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Abstract:
Morphogen gradients guide tissue patterning but do not act in isolation. How they integrate with other signalling modalities, like juxtacrine signalling, and how these integrations influence pattern resolution and robustness remain unclear. We address this in the Drosophila lamina, where columns of precursors are patterned with single-cell resolution into motion-processing neurons, dependent on a photoreceptor-derived Hedgehog gradient and glial-orchestrated differentiation. Combining experiments and theory, we show that glial-induced ERK activity drives *Delta* expression in lamina precursors, generating a graded Notch activity pattern. Notch restricts Hedgehog morphogen relay and enhances positional information. Glia act as timekeepers, scheduling ERK-driven differentiation after Hedgehog and Notch patterns are established. Thus, Notch and ERK dynamically integrate with Hedgehog to encode positional information, enabling reproducible cell fate patterning with single-cell resolution.

Biosketch:
Vilaiwan Fernandes is a Drosophila geneticist and developmental biologist. Vil's fascination with how animals make themselves was sparked while working with Garrett Odell at the University of Washington's Center for Cell Dynamics, where she worked on computational models of gene regulatory networks and the evolution of robustness. Her PhD work on epithelial morphogenesis in Esther Verheyen's lab at Simon Fraser University cemented her love of developmental biology. She then joined Claude Desplan's lab at New York University where she investigated the role that glial cells play in instructing neuronal development in the fly visual system. In 2018 Vil started her independent research group at University College London, where her lab is focused on understanding how cells in the brain communicate with each other to coordinate their development.