I expect you to do as I say! Prior intentional attributions bias the perceived kinematics of other's actions.

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Introduction

- Predictive coding: Prior expectations regarding action and perception influence perception by minimising processing of correctly predicted stimuli and highlighting unexpected stimuli (prediction errors)[1,2].
- Using Representational Momentum, we investigated the effect of top-down expectations regarding the goals and movements of the actor on the prediction of other people's actions.
- RM should be greater if the action confirms a prior expectation, and reduced if it contradicts a prior expectation.

Method

- Participants observed a hand move toward or away from an object, which was safe or painful to grasp.
- Prior to action onset, participants said a word creating the expectation of an approach or withdrawal. The action and expectation were therefore congruent or incongruent.
- A static probe stimulus of the action was presented, either in the same position as the final frame, one frame ahead of the final position along the observed trajectory or one frame behind the final position.

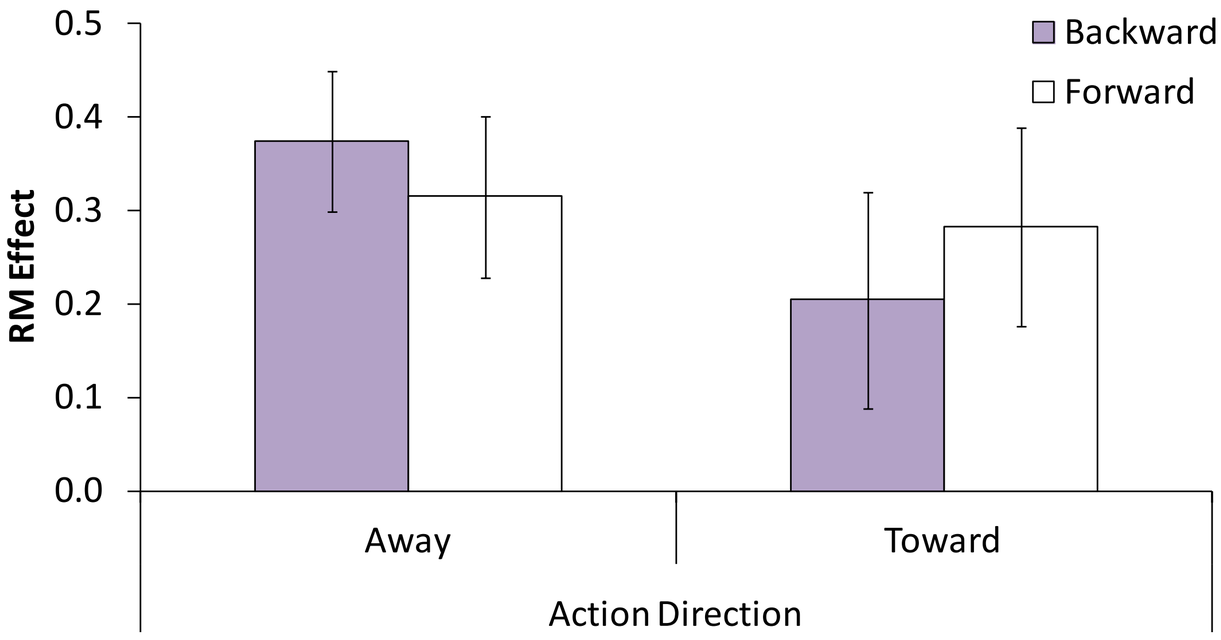
Trial Stimulus: Action toward object

- Participants judged if the probe was in the same or different position as the final position of the action.
- RM = Behind probe accuracy – Ahead probe accuracy.
- 2 (Action Direction) X 2 (Word) ANOVA.

Results

Experiment 1: Kinematic expectations

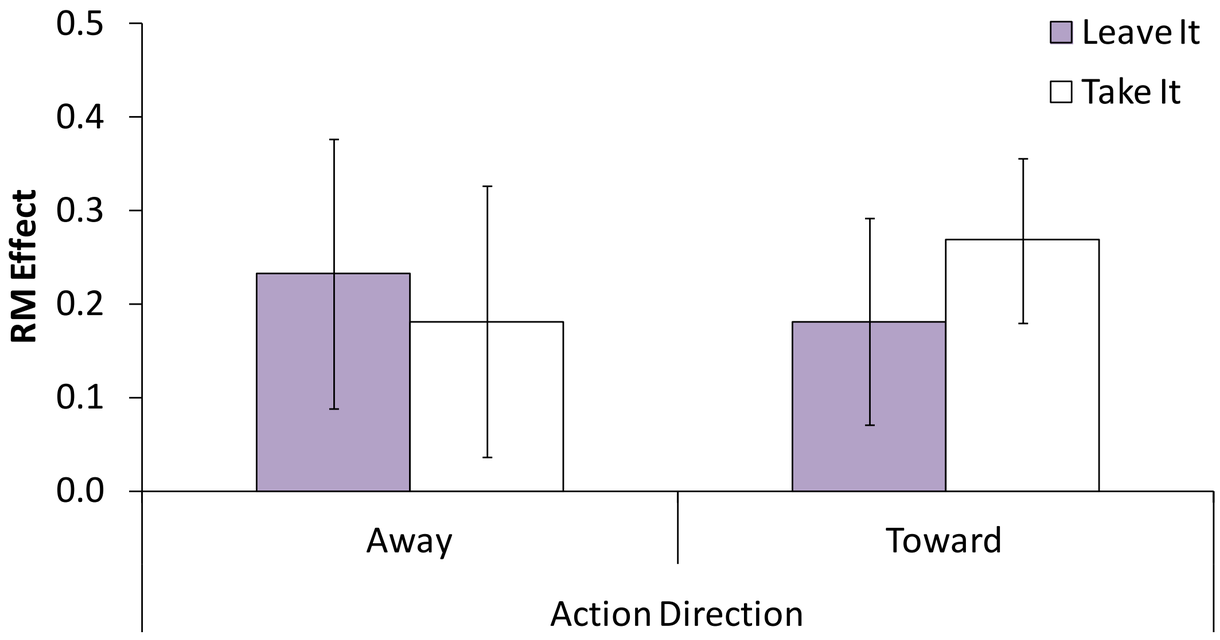
Participants (N = 31) said "Forward" if the object was safe, "Backward" if the object was painful.



