



Examining exogenous and endogenous mechanisms of temporal attention



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Background

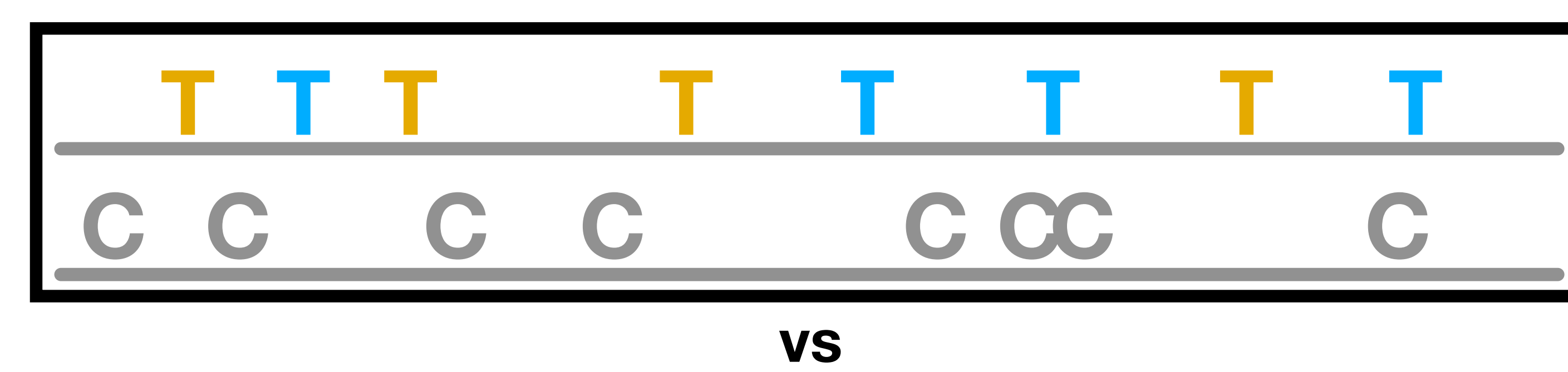
The exogenous/endogenous distinction has been useful in the study of spatial attention to compare relatively automatic mechanisms to mechanisms that are sensitive to learned contingencies, respectively.

Work on temporal attention has not yet adopted a similarly consistent framework, as the various terminology describing the object of study attests (“preparation”, “arousal”, “alertness”, etc.).

Typical studies of temporal attention employ trial-based designs that likely engage endogenous mechanisms and temporal cue stimuli that likely engage exogenous mechanisms.

Here we introduce two novel methods to permit isolation of endogenous and exogenous attention and to explore their interaction.

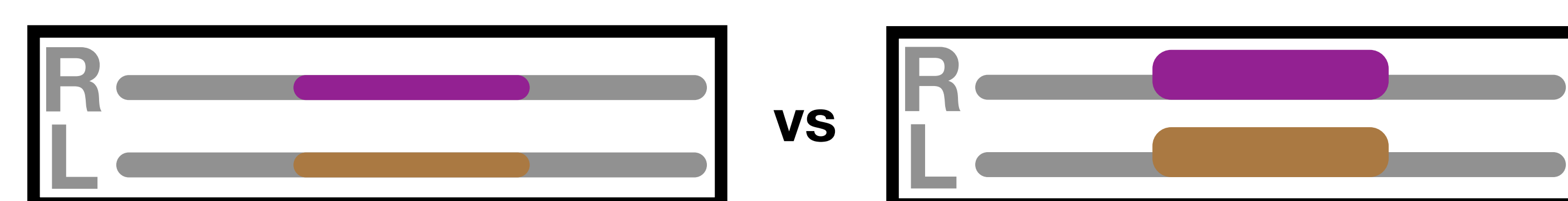
To avoid contribution from endogenous mechanisms, a non-contingent design (NCD) emulating Rescorla (1967)'s “truly random control” procedure was used and contrasted with the standard contingent design (CD) trial structure with fixed SOAs:



vs



To avoid contribution from exogenous mechanisms, an auditory cue with no global or local change in intensity was used (brief change from diotic to dichotic white noise; 0ΔdB) and contrasted with the same change accompanied by an intensity increase (+ΔdB):



Methods

21 Ss (aged 18-30, 11 male, 3 left handed) participated in 8 consecutive sessions consisting of 30 minutes of testing followed by 30 minutes of rest. Ss were tasked to monitor a central fixation stimulus for a brief color change and discriminate the color of change by keyboard response. Ss were provided with speed and accuracy feedback by means of the central fixation stimulus.

