

Closing The Loop On Developmental Dynamics

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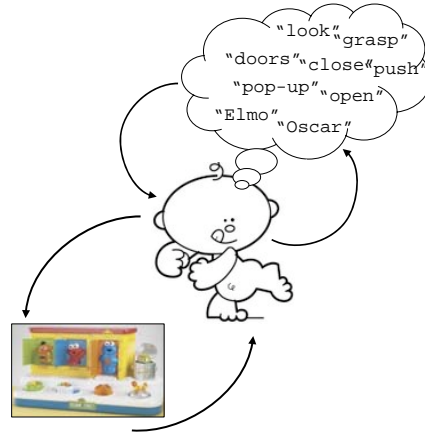
How Do Infants Acquire Knowledge?



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Closed Loop Developmental Dynamics



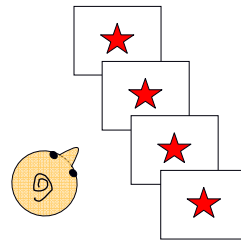
Simplifying The Task Space



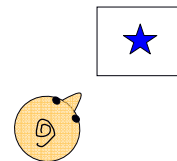
Simplification →

Habituation Phase

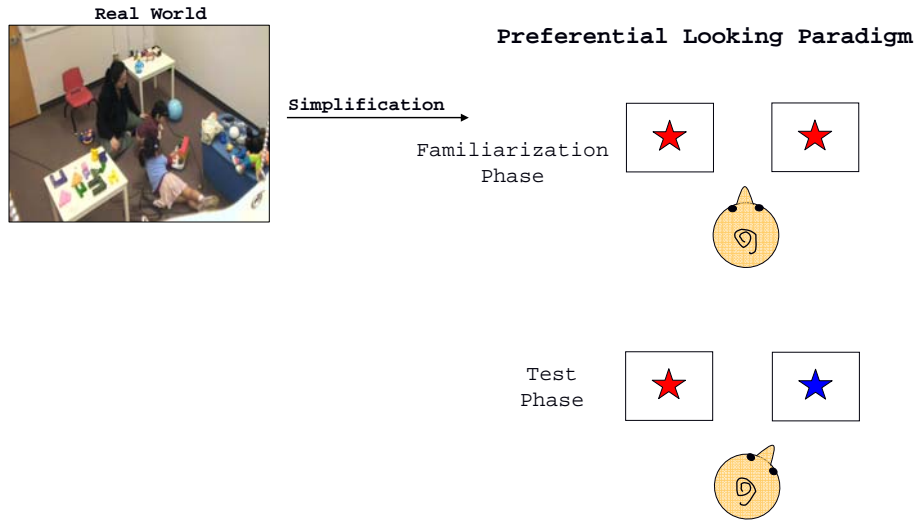
Habituation Paradigm



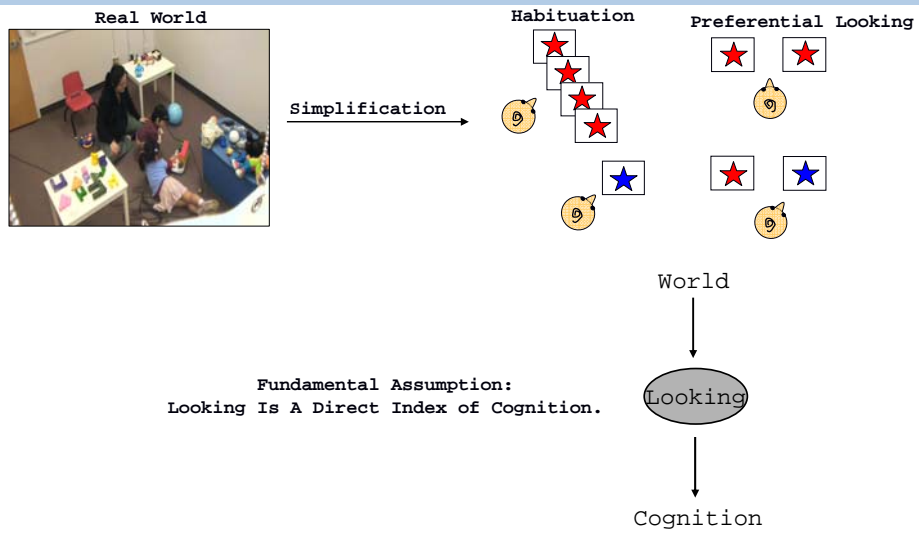
Test Phase



Simplifying The Task Space



Is Looking A Window Onto Cognition?

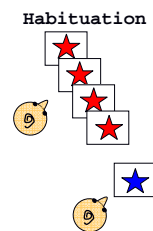


Looking In A Closed Loop



Is Looking Active and Dynamic In The Laboratory?

