Irrelevant Information in Working Memory

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Irrelevant Information in Working Memory

- What's the fate of irrelevant information in WM?
- Removal? Deactivation

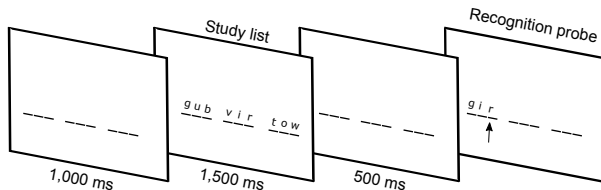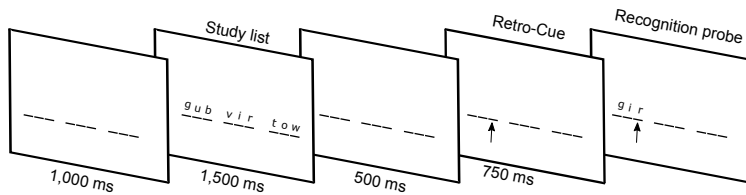- Familiarity (activation of representations) and recollection (bindings)

Series of Experiments

Participants

- Thirty participants (25 women, mean age $= 24.2$ years)
- One 1h session

Procedure

Stimuli

- IV: Probe Type, Context Type, Cue Type
- CVC Pool: 571 items

- BAC DEF GIH
- Second Letter - A - is Cued

Probe / Context	Intact	Swap	Novel
Match	BAC	GAH	KAP
Intrusion	BEC	GEH	KEP
New	BOC	GOH	KOP

Design

- 432 Trials; 18 in the smallest cell
- Distribution of conditions:

Probe / Context	Intact	Swap	Novel
Match	.08	.08	.08
Intrusion	.04	.04	.04
New	.04	.04	.04

Preprocessing of data

- Trials with RT 4 SD above or below the mean were excluded (individualized, per cue condition)
- Trials with RT below 100 ms were also discarded
- 3.2% (1.78% if cutoff at 3s)
- Participants 14 and 22 were excluded due to guessing
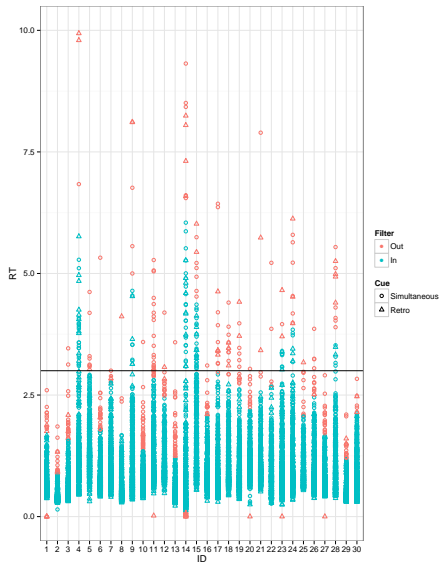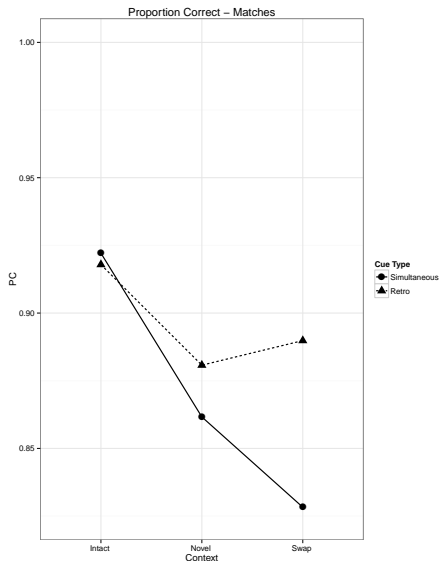
Match Probe PC

Effect	BF vs. ME
CX + ID	0.1
CUE + ID	$5 * 10^{-6}$
CX + CUE + ID	1
CX + CUE + CX:CUE + ID	3.1

Effect	df	F	p
CX	1.8, 47.3	16.7	<.0001
CUE	1, 27	6.2	.02
CX:CUE	1.9, 50.1	7.1	.003

