

Gain control explains the effects of distraction during perceptual decision-making

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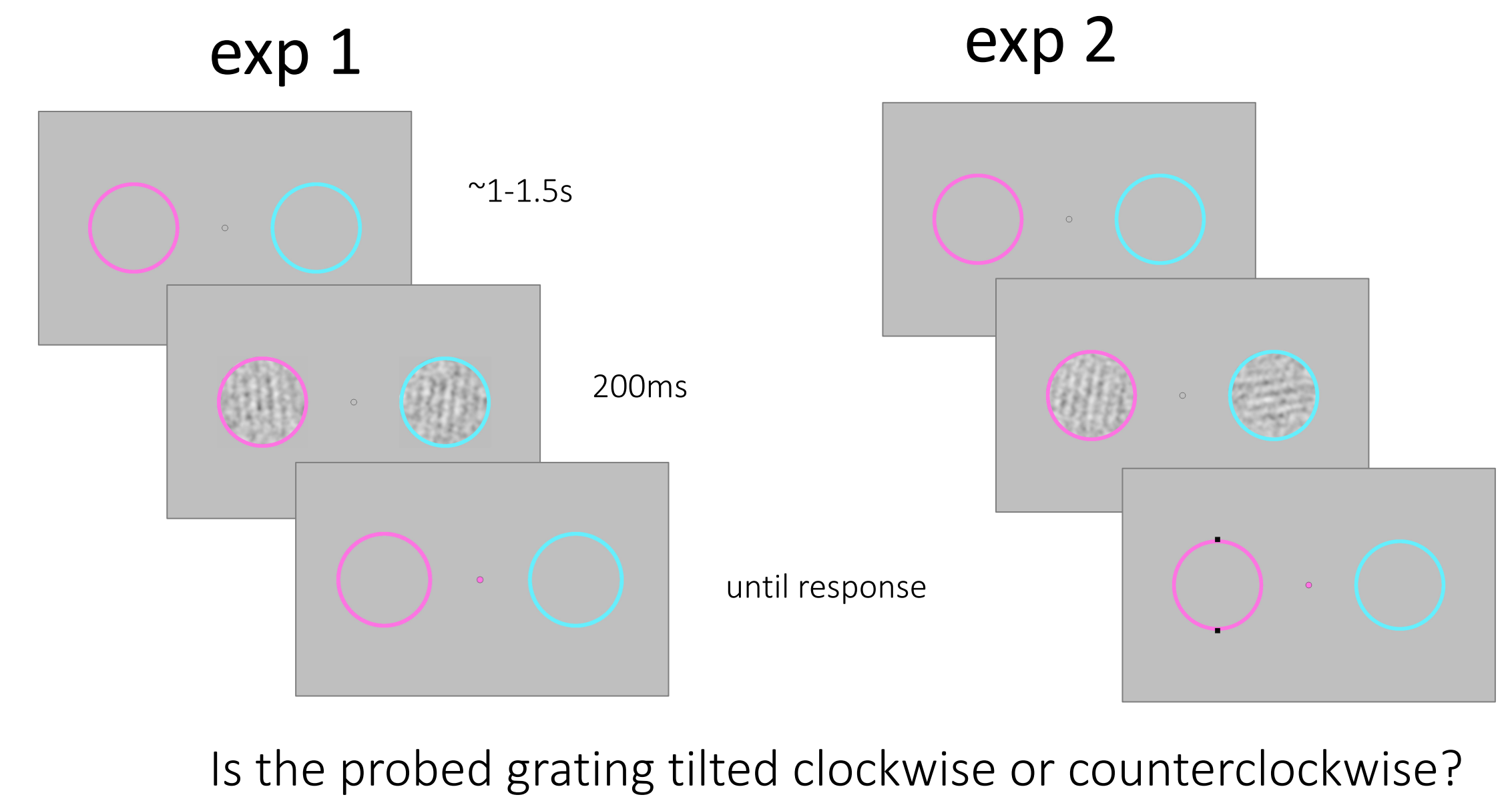
1. intro

- mechanisms of distraction in perceptual decisions
- psychophysical reverse correlation approach & computational modeling
- estimate decision kernels that quantified the relationship between fluctuations in signal energy and participant choices