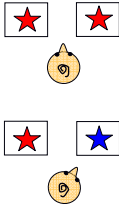
Looking In A Closed Loop: Habituation



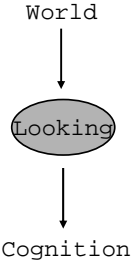
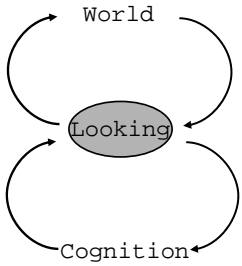
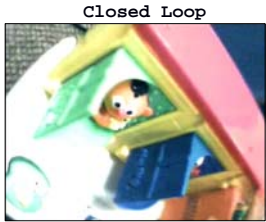
Looking In A Closed Loop: Preferential Looking



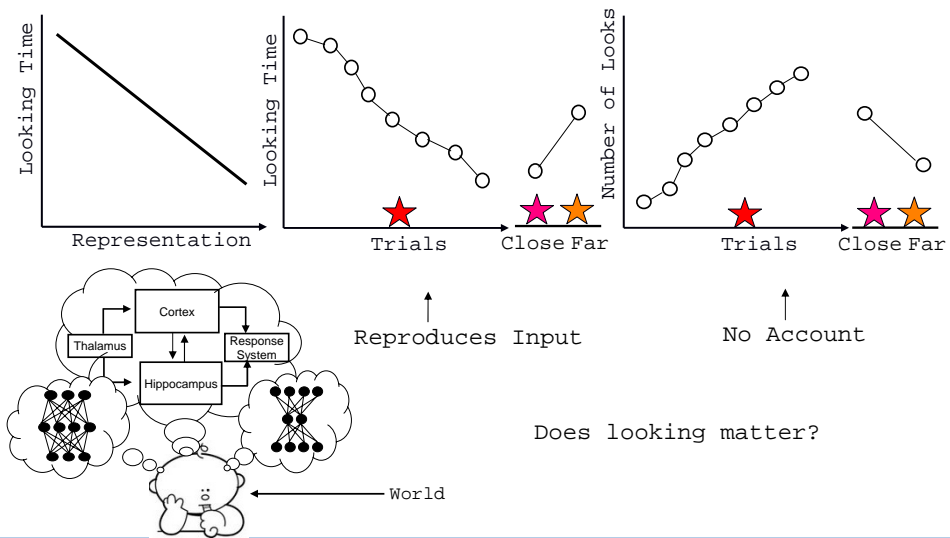
Preferential Looking



Looking In A Closed Loop

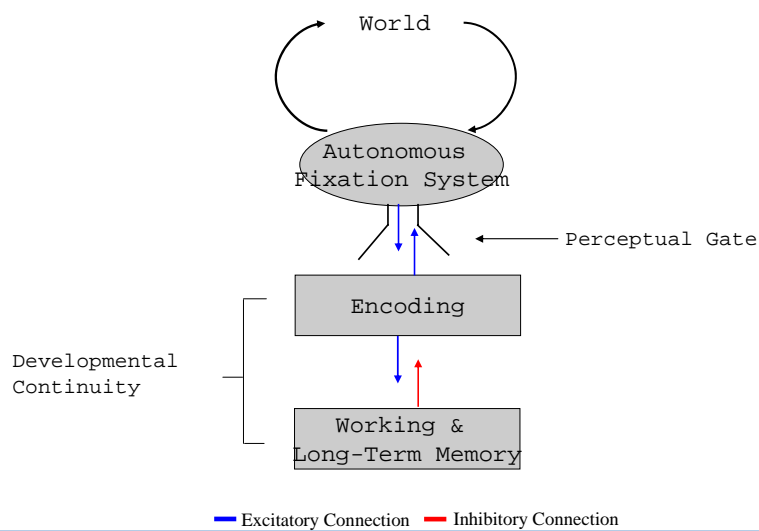


The Story of Infant Habituation

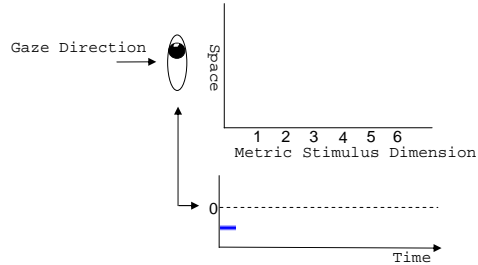


(French, Mareschal, Mermillod, & Quinn, 2004; Sirios & Mareschal, 2002; Westermen & Mareschal, 2004)

