

Action selection under conflict--

replacement vs. suppression of competing response mappings or actions



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Introduction

In our daily activities, we often need to withhold an automatic, habitual response in order to carry out a desired action. A key aspect of "Cognitive Control" is the ability to flexibly select among conflicting candidate responses to a stimulus.

Stroop task Stroop (1935)

Incongruent: ed blue (reen vellow Congruent: ed blue green yellow

How do we overcome the prepotent response to generate a deliberate response?

How do we overcome the prepotent responses?

Previous work: Replacement model

An automatic response is always prepared but is later replaced by a deliberate, more appropriate response. (Haith et al., 2017)

Responses become available at random times, updating the currently prepared response.



Alternative view: Suppression model

The prepotent response needs to be actively suppressed, allowing the correct response to be generated.

Suppression can operate on the entire mapping (representation level), or an individual response (output level) $p(T_{A}) \quad p(T_{C}) \quad p(T_{R})$



- Replacement?
- Suppresion?
 - --> Of what? (response, mapping?)

Do we need a conflict monitoring / control mechanism to carry out deliberate actions? (Ridderinkhof, 2002; Botvinick et al., 2001, 2004)

Predictions

- The pre-potent mapping/response is suppressed.
- "Other" errors will increase before the correct response is available.
- Suppression will exibit even in congruent trials;



Inongruent trials

Previous results: Spatial-symbol

Averaged data (N = 8)

Suppression model



A Probablistic Model for Suppression under Conflict

The probability of generating a response r_i given a particular RT, and the probability of $p(r \mid RT) = \sum_{e} p(r = i \mid e) p(e \mid RT)$



ferences	Botvinick et al. (2001) Psychol Rev., 108: 624-652	Ridderinkhof KR. (2002) Psycho
	Botvinick et al. (2004) Trends in Cognitive Sciences, 8: 539-546	Stroop JR. (1935) J Exp. Psych
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