Action Direction*Word: p = .035, η_p^2 = .140, 95% CI [.02, .26]

Experiment 2: Goal expectations

Participants (N = 24) said "Take It" if the object was safe, "Leave It" if the object was painful.

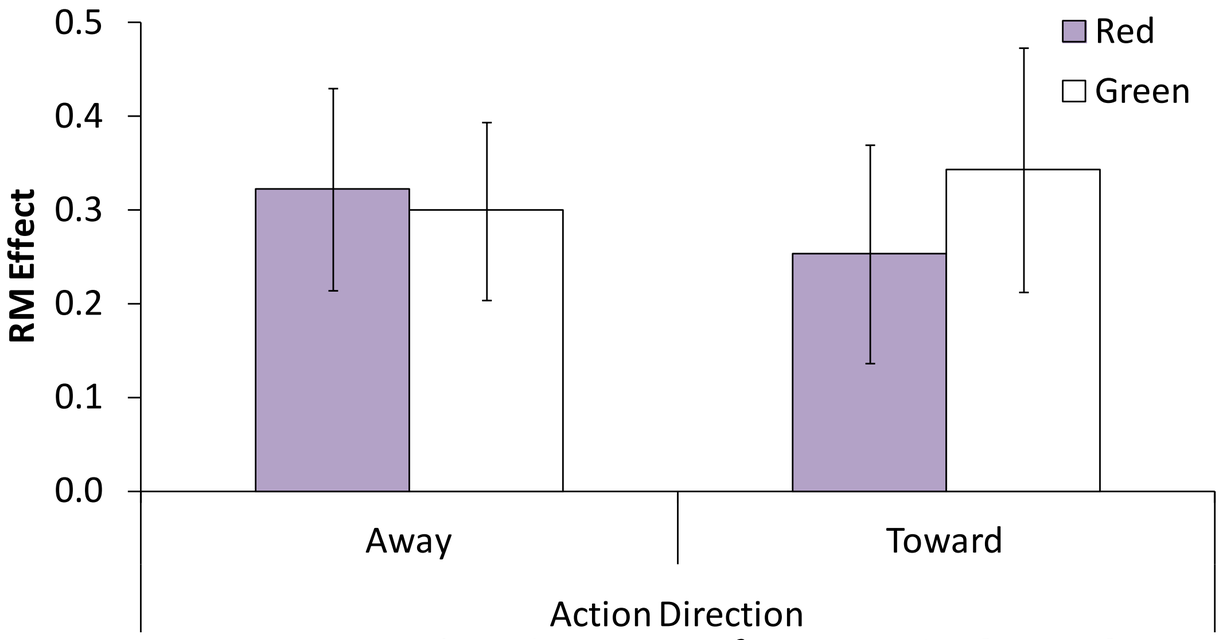


Action Direction*Word: p = .037, η_p^2 = .175, 95% CI [.01, .26]

In both experiments, there was a significant RM effect in all conditions (all p's < .001).
RM was greater for actions that were congruent with the prior expectation (actions away from an object after saying Backward or Leave it, actions toward the object after saying Forward or Take it) than for incongruent actions.

Experiment 3: Eliminating object knowledge

The colour of the object was altered to red or green, and was randomly selected on each trial to be independent of object type. Participants (N = 36) said "Forward" if the object was green and "Backward" if the object was red.



Action Direction*Word: p = .047, η_p^2 = .126, 95% CI [.01, .22]

The effect of Word/Action congruency persisted, irrespective of whether the expectation was congruent with the object.

Conclusions

- Action observation is highly malleable and susceptible to our preconceived expectations regarding what the action will look like.
- These results reveal the influence of top-down predictive processes that model forthcoming actions, and biases perception to stimuli that contradict these predictions[3].
- This could not be achieved by a bottom-up matching of observed kinematics to stored representations of goal directed actions, as the movement kinematics were identical for each expectation[4].
- This process also requires taking the perspective of the actor (e.g. transposing Forward/Backward expectations into a left/right movement on screen) and higher level expectations of goal-directed behaviour (e.g. Take It/Leave It).

[1] Friston, K.J. & Kiebel, S. 2009. *Neural Networks, 22,* 1093-1104. [2] Wolpert, D.M., Doya, K. & Kawato, M. 2003. *Phil Trans Roy Soc, B. 358,* 593-602. [3] Kilner, J.M., Friston, K.J. & Frith, C.D. 2007. *Cogn Proc, 8,* 159-166. [4] Rizzolatti, G., & Craighero, L. 2004. *Ann Rev Neuro, 27*, 169-192.