

# The influence of symbolic generalisation on simulated slot machine choice

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# Traditional behavioural accounts of gambling

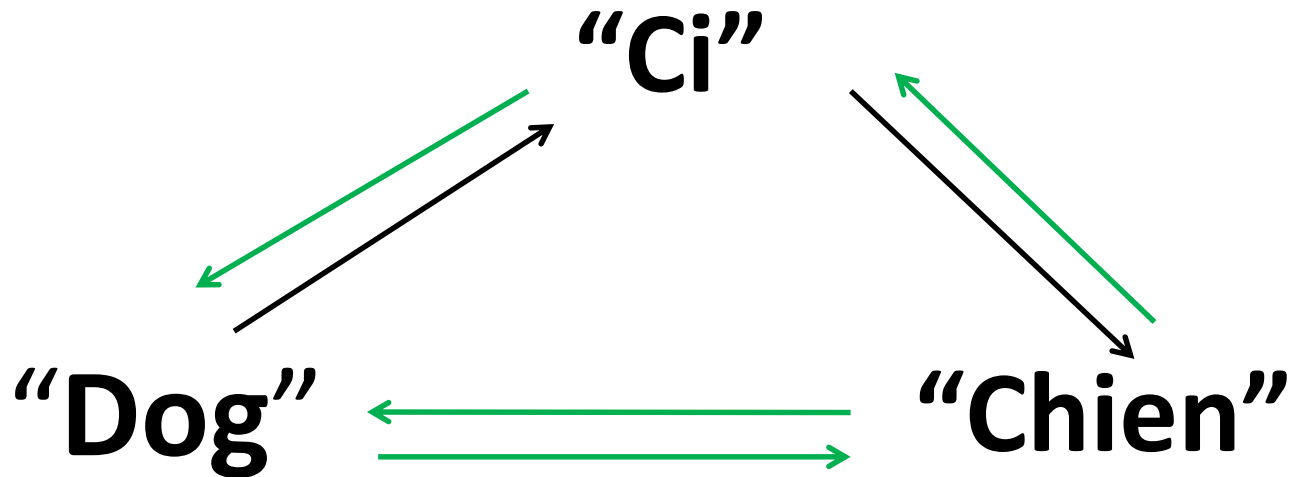
- Schedules of reinforcement are fundamental to gambling behaviour: Matching law
- Skinner (1971). Variable Ratio schedule is at the heart of gambling.
- Haw (2008); Weatherly et al (2009): Ps do not always prefer the slot with highest payout.
- Rule governed behaviour: schedules of reinforcement overridden by externally delivered rules
- Can schedules of reinforcement account for all aspects of gambling behaviour?
- How might verbal behaviour influence gambling?

# Contemporary behaviour analytic account of gambling

- Relational Frame Theory (RFT) – contemporary behaviour analytic account of language and cognition
- Explains how humans can learn in the absence of direct reinforcement, through the way we relate stimuli
- Relate things in non-arbitrary and arbitrary ways.

