

Dual-process accounts of learning

Singapore – June 2009

Two accounts

- Rational inference
- Surprise-driven learning
- Both can account for many phenomena
- Competing theoretical accounts, or complementary mental processes?

Blocking

Tuna -> Allergy

Tuna & Carrots -> Allergy

Carrots?

versus

Dates -> Allergy

Tuna & Carrots -> Allergy

Carrots?

- Rational inference account

- Surprise-driven learning account

- Rational inference account

Unblocking

- Surprise-driven learning account

A->1,2 then AB->1,3

Versus

A->1,2 then AB->1,2

B->3?

“direct”

unblocking

B->1?

“indirect”

unblocking

Trial-by-trial vs. questionnaires

- Trial-by-trial
 - Blocking
 - Direct unblocking
 - Indirect unblocking
 - Questionnaires
 - Blocking
 - Direct unblocking
 - ...but no indirect unblocking
- Rational inference account
 - Surprise-driven learning account

The two procedures are very different

- Our guess is that one critical factor is memory load – quite high in trial-by-trial, very low in questionnaire.
- Let's manipulate memory load whilst leaving everything else the same.

This morning's experiment

- Two conditions – HML and LML
- Phases 1 and 2 are identical
 - Phase 1 single cues e.g. A->1,3
 - Phase 2 compound cues e.g. AB->1,4
- Phase 3 has a “questionnaire” format in both conditions but...

LML

$\alpha \rightarrow 1,3$ then $QR \rightarrow 1,3$
 $\beta \rightarrow 1,4$ then $ST \rightarrow 1,4$
 $\gamma \rightarrow 2,3$ then $UV \rightarrow 2,3$
 $\delta \rightarrow 2,4$ then $WX \rightarrow 2,4$

$A \rightarrow 1,3$ then $AB \rightarrow 1,3$
 $C \rightarrow 1,4$ then $CD \rightarrow 1,4$
 $E \rightarrow 2,3$ then $EF \rightarrow 2,3$
 $G \rightarrow 2,4$ then $GH \rightarrow 2,4$

$I \rightarrow 1,3$ then $IJ \rightarrow 1,4$
 $K \rightarrow 1,4$ then $KL \rightarrow 1,3$
 $M \rightarrow 2,3$ then $MN \rightarrow 2,4$
 $O \rightarrow 2,4$ then $OP \rightarrow 2,3$

HML

$A \rightarrow 1,3$ then $QR \rightarrow 1,3$
 $C \rightarrow 1,4$ then $ST \rightarrow 1,4$
 $E \rightarrow 2,3$ then $UV \rightarrow 2,3$
 $G \rightarrow 2,4$ then $WX \rightarrow 2,4$

$I \rightarrow 1,3$ then $AB \rightarrow 1,3$
 $K \rightarrow 1,4$ then $CD \rightarrow 1,4$
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Randomization - HML