Building a Closed Loop System



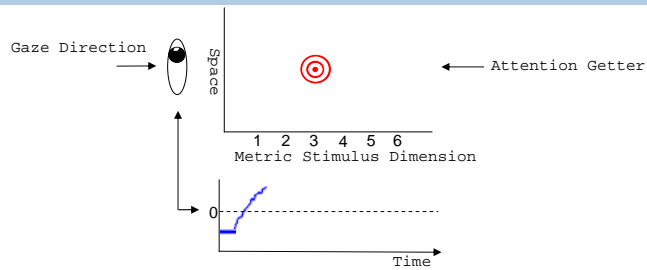
Building a Closed Loop System



— Excitatory Connection — Inhibitory Connection

Perone & Spencer, in prep

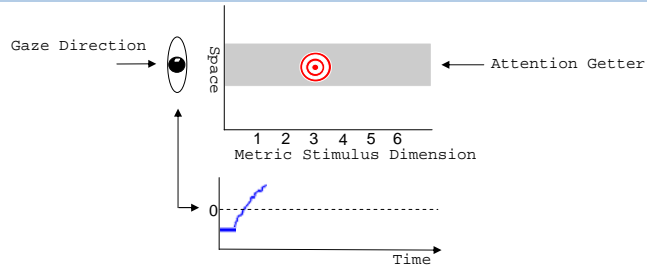
Building a Closed Loop System



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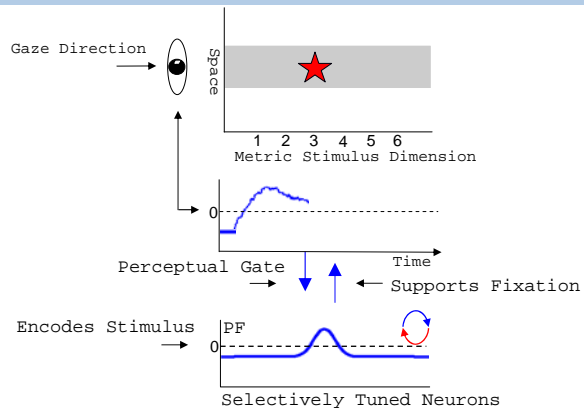
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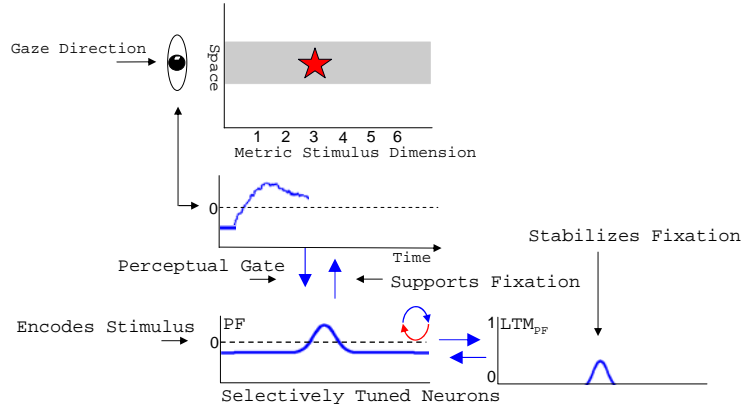
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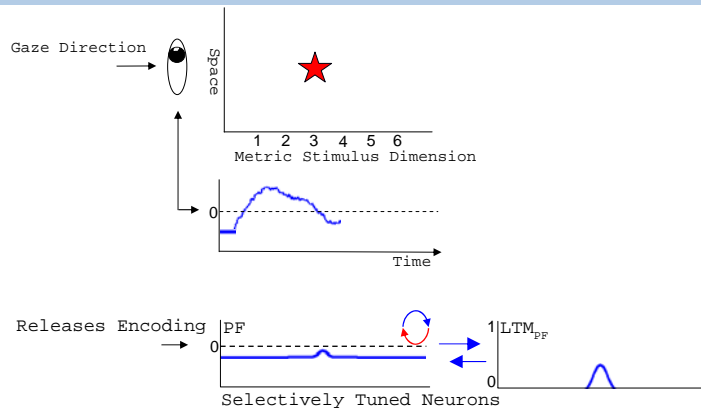
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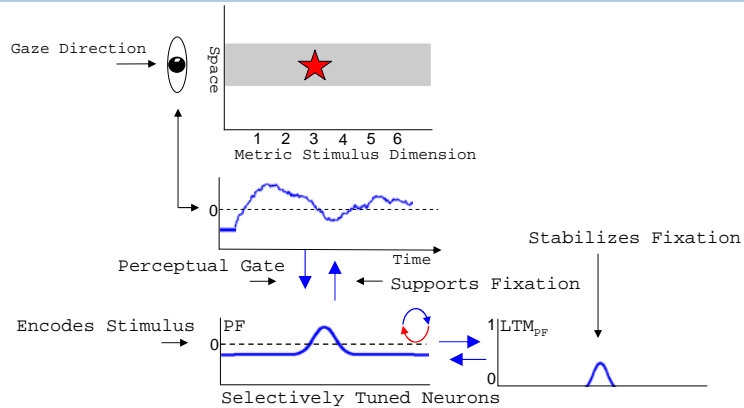
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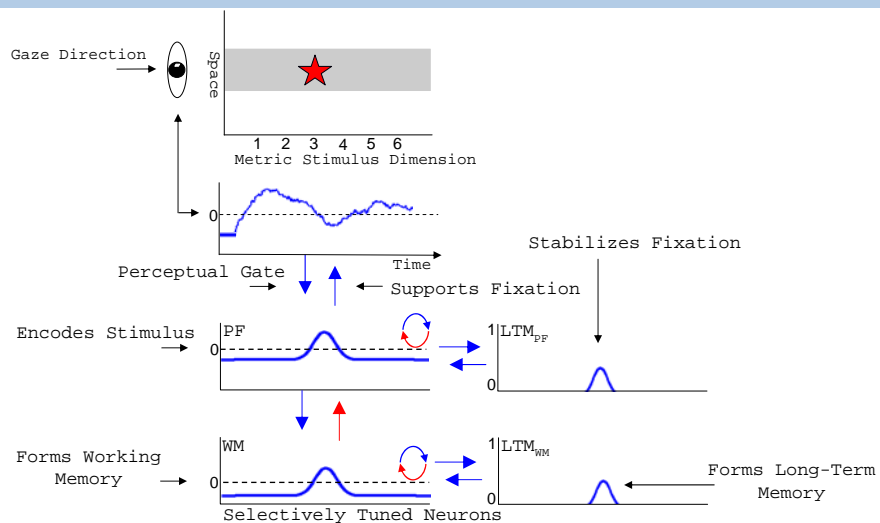
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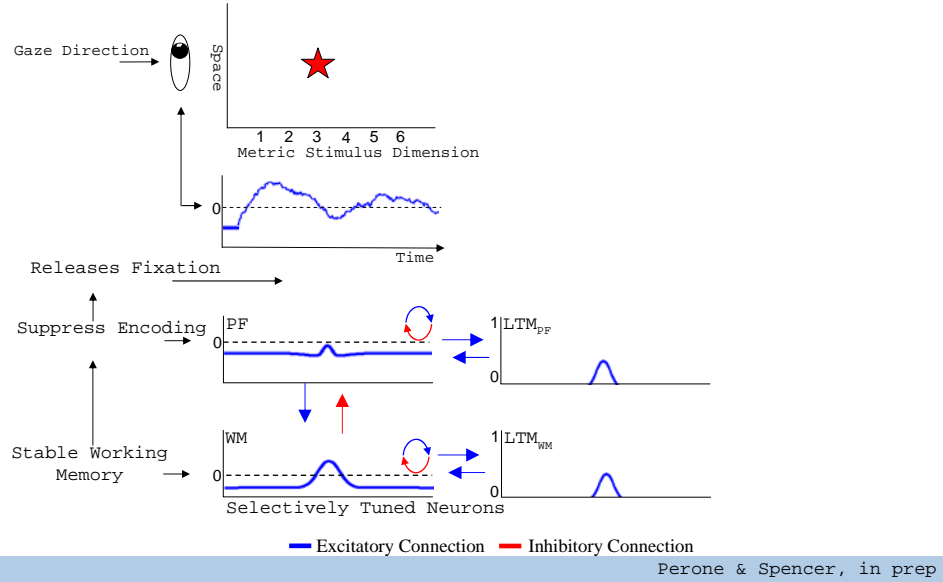
Building a Closed Loop System