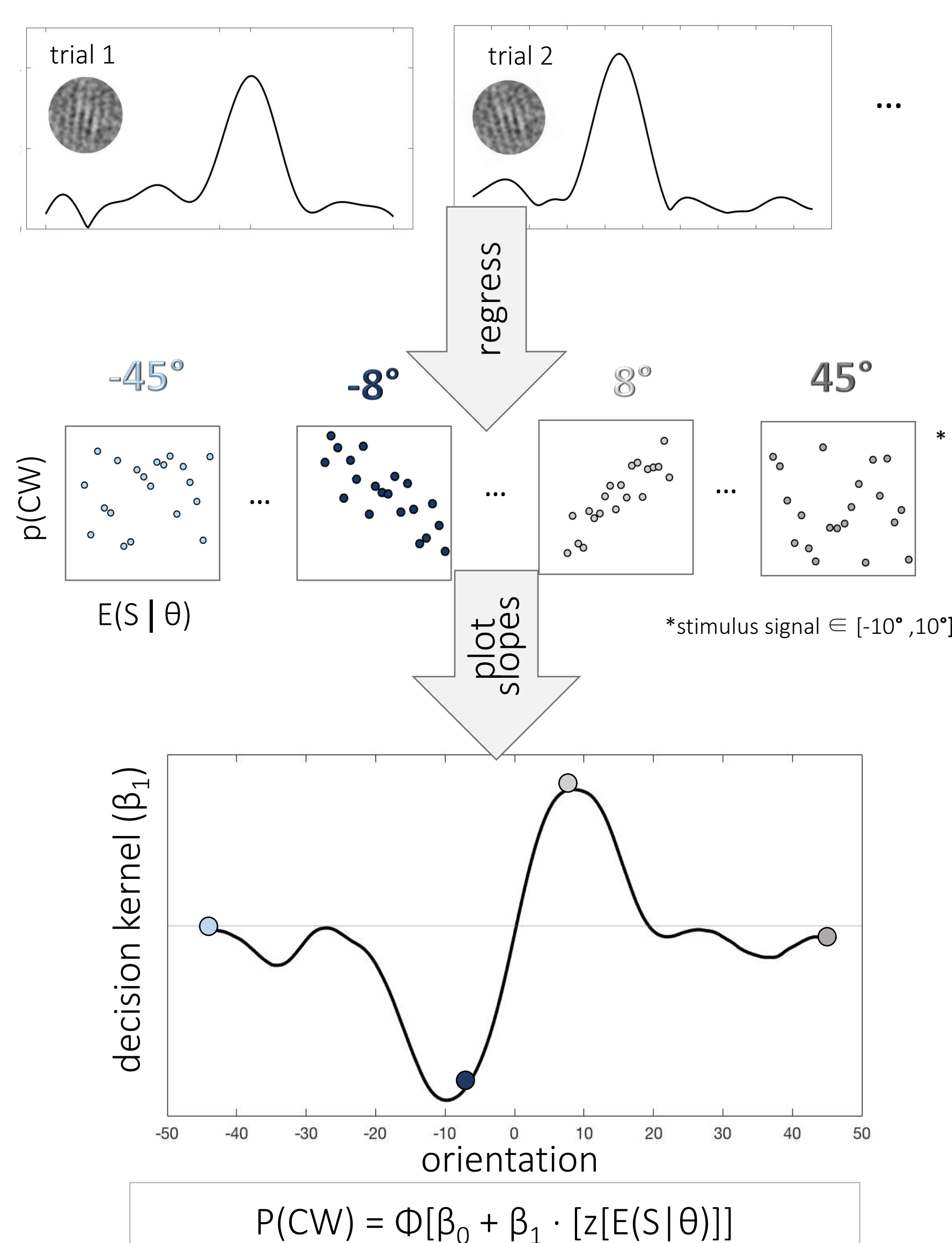
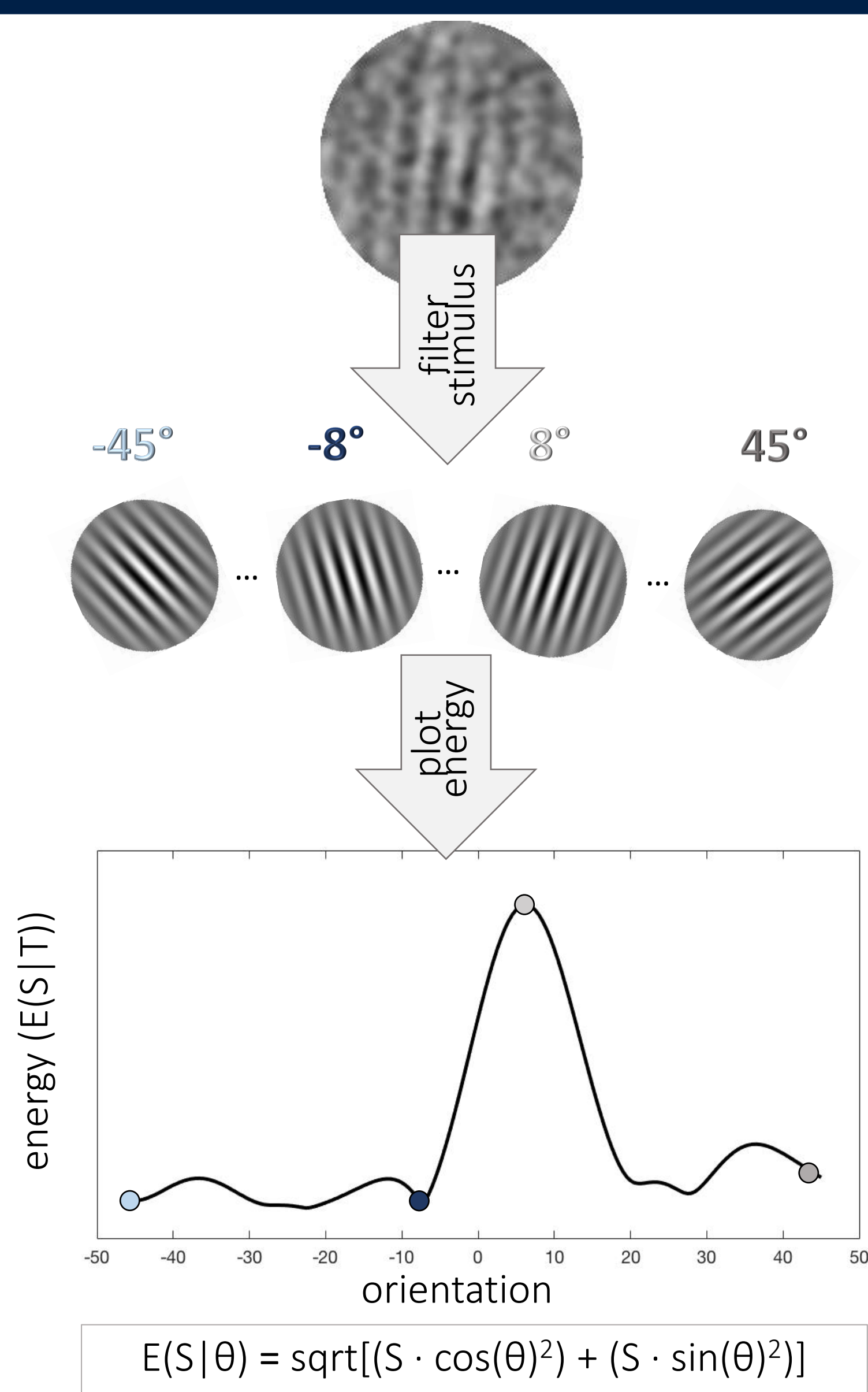
2. hypotheses