CX = Context
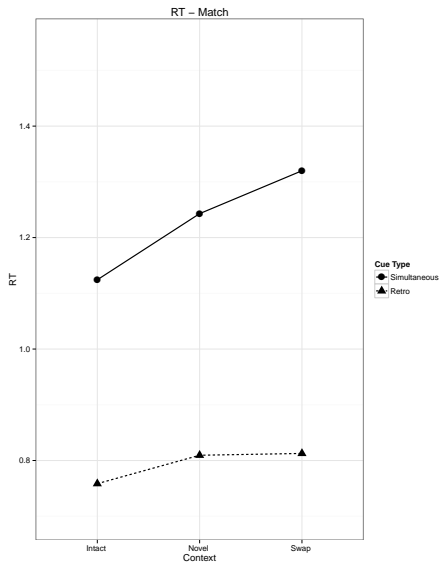

Proportion Correct – Matches
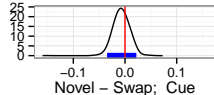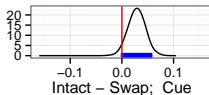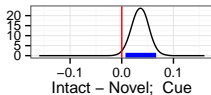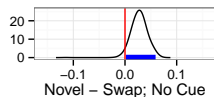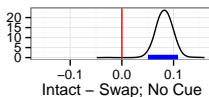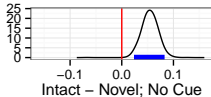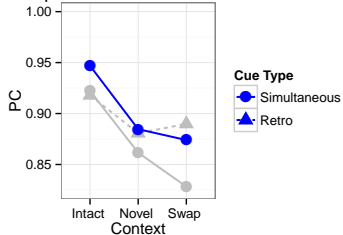
Match Probe PC

Match Probe RT

Effect	BF versus ME
CX + ID	$8 * 10^{-339}$
CUE + ID	$3 * 10^{-329}$
CX + CUE + ID	1
CX + CUE + CX:CUE + ID	64121

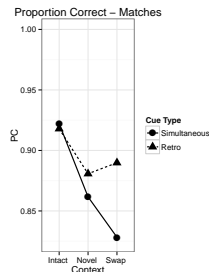| Effect	df	F	p
CX	1.7, 46.8	28.2	$< .0001$
CUE	1, 27	454.7	$< .0001$
CX:CUE	1.5, 40.5	20.4	$< .0001$

Match Probes RT
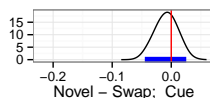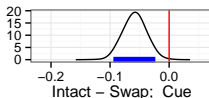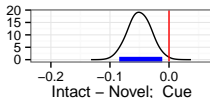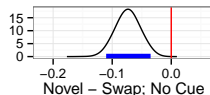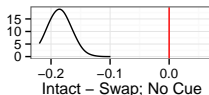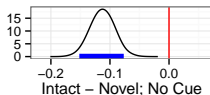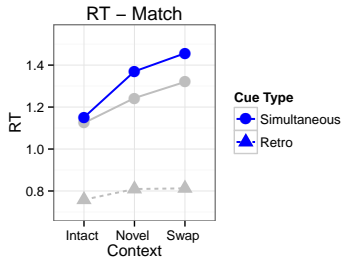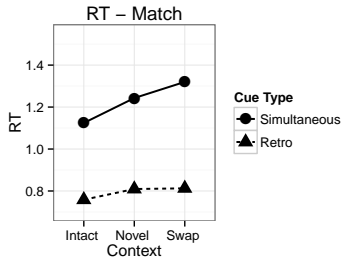
Match Probe Summary
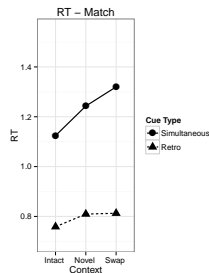
Simultaneous Cue

- Benefit for intact context
- Cost for swap in comparison to novel context
- Similarity to memory probe that requires rejection
- Context is not a familiarity process

Retro Cue

- Intact context benefits performance does not vanish
- Cost for swap context vanishes with a retro-cue
- Consistent with the idea of a deactivation of uncued triplets

Negative Probes PC

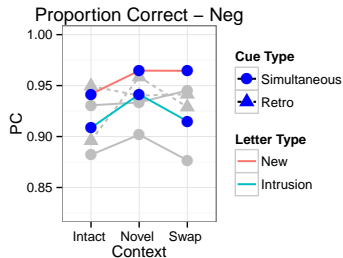| Effect	BF versus ME
LT + CUE + ID	0.1
LT + CX + CUE + LT:CUE + ID	0.1
LT + CX + LT:CX + CUE + ID	0.8
LT + CX + CUE + ID	1
LT + CX + LT:CX + CUE + ID	1.2
LT + CX + LT:CX + CUE + LT:CUE + ID	1.9

Effect	df	F	p
LT	1, 27	21.0	.0001
CX	1.9, 50.1	10.6	.0002
CUE	1, 27	5.0	.03
LT:CX	1.9, 51.9	2.5	.10
LT:CUE	1, 27	4.4	.05
CX:CUE	1.9, 52.4	0.5	62
LT:CX:CUE	1.9, 49.9	0.9	.40

LT = Letter Type (Intrusion, New)
CX = Context Type (Intact, Novel, Swap)