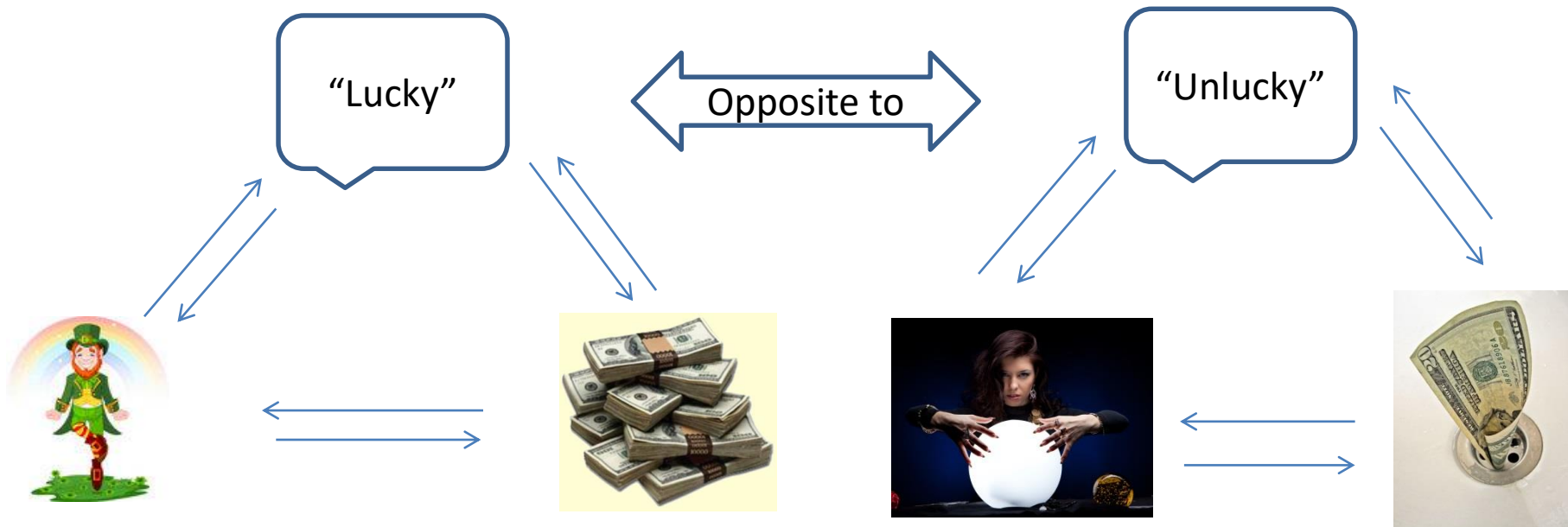
# Derived stimulus relations

- Relate stimuli to one another – any stimuli can become related (derived relational responding)



# Derived stimulus relations

- Relate stimuli to one another – any stimuli can become related (derived relational responding). Emergent relations have not been explicitly trained.



# Transformation of function

“When a given stimulus in a relational network has certain psychological functions, the functions of other events in that network may be modified in accordance with the underlying derived relation” (Hayes et al., 2001, p 31).



# Present experiment

- Could derived verbal rules be involved in slot machine choice?
- Could we experimentally manipulate to participants derive an 'arbitrary rule' with regard to structural characteristics of a slot machine, and influence slot machine choice?

# Overview

**Phases 1 & 2:  $A < B < C < D < E$**

**Phase 3:**

**Slot machine C**

0.2 payout probability

**Slot machine X**

0.8 payout probability

**Phase 4: Presented concurrent choice of all combinations of slot machine**



# Participants

- Participants:  $N = 88$ , aged 18 to 30 years ( $M = 21.33$ ,  $SD = 2.79$ ).
- Ps randomly assigned to one of four conditions:
  - Condition 1:  $E > D > C > B > A$
  - Condition 2:  $A > B > C > D > E$
  - Condition 3:  $A < B < C < D < E$
  - Condition 4:  $E < D < C < B < A$

