

**Supplemental Materials**

Table 1. Significant population activity of dTP revealed during cue events of the auditory DMS task, relative to pre-trial firing rate. Spike activity of each unit for a given cue interval was used as a single data point. The resultant standardized values of a unit for a cue event were then used for population analyses. One-way ANOVAs ( $p \leq 0.05$ ) were used to examine if a given cue interval (5 - 100ms) was significantly different from pre-trial firing. Asterisks denote  $p$ -values for ANOVAs and *post-hoc* Tukey's tests of pair-wise comparisons (\*  $p < 0.01$ ; \*\*  $p < 0.005$ ; \*\*\* $p < 0.001$ ), unless specified. All except match incorrect trials did not yield significant results at any cue event or interval (n.s.). Spike firing during match incorrect trials was low and irregular across trials within a session compared to the other three trial types, with nearly 80% of total units associated with this trial type non-responsive to task events on match incorrect trials. This low firing-rate activity may suggest a lack of attention during these trials and is in sharp contrast with the activity pattern on the nonmatch incorrect trials on which the subjects make an erroneous behavioral response.

Trial Type	Cue event	Significantly evoked interval	Statistics
Match Correct	Cue 1	1 <sup>st</sup> 100ms ***; 4 <sup>th</sup> 100ms ***	$F_{(10, 24749)} = 3.62 *$
	Cue 2	n.s.	
	Cue 1 offset	n.s.	
	Cue 2 offset	5 <sup>th</sup> 100ms **	$F_{(10, 24749)} = 2.51 *$
Match Incorrect	Cue 1	n.s.	
	Cue 2	n.s.	
	Cue 1 offset	n.s.	
	Cue 2 offset	n.s.	
Nonmatch Correct	Cue 1	1 <sup>st</sup> 100ms ***; 5 <sup>th</sup> 100ms ***	$F_{(10, 24749)} = 4.48 *$
	Cue 2	1 <sup>st</sup> 100ms ***	$F_{(10, 24749)} = 3.28 *$
	Cue 1 offset	n.s.	
	Cue 2 offset	n.s.	
Nonmatch Incorrect	Cue 1	n.s.	
	Cue 2	1 <sup>st</sup> 100ms *	$F_{(10, 24749)} = 2.46 *$
	Cue 1 offset	n.s.	
	Cue 2 offset	n.s.	

Table 2. Significant population activity of dTP revealed during early cue onset events of the auditory DMS task. Population analyses of trial-type effect further divided the first 100-ms intervals into two 50-ms intervals to reveal subtle changes at cue presentation periods. For each condition (match or nonmatch trials), repeated-measures ANOVAs were used, in which the within-subject factors were cue (i.e., cue 1 and 2) and interval (2-, 50-ms intervals) and the between-subject factor was trial (correct and incorrect trials). Asterisks denote significant differences of main effects or interactions, and those for *post-hoc* Tukey's tests of pair-wise comparisons ( $p \leq 0.05$ , except where noted with actual  $p$ -value in table). Reduced population activity of dTP when subjects heard two matching sound stimuli was in contrast to increased population activity of dTP when subjects heard two nonmatching sound stimuli. Overall, population activity was higher during correct trials than incorrect trials, though the results were marginally significant during match trials. Abbreviations: match correct trials (MC), match incorrect trials (MI), nonmatch correct trials (NC), and nonmatch incorrect trials (NI).

