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Exploring feedforward and feedback communication between visual cortical areas with DLAG

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Technological advances have increased the availability of recordings from large populations of neurons across multiple brain areas. Coupling these recordings with dimensionality reduction techniques, recent work has led to new proposals for how populations of neurons can send and receive signals selectively and flexibly. Advancement of these proposals depends, however, on untangling the bidirectional, parallel communication between neuronal populations. Because our current data analytic tools struggle to achieve this task, we have recently validated and presented a novel dimensionality reduction framework: DLAG, or Delayed Latents Across Groups. DLAG decomposes the time-varying activity in each area into within- and across-area latent variables. Across-area variables can be decomposed further into feedforward and feedback components using automatically estimated time delays. In this talk, I will review the DLAG framework. Then I will discuss new insights into the moment-by-moment nature of feedforward and feedback communication between visual cortical areas V1 and V2 of macaque monkeys. Overall, this work lays the foundation for dissecting the dynamic flow of signals across populations of neurons, and how it might change across brain areas and behavioral contexts.

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