# Non-arbitrary relational training

Less-than

You need the more trained to select on TO Your number correct 0

10

0

# Non-arbitrary relational training

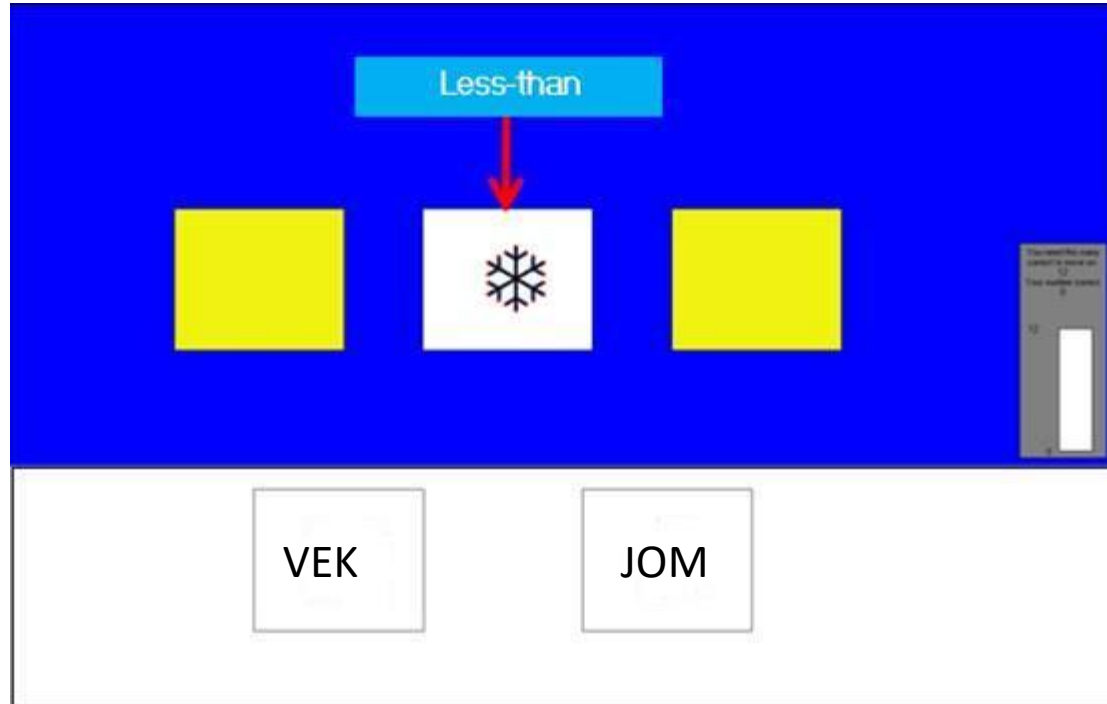
More-than

You need the money earned to reach up to 10. Your number correct is 1