- context modulates the gain of processing of decision inputs
- such that consistent information is processed with the highest gain
- the effect occurs on the decision level (exp 2)

3. experimental design

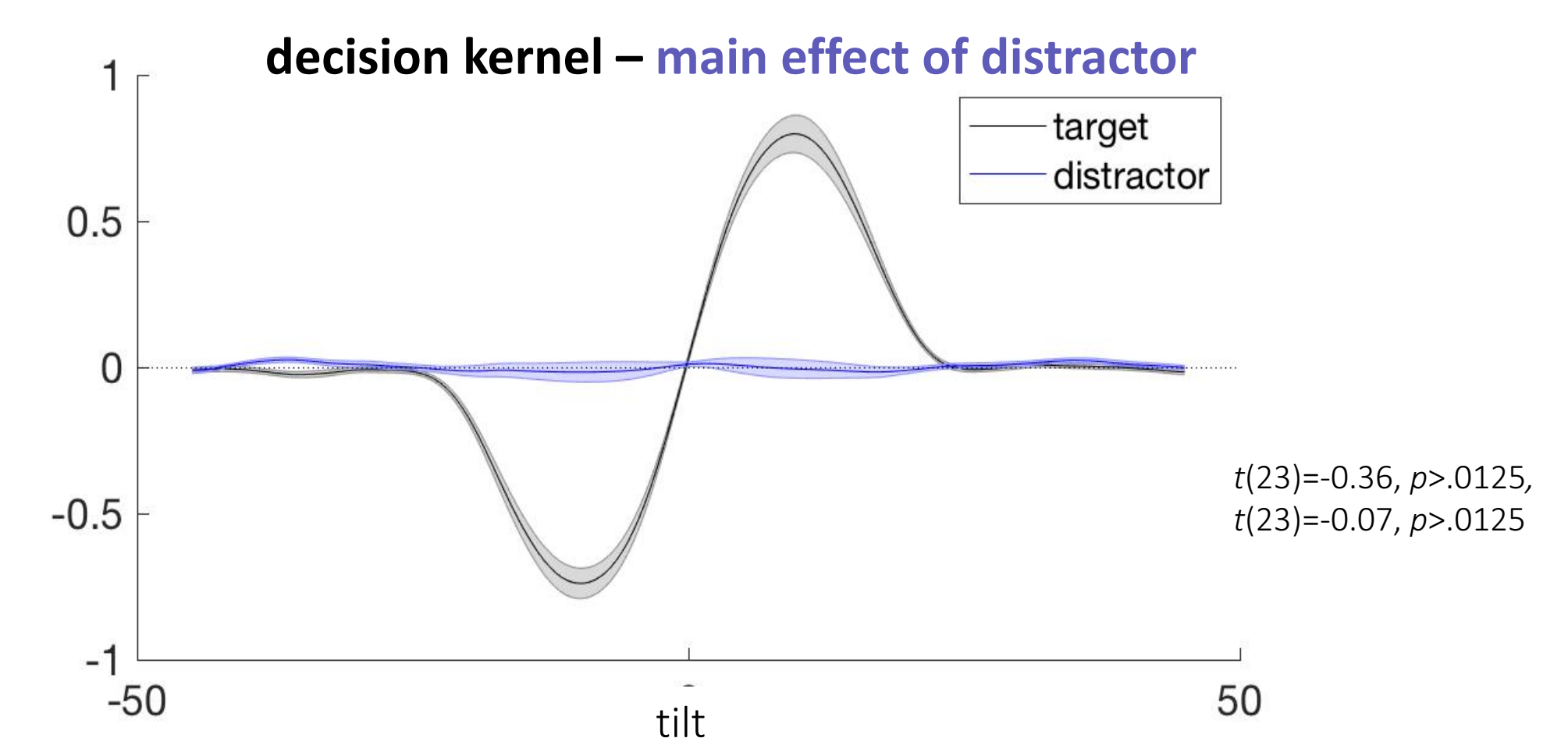


4. reverse correlation procedure

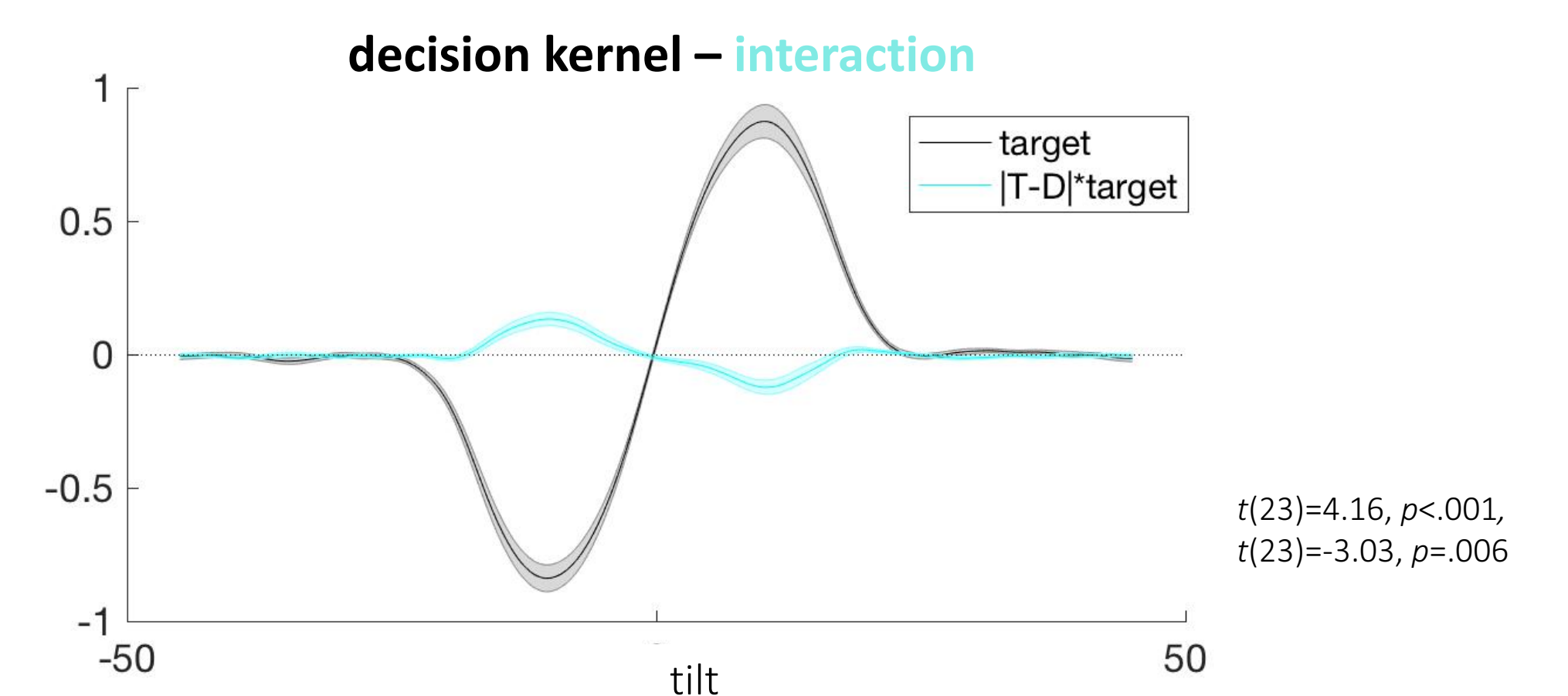


5. results

- no direct effect of distractor energy on choice

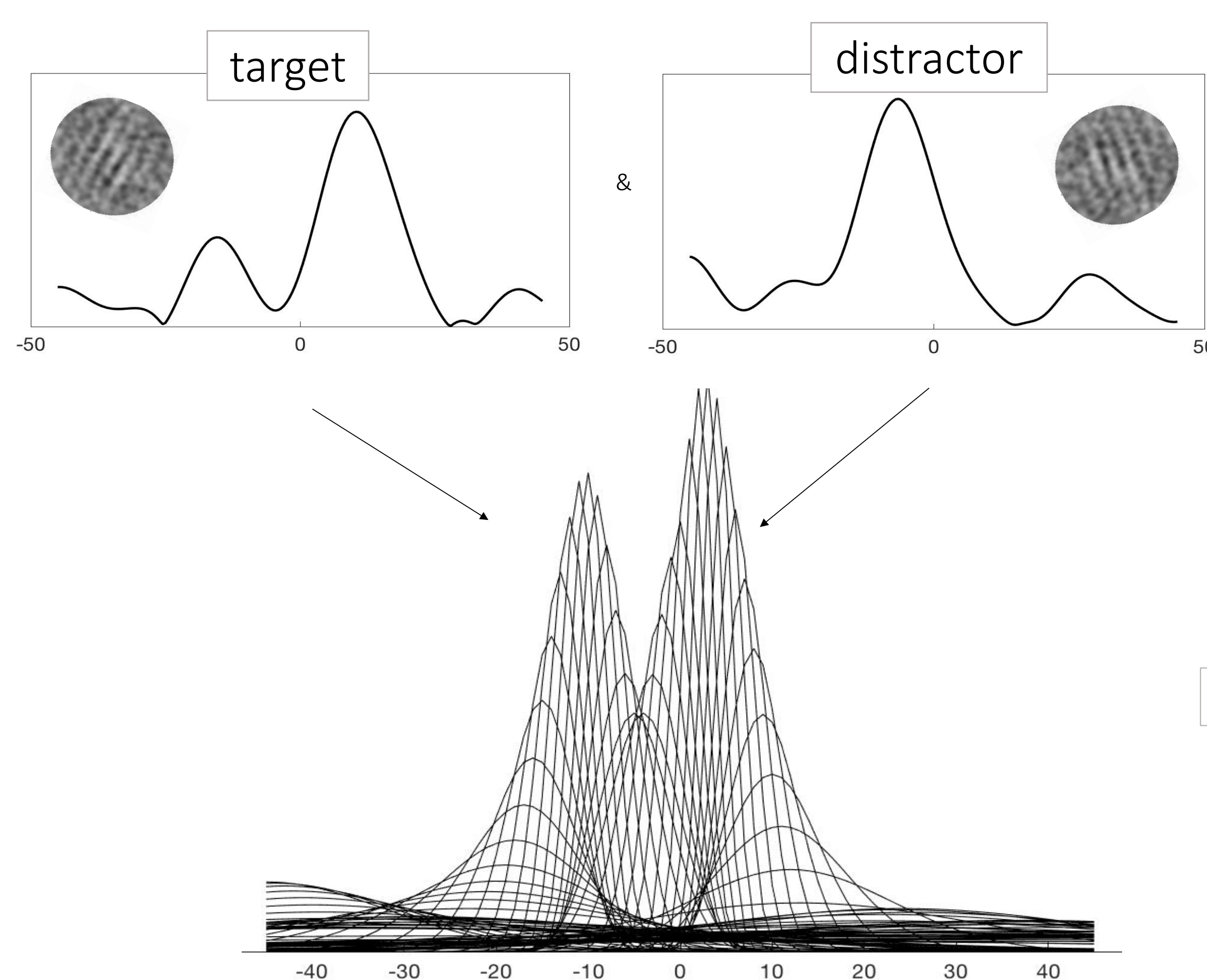