Trial Type	Events	Factors	Results
Match	Cue	Cue	Cue 1 > Cue 2 * $F_{(1, 2143)} = 5.77 *$
		Interval	1 <sup>st</sup> 50 ms > 2 <sup>nd</sup> 50 ms * $F_{(1, 2143)} = 3.81 *$
		Trial	n.s.
		Cue - Interval	n.s.
		Cue - Trial	n.s.
		Interval - Trial	n.s.
		Cue - Interval - Trial	At 2 <sup>nd</sup> 50 ms, MC > MI * $F_{(1, 2143)} = 3.53, p = 0.06$
		Cue-offset	n.s.
	Cue	Cue	n.s.
		Interval	n.s.
		Trial	n.s.
		Cue - Interval	At 1 <sup>st</sup> 50 ms, MI > MC * $F_{(1, 2143)} = 3.82 *$
		Cue - Trial	n.s.
		Interval - Trial	n.s.
Cue - Interval - Trial	n.s.		
Nonmatch	Cue	Cue	Cue 2 > Cue 1 * $F_{(1, 2248)} = 3.97 *$
		Interval	1 <sup>st</sup> 50 ms > 2 <sup>nd</sup> 50 ms * $F_{(1, 2248)} = 5.36 *$
		Trial	NC > NI * $F_{(1, 2143)} = 3.84 *$
		Cue - Interval	n.s.
		Cue - Trial	n.s.
		Interval - Trial	n.s.
		Cue - Interval - Trial	n.s.
		Cue-offset	n.s.
	Cue	Cue	n.s.
		Interval	2 <sup>nd</sup> 50 ms > 1 <sup>st</sup> 50 ms * $F_{(1, 2248)} = 7.06 *$
		Trial	n.s.
		Cue - Interval	n.s.
		Cue - Trial	n.s.
		Interval - Trial	n.s.
Cue - Interval - Trial	At 1 <sup>st</sup> 50 ms, NC > NI * $F_{(1, 2143)} = 2.94, p = 0.08$		

Table 3. Quick, time-limited suppression at population activity of dTP upon identical sound presentations. Population activity of 225 units during the first 90-ms was re-sampled into three 30-ms intervals for detailed analyses to capture the peak activity differences. The combined cue 1 data (Cue 1 – MCNC) was then compared to match and nonmatch correct trials during cue 2 (Cue 2 - MC and Cue 2 - NC) with paired-sample *t*-tests. The adjusted critical probability level was 0.033 (0.05 “alpha level” × 2 “degree of freedom” divided by 3 “number of comparisons”). Abbreviations: match correct trials (MC), nonmatch correct trials (NC), and nonmatch incorrect trials (NI).

Cue event	Pair-wise comparison	<i>P</i> -values
2 <sup>nd</sup> 30-ms cue interval	Cue 1 – MCNC > Cue 2 – MC	0.019
	Cue 2 – NC > Cue 2 – MC	0.017
1 <sup>st</sup> 30-ms Cue 2 offset	MC > NC or NI	0.022
Last 30-ms Cue 2 offset	MC > NC or NI	0.019

Table 4. Incorrect trials associated with higher population activity during memory delays, compared to correct trials. Repeated-measures ANOVAs with *post-hoc* Tukey's tests of pair-wise comparisons were used to reveal significant differences among factors (\*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ ). For each condition (match or nonmatch trials), within-subject factors here were three delay periods (early, middle and late) with three time intervals (500-ms/interval) per period, while the between-subject factor was trial (correct and incorrect trials). Abbreviations: match correct trials (MC), match incorrect trials (MI), nonmatch correct trials (NC), and nonmatch incorrect trials (NI).

Trial Type	Factors	Results	
Match	Trial	MI > MC *	$F_{(2, 20398)} = 14.43^{**}$
	Delay	n.s.	
	Interval	n.s.	
	Trial – Delay	n.s.	
	Trial– Interval	n.s.	
	Delay – Interval	n.s.	
	Trial – Delay – Interval	n.s.	
Nonmatch	Trial	NI > NC *	$F_{(2, 20398)} = 14.18^{**}$
	Delay	Late delay > Early delay ( $p = 0.008$ )	$F_{(2, 40796)} = 5.72^*$
	Interval	n.s.	
	Trial – Delay	n.s.	
	Trial– Interval	n.s.	
	Delay – Interval	n.s.	
	Trial – Delay – Interval	n.s.	