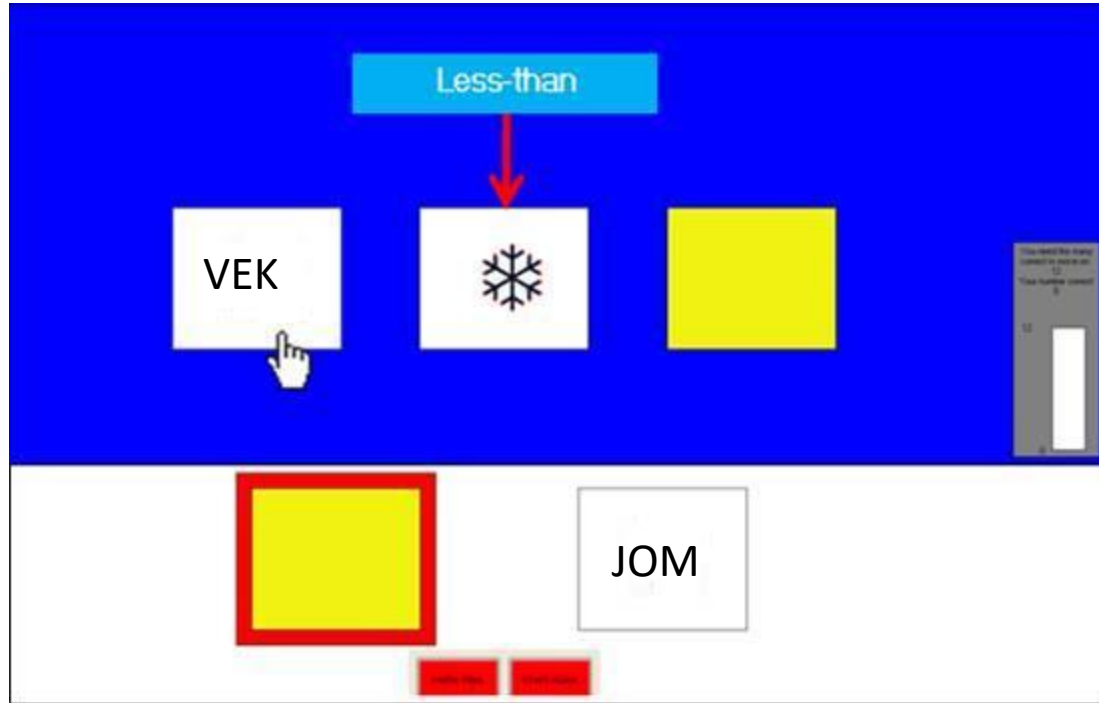
10

1

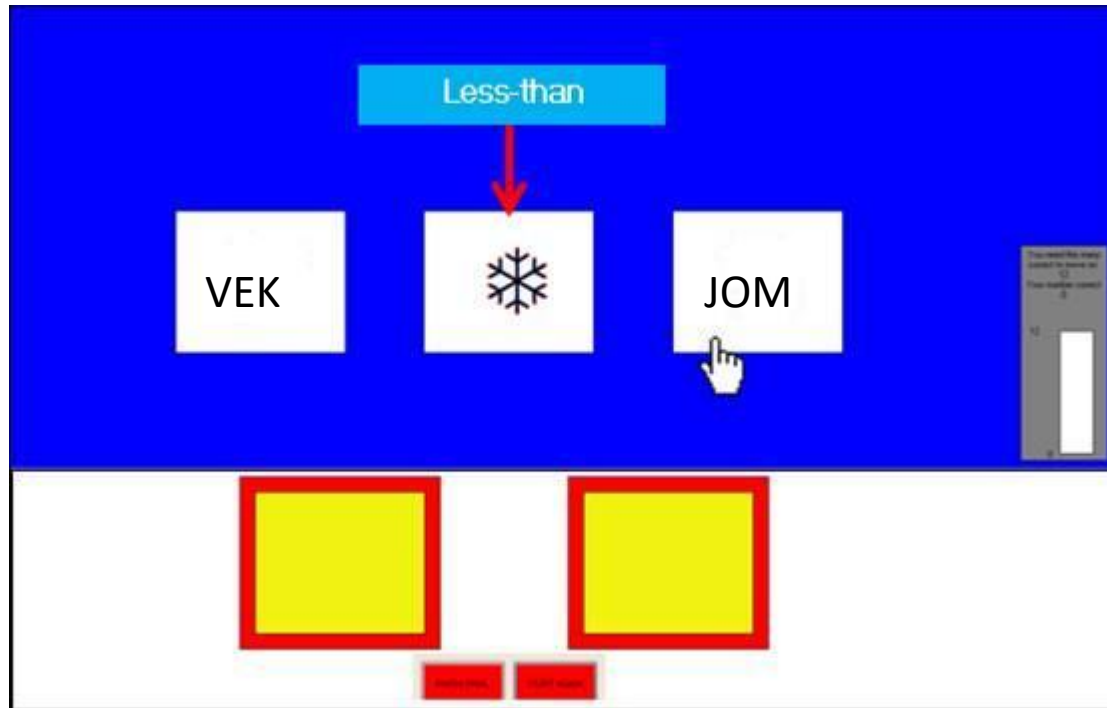
# Arbitrary relational training



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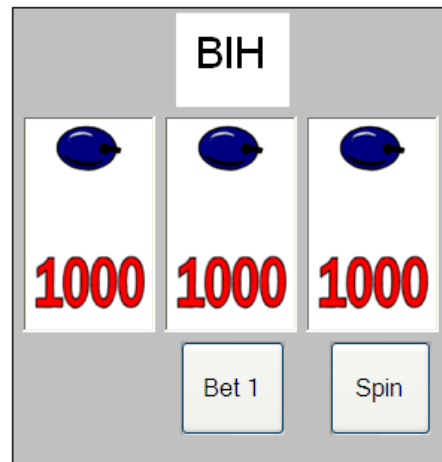
- $A < B < C < D < E$
- $VEK < JOM < BIH < CUG < PAF$