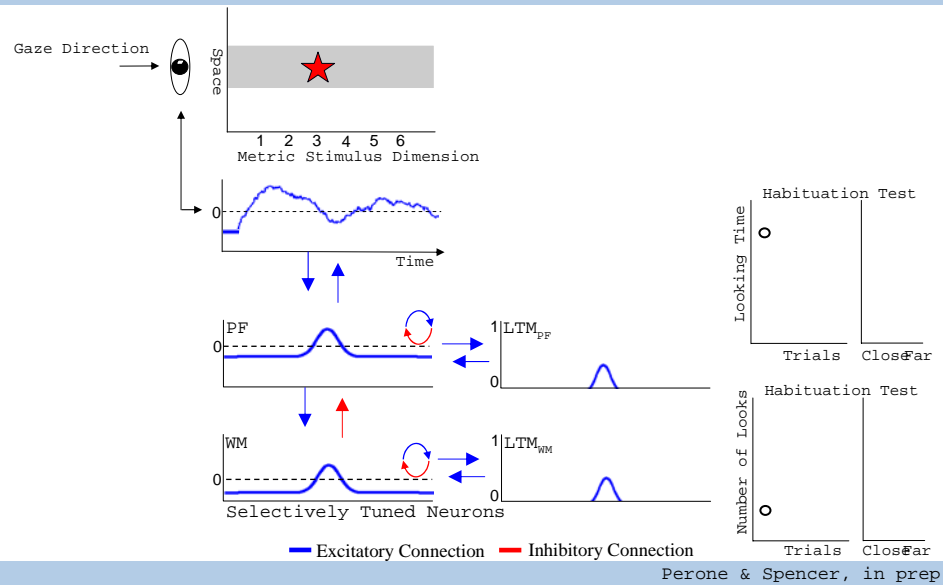
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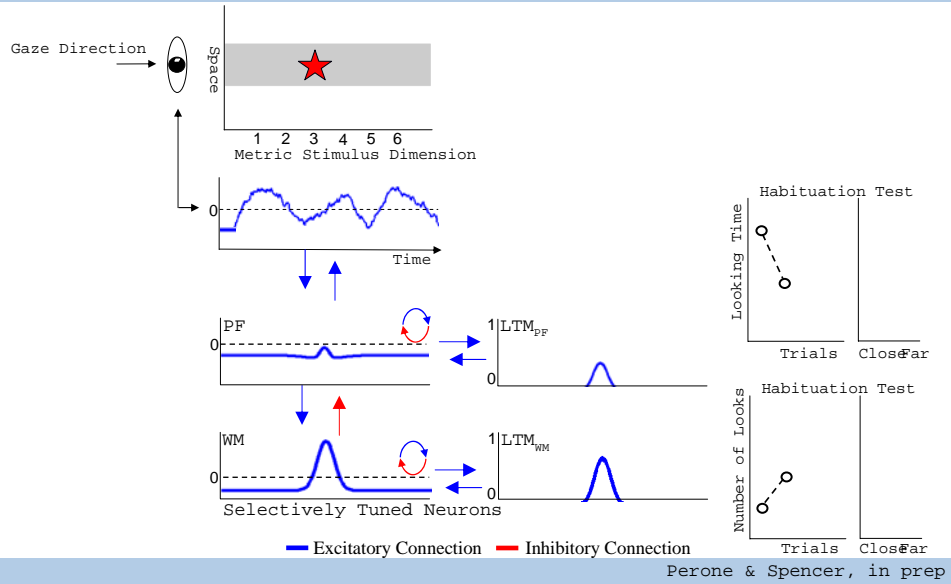
Building a Closed Loop System