Proportion Correct – Neg
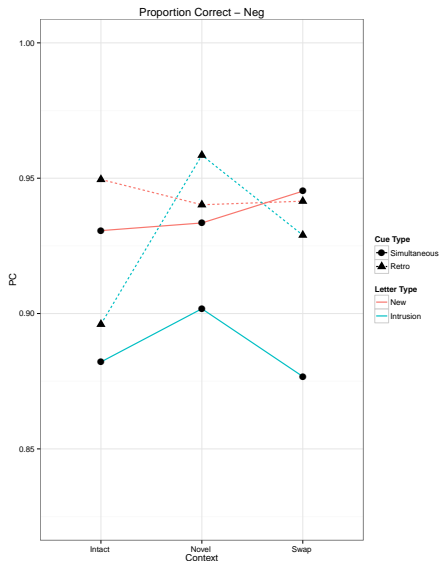
Negative Probes PC

Negative Probes RT

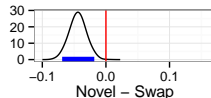| Effect	BF versus ME
LT + CX + + LT:CX + CUE + LT:CUE + ID	0.14
LT + CX + CUE + LT:CUE + CX:CUE + ID	0.14
LT + CUE + LT:CUE + ID	0.99
LT + CX + CUE + ID	1
LT + CX + CUE + LT:CUE + ID	24.2

Effect	df	F	p
LT	1, 27	48.1	<.0001
CX	2.0,52.9	9.3	.0004
CUE	1, 27	425.6	<.0001
LT:CX	2.0, 53.6	0.3	.75
LT:CUE	1, 27	8.3	.008
CX:CUE	2, 53.0	0.4	.67
LT:CX:CUE	2, 53.0	0.6	.57

LT = Letter Type (Intrusion, New)
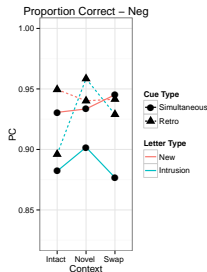CX = Context Type (Intact, Novel, Swap)
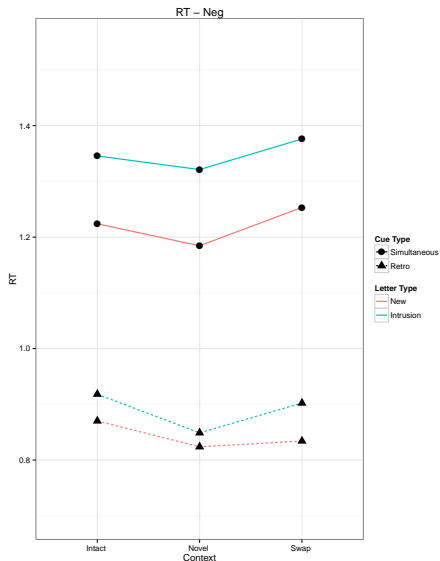
Negative Probes RT
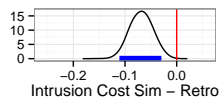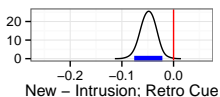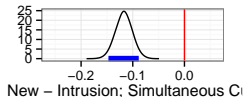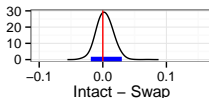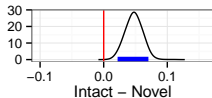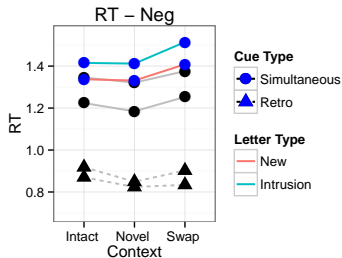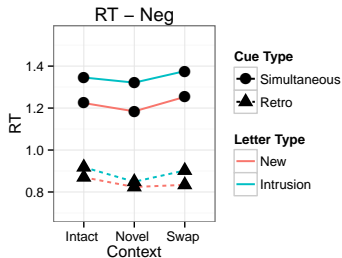
Negative Probes Summary

Simultaneous Cue

- Rejection benefit for novel context
- Low similarity to memory probes
- Accumulation of negative evidence

Retro Cue

- Reduction of intrusion costs: Deactivation of uncued triplet
- Swap context costs remain: No deactivation of uncued triplet
- For rejection RTs, this may be driven by the original Intrusion x Swap triplet.
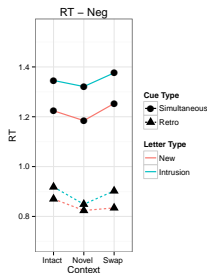
Shortcomings

- Removal and decay (protection) cannot be distinguished
- Retention interval of 500 ms is short

Future Directions

- Consider shortcomings: extend experiment
- Dual-Process model based on Oberauer & Lange (2009, Cognitive Psychology)
- Congruency benefit with retro-cue if no CVC are presented
- Mix Swap x Intrusion: Familiarity remains
- Visual stimuli: Object vs. feature removal

Overview; Discussion