- but distractor signals mediated the effect of target energy on choice



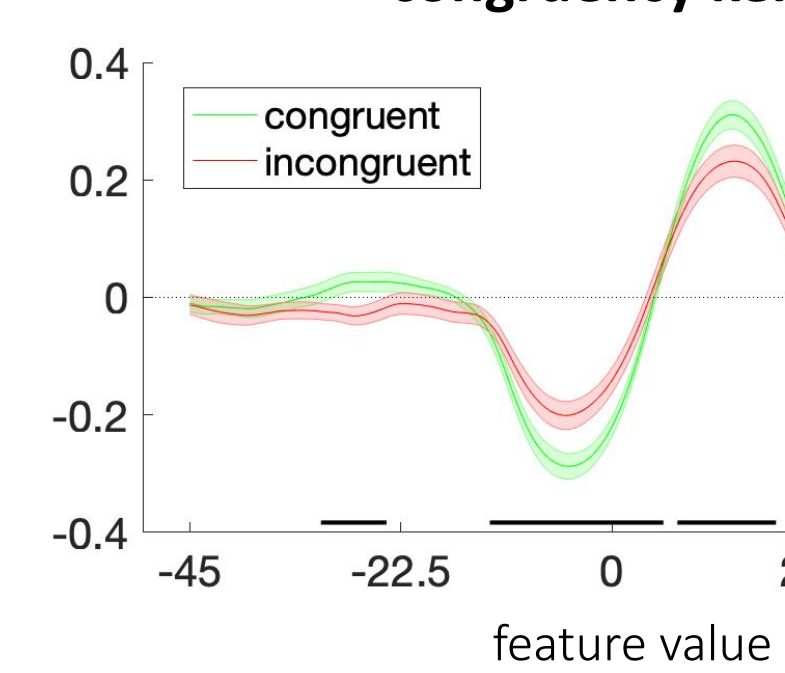
→ signal orientations that were consistent with the distractor had more impact in driving decisions