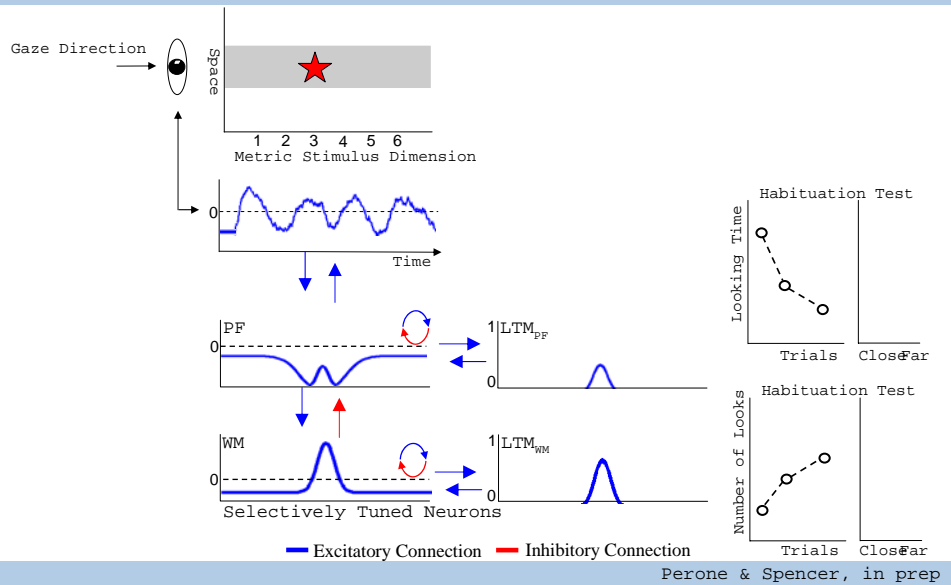
Learning In Closed Loop System



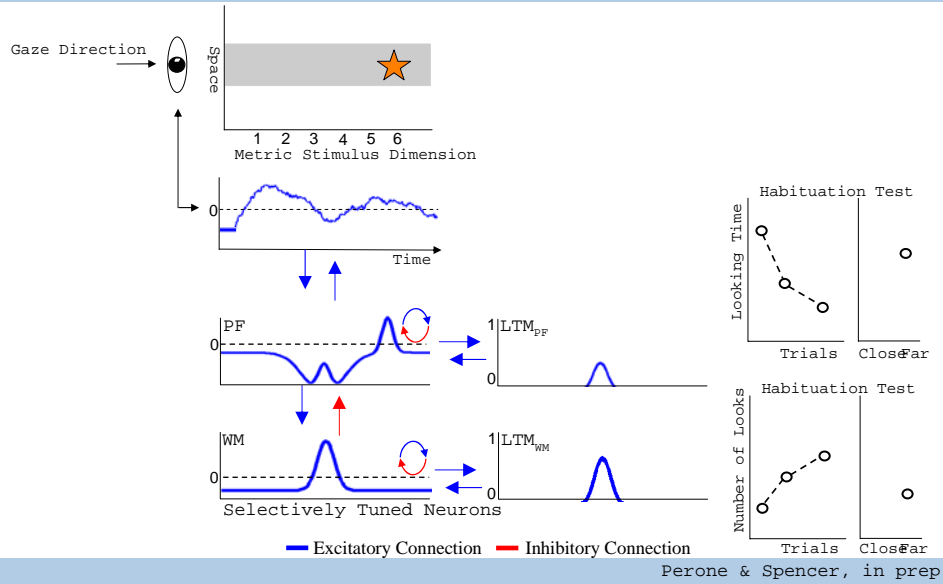
Learning In Closed Loop System



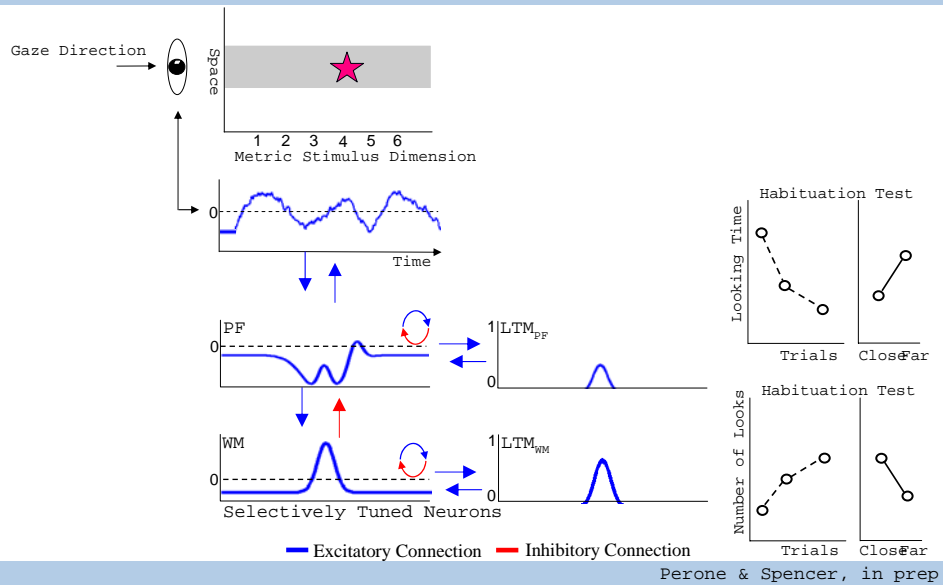
Learning In Closed Loop System



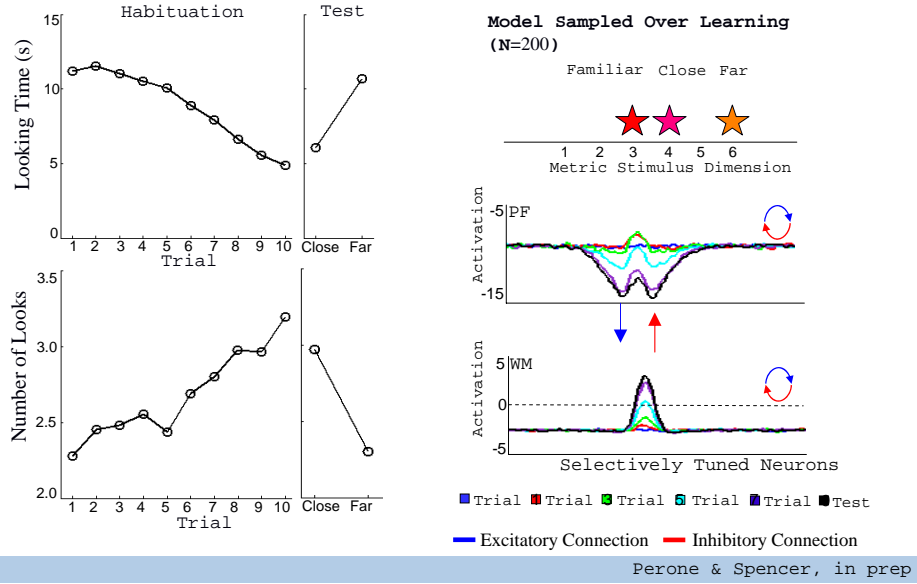
Learning In Closed Loop System



Learning In Closed Loop System

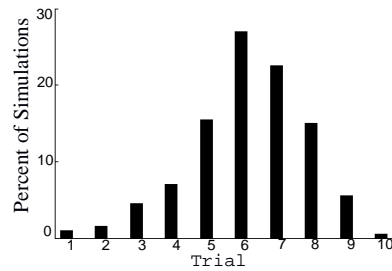


Learning In Closed Loop System



Emergent Individual Differences

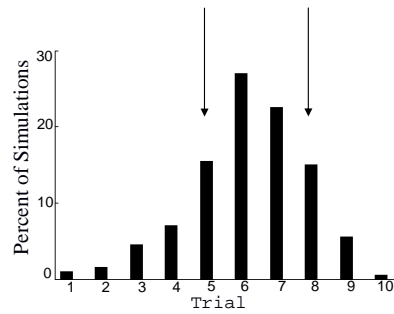
Trial of Stable Working Memory Formation



A Clue That Looking Matters...

Emergent Individual Differences

Trial of Stable Working Memory Formation

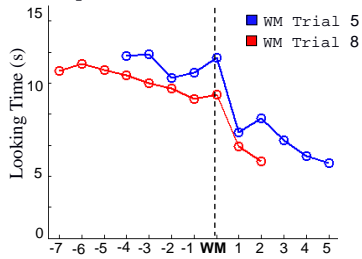


A Clue That Looking Matters...

