Figure S1: We imagine two scenarios: if the representative cell is moving to the right at \((x, t)\), it may have swum along the path \((x - l_+, t - \delta t_+) \rightarrow (x, t)\) with the initial activity \(a(x - l_+, t - \delta t_+) = \overline{a}(x, t)\); if the cell is moving to the left at \((x, t)\), it may have come from the path \((x + l_-, t - \delta t_-) \rightarrow (x, t)\) with \(a(x + l_-, t - \delta t_-) = \overline{a}(x, t)\).