6. computational model

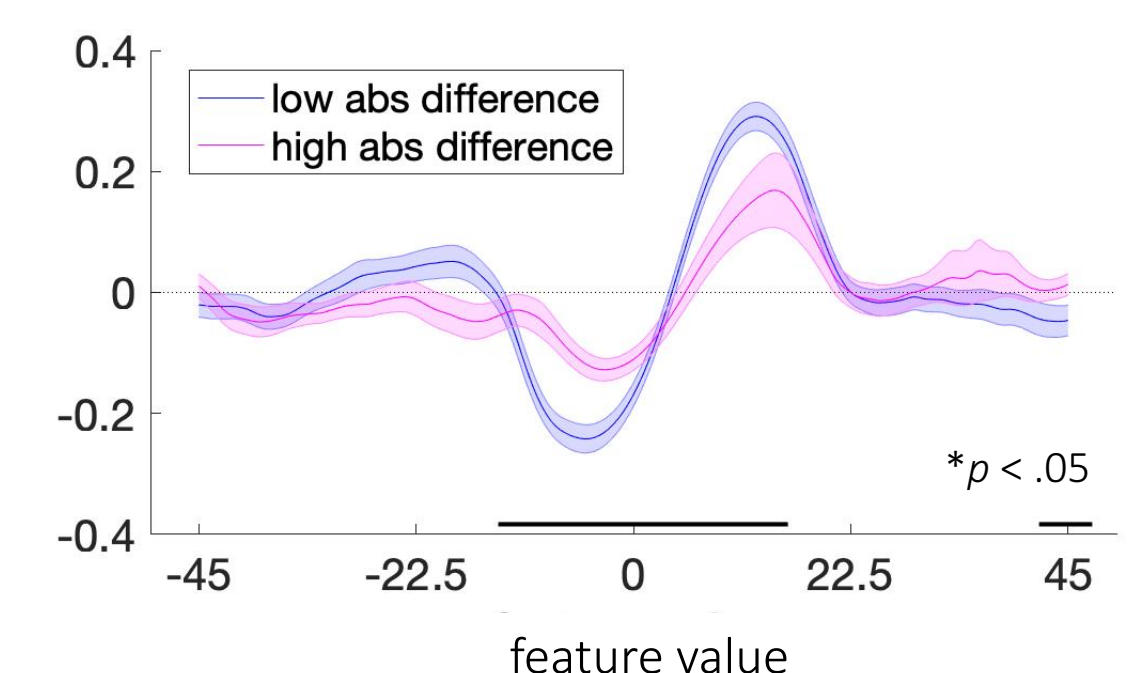


- tilt linearly decoded from population of feature-selective neurons
- each neuron has a preferred orientation and a Gaussian tuning curve
- the width of the tuning curve is inversely proportional to T and D energy:
- compare model fits:
 - tuning only (fixed gain)
 - gain only (fixed tuning)