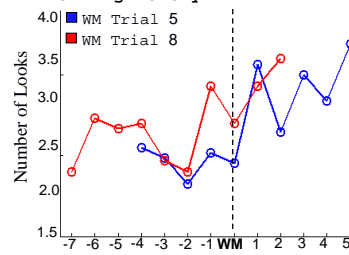
Perone & Spencer, in prep

Emergent Individual Differences

Looking Before and After Working Memory



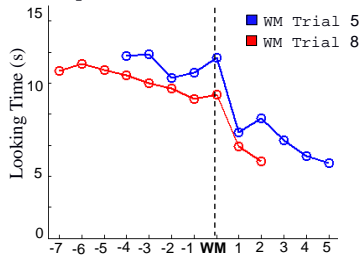
Looks Before and After Working Memory



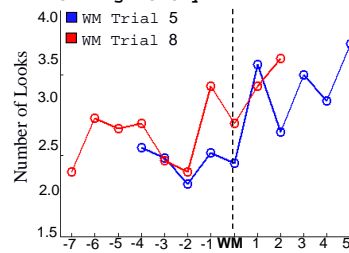
Perone & Spencer, in prep

Emergent Individual Differences

Looking Before and After Working Memory



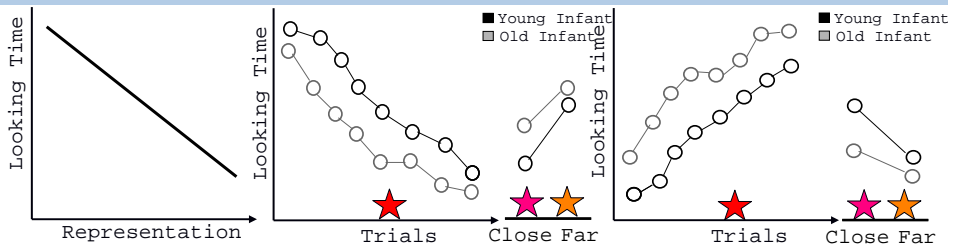
Looks Before and After Working Memory



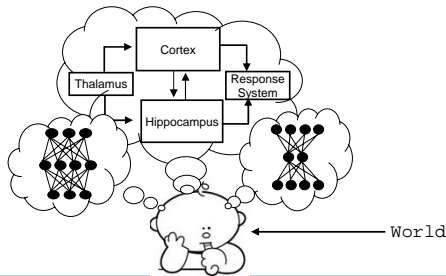
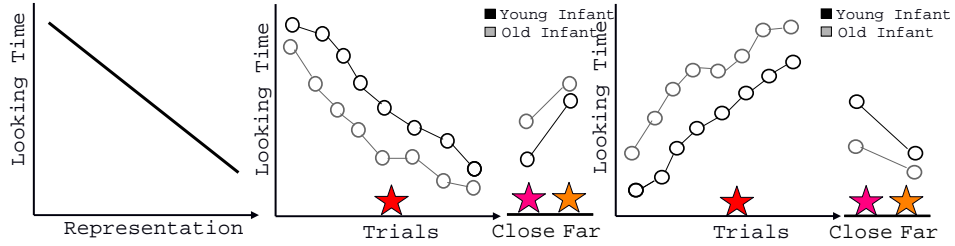
Emergent Individual Differences In Looking Have An Effect On Learning.

Perone & Spencer, in prep

What About Development?



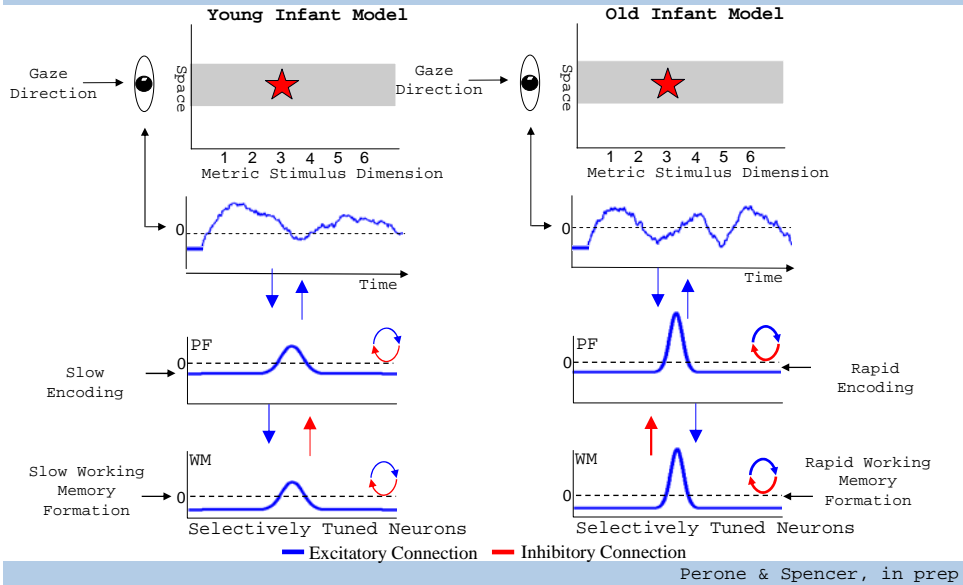
What About Development?



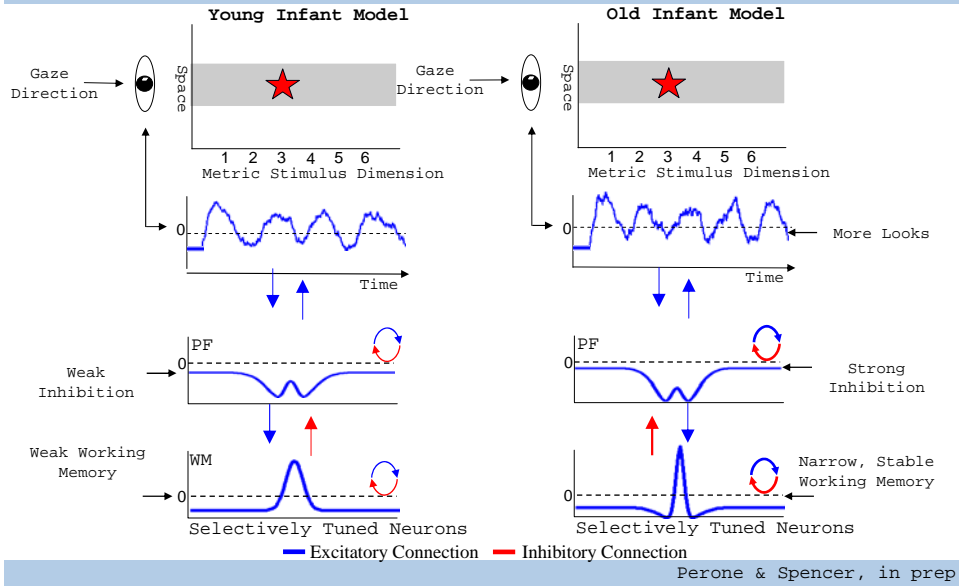
1. Cannot capture looks.
2. Captures precision "by hand."