# Phase 2: Arbitrary training and testing

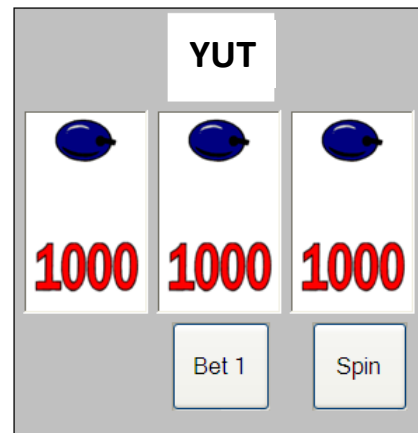
$$A < B < C < D < E$$

Trained Relations	$A < B$	$B < C$	$C < D$	$D < E$			
Mutually Entailed	$B > A$	$C > B$	$D > C$	$E > D$			
Combinatorially Entailed	$A < C$	$B < D$	$C < E$	$C > A$	$D > B$	$E > C$	
	$A < D$	$B < E$	$D > A$	$E > B$			

# Phase 3: Training discriminative slot machine functions



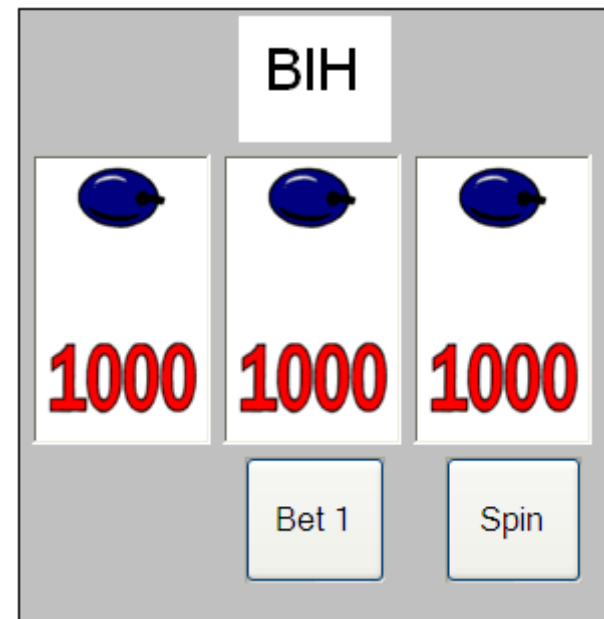
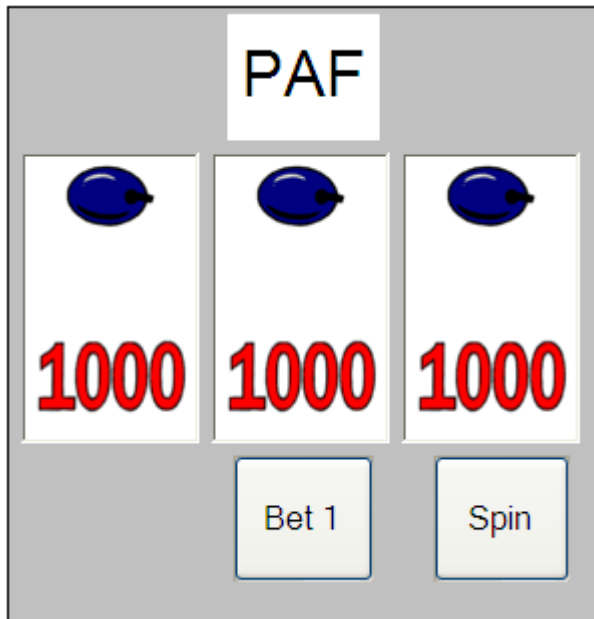
Slot machine C  
0.2 payout



Slot machine X  
0.8 payout



## Phase 4: Preference testing (Test for transformation of functions)



Concurrently presented with choice between two slot machines labelled with the nonsense words. All possible combinations presented four times.