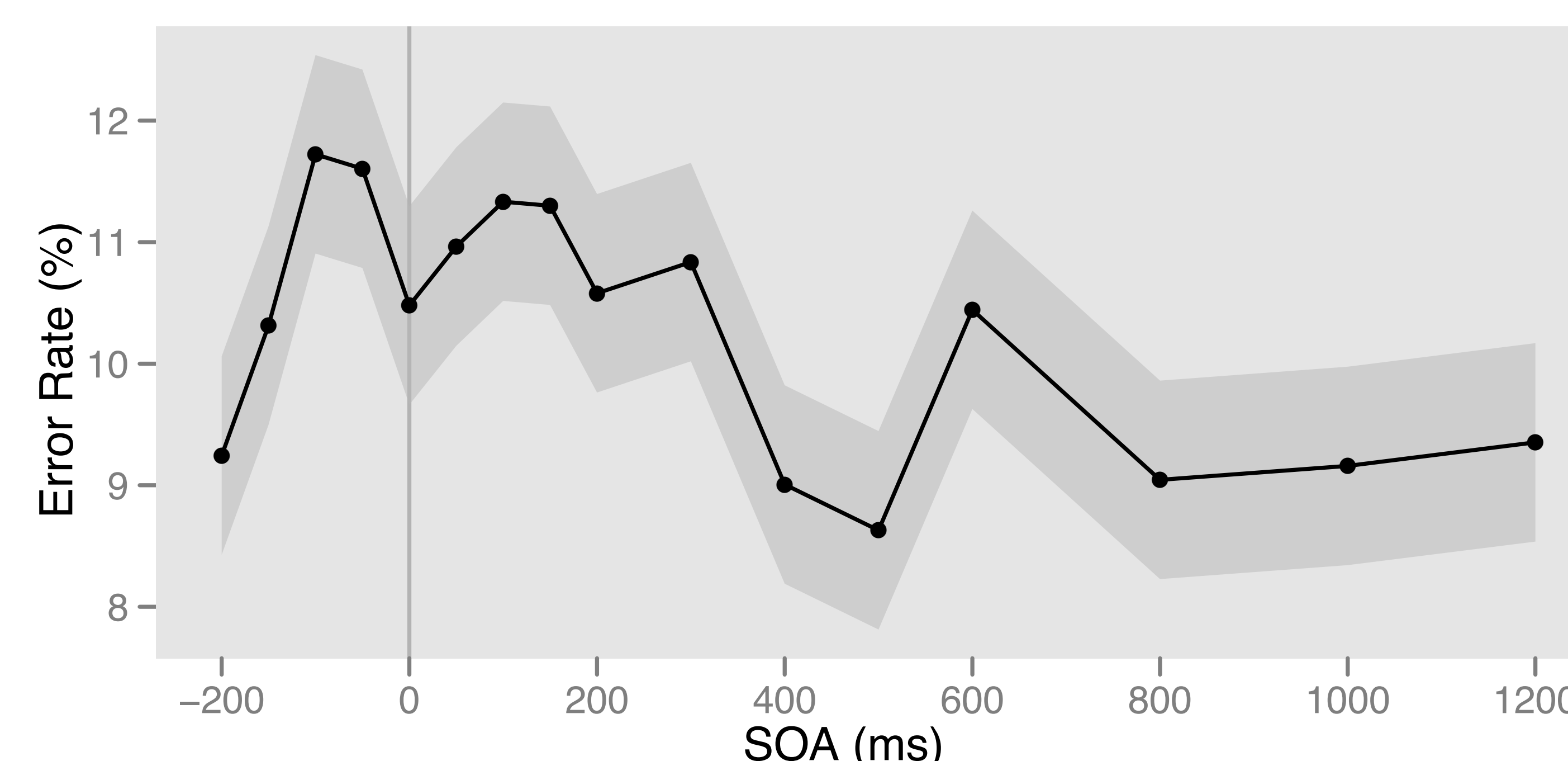
Ss wore headphones through which diotic white noise was played at 56dB. Temporal cue consisted of a brief change from diotic to dichotic white noise. In the 0ΔdB condition, the dichotic white noise was played at 56dB, in the +ΔdB condition the dichotic white noise was played at 82dB.

In the contingent design (CD) condition, cue-target SOA was held constant within each block of trials. In the non-contingent design (NCD) condition, cues and targets were randomly distributed through time.