(French, Mareschal, Mermillod, & Quinn, 2004; Sirios & Mareschal, 2002; Westermen & Mareschal, 2004)

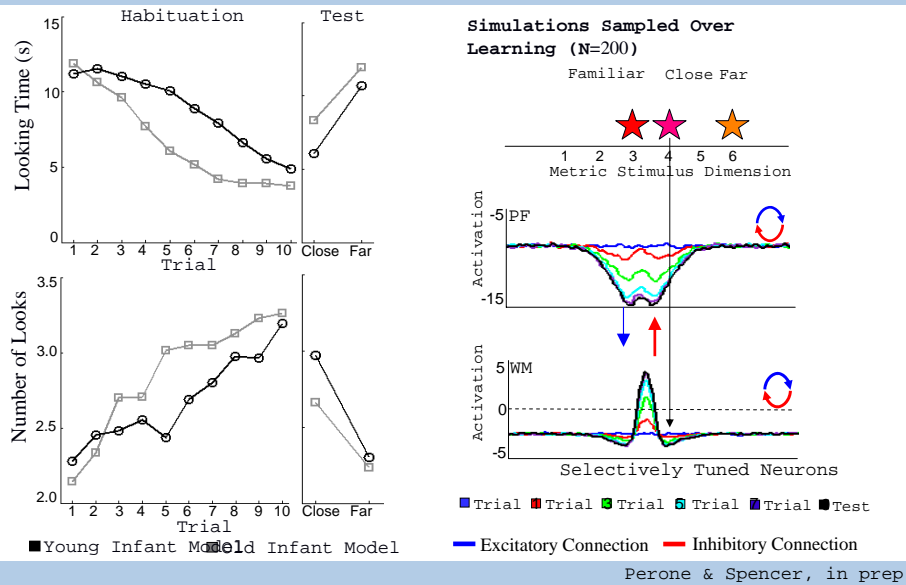
Developmental Dynamics: Early In Learning



Developmental Dynamics: Late In Learning

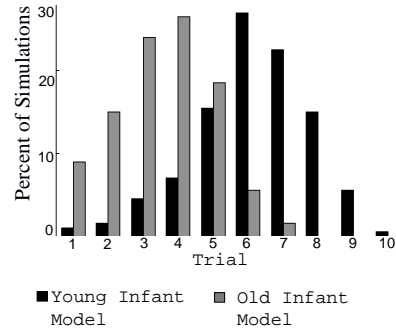


Enhanced Representational Precision



Faster Processing Speed

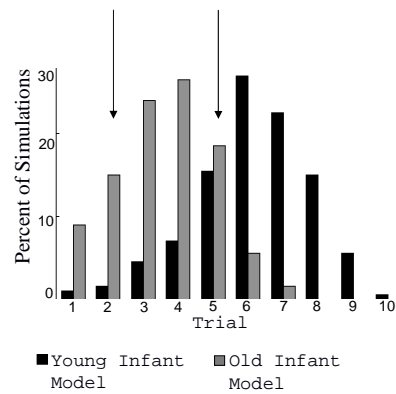
Trial of Stable Working Memory Formation



Perone & Spencer, in prep

Faster Processing Speed

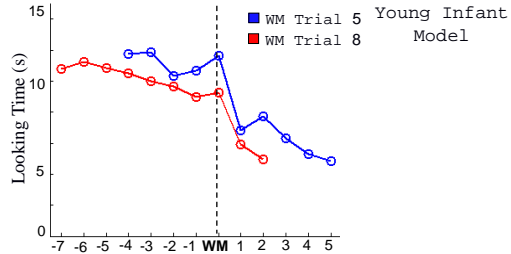
Trial of Stable Working Memory Formation



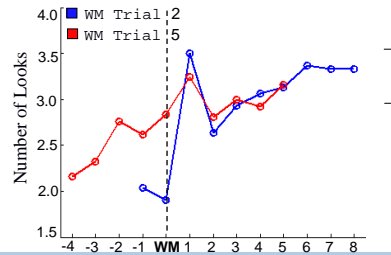
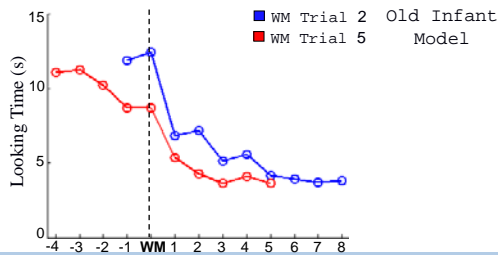
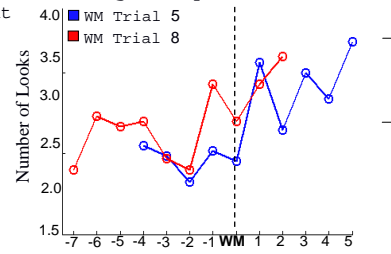
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Enhanced Stability

Looking Before and After Working Memory



Looks Before and After Working Memory



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Habituation Summary

Closed Loop



Habituation



1. Dynamic Neural Field model captures the stability of basic cognitive processes involved in infant visual exploration in the habituation paradigm.
2. Single stochastic, autonomous system produces individual differences in looking, memory formation, and learning that emerge as system looks about the task space.
3. A simple developmental hypothesis lead to the emergence of enhanced representational precision, faster processing speed, and stability of the link between looking and learning.