congruency kernel

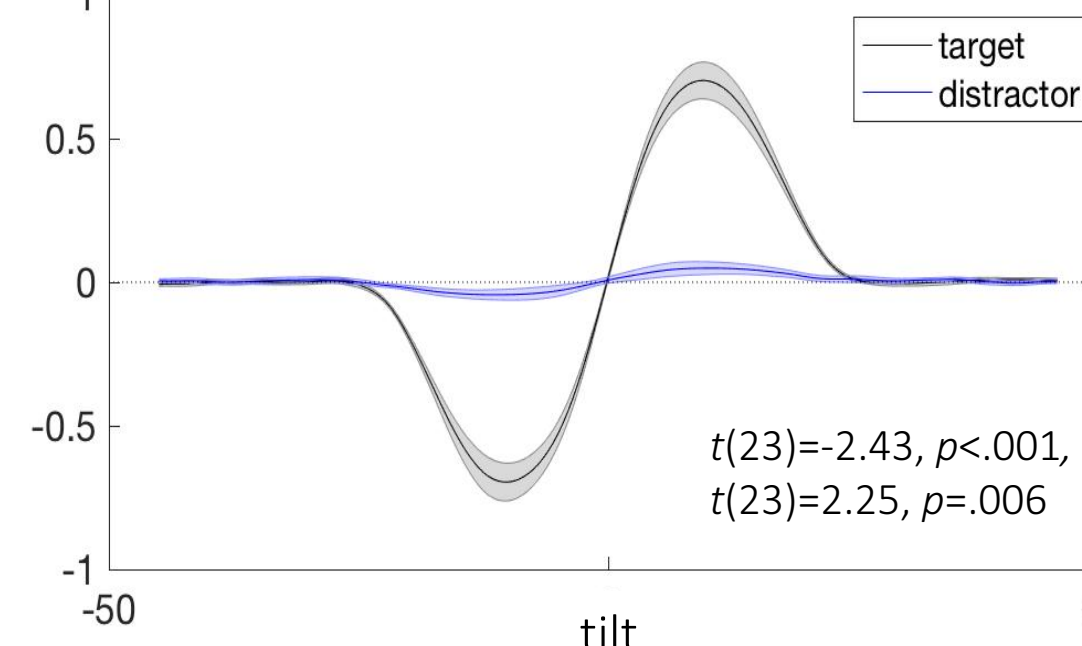


T-D difference kernel

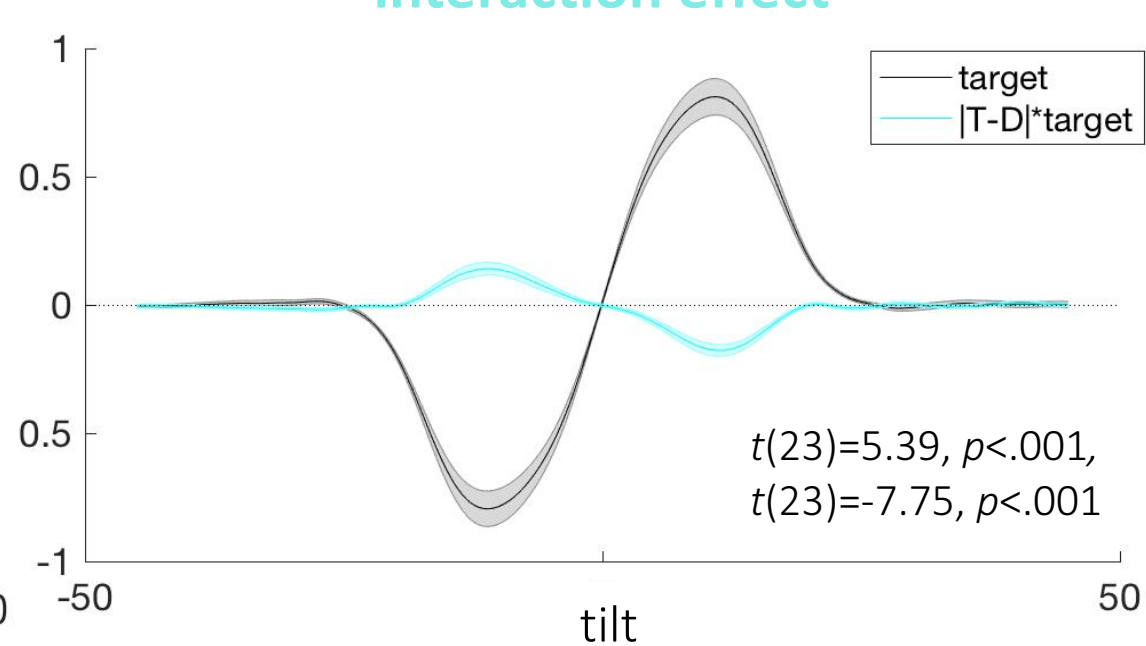


experiment 2 replicated these results

main distractor effect

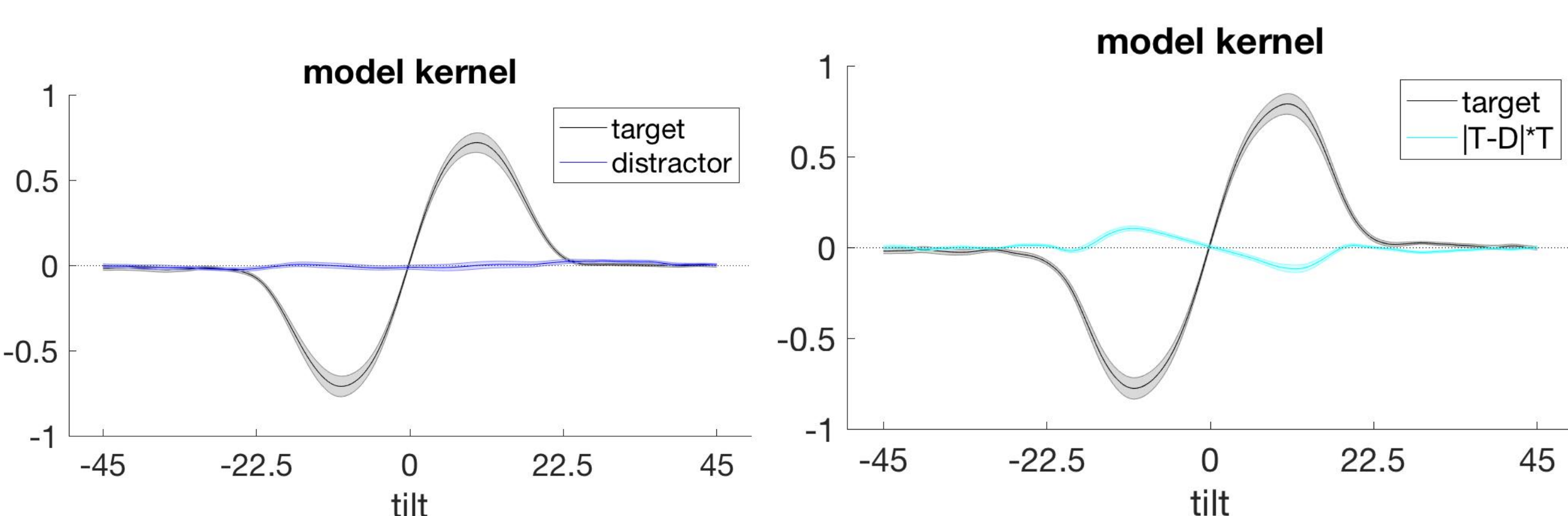


interaction effect



7. model results

- model reproduces behavioral effects



- gain only model outperforms tuning only model

model crossentropy (crossvalidated):

	exp 1	exp 2
gain	.4873	.5175
tuning	.4975	.5306

8. conclusions

- the effect of distraction – a multiplicative process, in which contextual signals determine the gain with which targets are evaluated
- modulation occurs on decision and not on sensory level
- implications for attention?



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