Pure Condition

In the pure condition, there was no need for task representation unit since the task is based on simple stimulus-response association without the need for task selection. Instead, top-down input is directly sent to the Yes and No responses without the mediation of task representation. The optimal strategy in the pure condition is indeed to rely on PS-RO association, without the need for top-down input. However without top-down input, selection of response is generally slow. Furthermore, participants in the behavioural experiments make both commission and omission errors, suggesting that responses may be influenced by top-down attention. Our task instruction was to make a positive response to the target, hence it is assumed that the participants are preconditioned to making a positive response as quickly as possible, having a greater top-down bias towards the Yes RO node. This bias, however, only comes into effect intermittently. The stronger asymmetric input to the RO yes node facilitates the RT on the target-positive trials, however this asymmetry can have a negative effect on the target-negative trial and result in commission error. Adult network may be more aware of the optimal PS-RO strategy and may strategically limit their top-down attentional bias. Younger children, however, showed biases towards making positive responses, as exhibited in their tendency in making commission errors. However, younger networks do not modulate their attententional update based on risk assessment of commission errors and may deploy top-down attention often even when it is not called for in the situation.

Weaker the update netinput more susceptible to noise

Biselection trials: The strong weights in adult network means that the on TA does not have time to degrade, consequently TA remains high (updating TA is not the best strategy). As a consequence, consistent application of inhibitory control is required to perform the task.

Update frequency matters a lot to biselection trials. If the update is too frequent (maintaining the TA at high level), there is a danger to be predisposed to Yes response on the target-absent trials. However, if a sufficient level of TA level is not maintained, there is a danger to process information in a bottom-up manner and commit omission errros on biselection trials (e.g. choosing the No response if the distractor is visual).

Selective Attention: On biselection trials, competition between Yes and No RO nodes is often the strongest since both RO nodes receive positive input from the PS units. The inhibitory connection between TA and RO decreases the activation of the competing PS units quickly, and therefore widening the gap between the RO units.

Asymmetric inhibition (stronger from Yes to No): Asymmetric inhibition on single target trials generally incur no accuracy cost when the TA activation is moderate, since the information from PS only activates one RO unit therefore there is little competition between RO units. However, the asymmetric inhibition is facilitative when the

Boundary separation between pure trials, repetition trials and switch trials.