 \end{bmatrix}$$

what results from cueing M with a mixture of $.3u_1 + .7u_2$? (You needn't calculate the matrix!)

result   synaptic weights M $.3u_1 + .7u_2$ combined cue

$$\begin{bmatrix} \ \\ \ \\ \ \\ \ \\ \ \\ \ \\ \ \end{bmatrix} = \begin{bmatrix} & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \end{bmatrix} \begin{bmatrix} .0 \\ .24 \\ .42 \\ .18 \\ .0 \\ .56 \\ .0 \end{bmatrix}$$

(b) [3 pts.] Describe the result in terms of v_1 and v_2.

3. (a) [7 pts.] If a filter F is made from auto-associated vectors v_1 and v_3 (NOTE variable names!):

v_1 (light) v_1 (light) v_3 (flight) v_3 (flight)

$$F = \begin{bmatrix} .0 \\ .80 \\ .60 \\ .0 \\ .0 \\ .0 \\ .0 \end{bmatrix} \begin{bmatrix} .0 & .80 & .60 & .0 & .0 & .0 & .0 \end{bmatrix} + \begin{bmatrix} .58 \\ .0 \\ .0 \\ .0 \\ .58 \\ .58 \\ .0 \end{bmatrix} \begin{bmatrix} .58 & .0 & .0 & .0 & .58 & .58 & .0 \end{bmatrix}$$

what is the result of cueing F with a mixture of $.2v_1 + .8v_2$? (You needn't calculate the matrix!)

result   filter F $.2v_1 + .8v_2$ combined cue

$$\begin{bmatrix} \ \\ \ \\ \ \\ \ \\ \ \\ \ \\ \ \end{bmatrix} = \begin{bmatrix} & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \end{bmatrix} \begin{bmatrix} .0 \\ .16 \\ .12 \\ .64 \\ .0 \\ .0 \\ .48 \end{bmatrix}$$

(b) [3 pts.] Describe the result in terms of v_1, v_2 and v_3.

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