# Phase 4: Test for transformation of functions

**A>B>C>D>E**

A	<b>B</b>	B	<b>C</b>	C	<b>D</b>	D	<b>E</b>	A	<b>X</b>
A	<b>C</b>	B	<b>D</b>	C	<b>E</b>	D	<b>X</b>		
A	<b>D</b>	B	<b>E</b>	C	<b>X</b>				
A	<b>E</b>	B	<b>X</b>						
A	<b>X</b>								

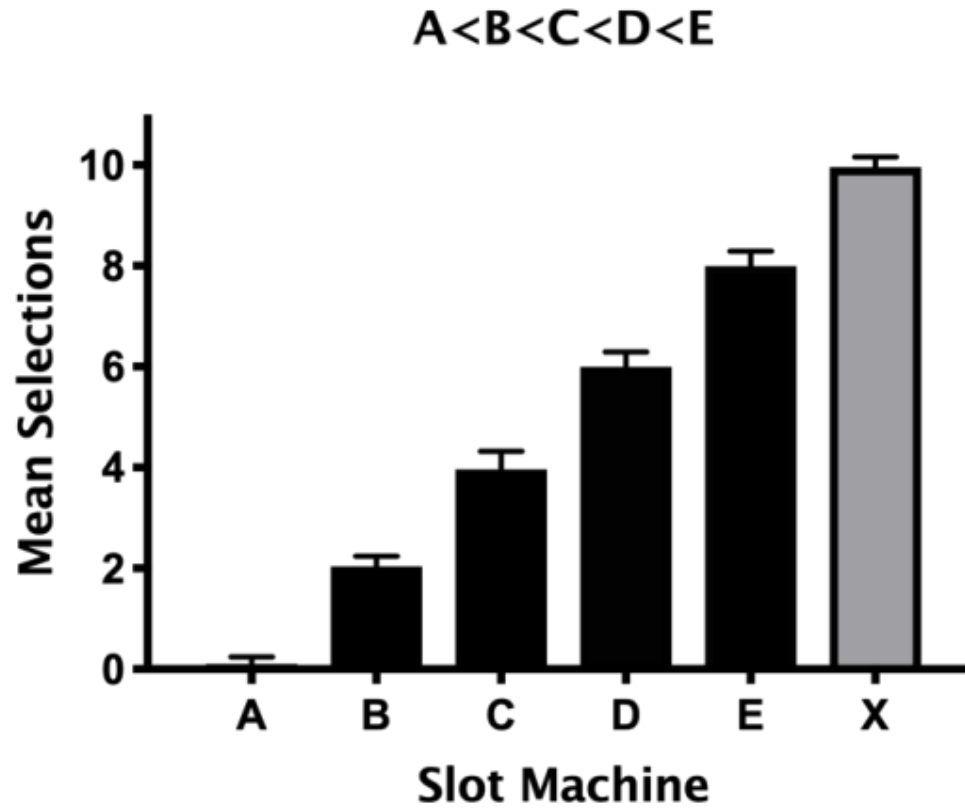
# Results

Mean trials to criterion and the mean number of exposures (with standard deviations in brackets) during non-arbitrary and arbitrary relational training and testing phases for all conditions.

