



**Online Resource 2** a) Discrimination performance as a function of the temporal resolution parameter  $\tau$  for a sample of neurons from the three processing stages in the metathoracic ganglion. b) The values of optimal  $\tau$  for ascending (AN, Median = 8 ms), local (LN, Median = 3ms) and receptor cells (REC, Median = 5ms). There was a significant difference across computation levels ( $P < 0.0001$ ; Kruskal-Wallis-test). REC-LN:  $p = 0.167$ ; REC-AN:  $p = 0.0004$ ; LN-AN:  $p < 0.0001$ ; Mann-Whitney-U-test).

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