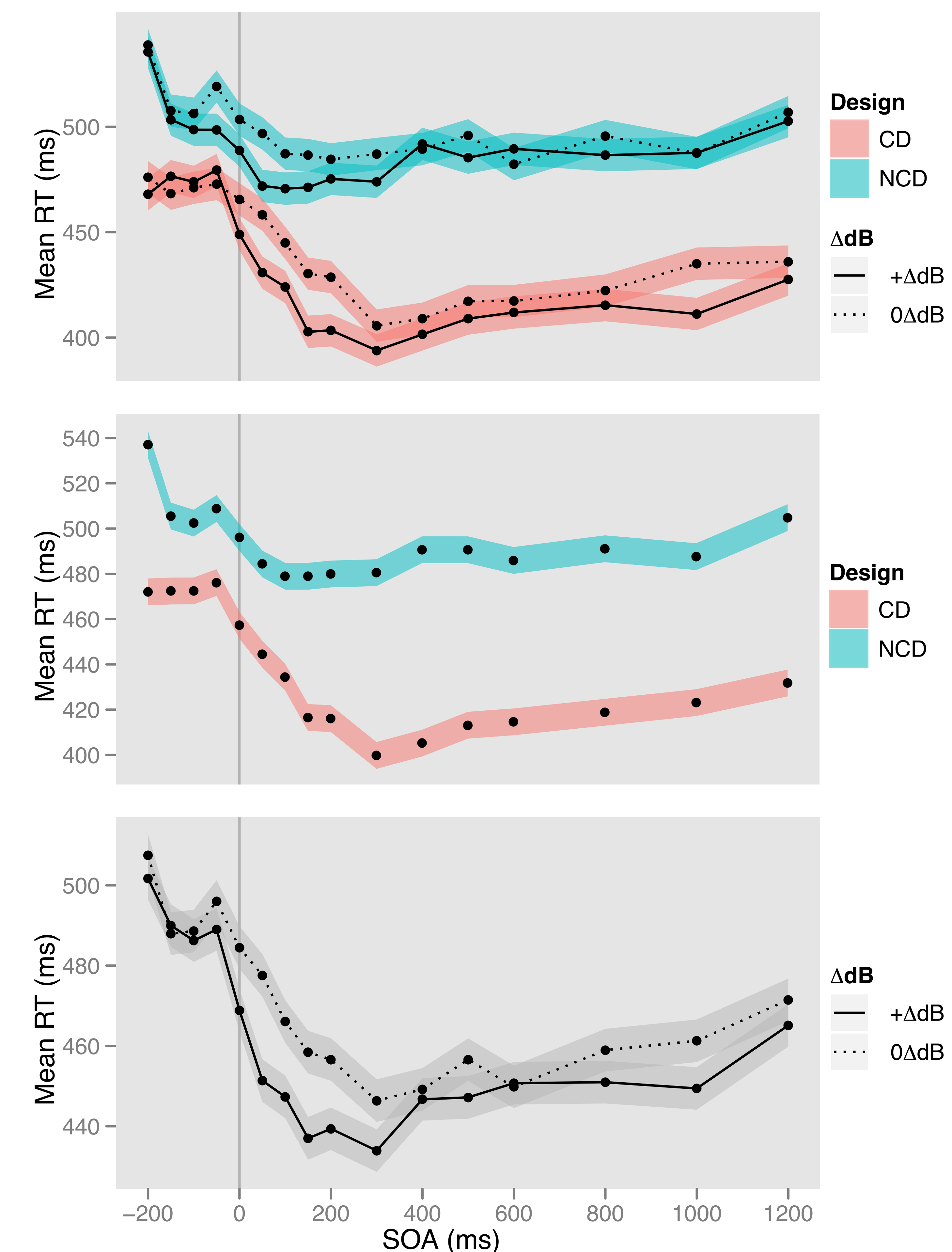
		Design	
		NCD	CD
Cue	0ΔdB	Null	Pure Endo
	+ΔdB	Pure Exo	Mix

Results

In error rate, only main effects of SOA and Design (NCD>CD) were obtained.



In RT, Design failed to interact with ΔdB, nor was there a Design×ΔdB×SOA interaction. There were significant Design×SOA and ΔdB×SOA interactions.



Conclusions

Support for both exogenous and endogenous mechanisms of temporal attention was found. Failure to observe interactions between these mechanisms suggests they may operate independently. Furthermore, where no evidence was found for a speed-accuracy trade-off (SAT) within the endogenous mechanism, some suggestion of SAT was obtained within the exogenous mechanism (not shown). Follow-up research employing persistent targets is underway to further explore this suggestion.