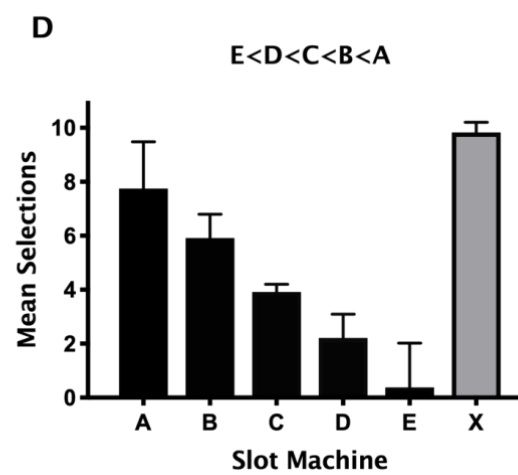
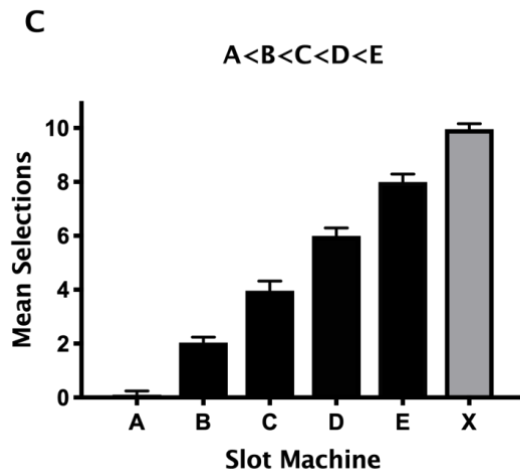
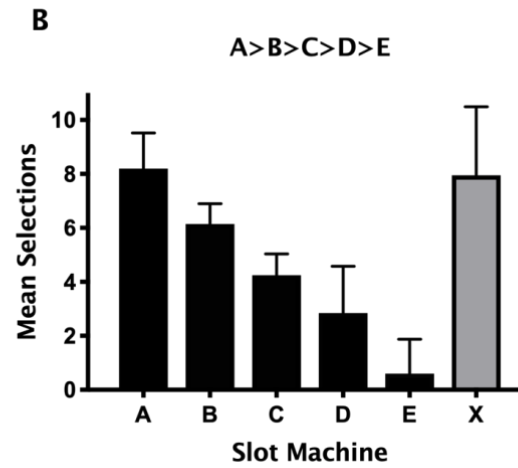
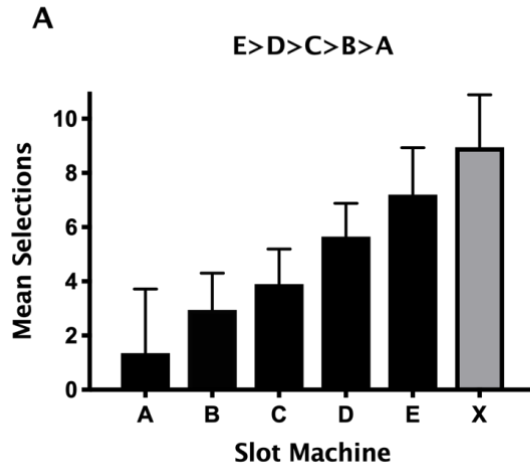
Condition	Phase 1: Non- arbitrary training	Phase 1: Non- arbitrary test	Phase 2: CR Non- arbitrary training	Phase 2: CR Non- arbitrary test	Phase 3: Arbitrary training	Phase 3: No. exposures to Arbitrary training	Phase 3: Arbitrary test (ME)	Phase 4: Arbitrary test (CE)
<b>1 (E&gt;A)</b>	13.51 (7.36)	7.97 (0.19)	10.64 (2.02)	7.96 (0.19)	9.53 (2.43)	2.41 (0.19)	30.07 (3.34)	50.24 (10.26)
<b>2 (A&gt;E)</b>	12.70 (4.20)	7.96 (0.19)	10.5 (1.90)	8 (0)	9.94 (2.31)	2.40 (1.52)	31.52 (1.39)	53.21 (5.97)
<b>3 (A&lt;E)</b>	12.96 (6.39)	7.93 (0.26)	11.4 (4.24)	8.16 (0.55)	10.86 (7.21)	2.60 (1.80)	30.79 (1.36)	53.19 (5.89)
<b>4 (E&lt;A)</b>	10.65 (1.84)	7.82 (0.39)	10.83 (2.36)	8 (0)	9.92 (2.52)	2.03 (1.03)	30.60 (2.14)	54.80 (1.38)

Note: CR refers to constructed response training; ME refers to mutual entailment test trials; CE refers to combinatorial entailment test trials.

# Results



# Results



# Conclusions

- Participants showed preferences for slot-machine despite no history of a win on that machine
- Derived verbal self-rules may influence slot machine choice such that Slot machine choice may be influenced by labels or names given to slot-machines

# Limitations & implications

## Limitations

- Real world gambling?
- Challenge: balancing controlled experimental design vs translational implications

## Implications

Talking therapies such as ACT – identifying maladaptive verbal rule following

Alice E. Hoon, Craig Bickford, Lotte Samuels & Simon Dymond (2019) 'This slot is hotter than that one': symbolic generalization of slot machine preference in simulated gambling, *International Gambling Studies*, DOI: [10.1080/14459795.2019.1602159](https://doi.org/10.1080/14459795.2019.1602159)



# Thanks for listening!

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