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An *in vivo* and *in silico* approach to study *cis*-antisense: a short cut to higher order response COLLEEN COURTNEY, USHA VARANASI, ANUSHREE CHATTERJEE, University of Colorado Boulder — Antisense interactions are present in all domains of life. Typically sense, antisense RNA pairs originate from overlapping genes with convergent face to face promoters, and are speculated to be involved in gene regulation. Recent studies indicate the role of transcriptional interference (TI) in regulating expression of genes in convergent orientation. Modeling antisense, TI gene regulation mechanisms allows us to understand how organisms control gene expression. We present a modeling and experimental framework to understand convergent transcription that combines the effects of transcriptional interference and *cis*-antisense regulation. Our model shows that combining transcriptional interference and antisense RNA interaction adds multiple-levels of regulation which affords a highly tunable biological output, ranging from first order response to complex higher-order response. To study this system we created a library of experimental constructs with engineered TI and antisense interaction by using face-to-face inducible promoters separated by carefully tailored overlapping DNA sequences to control expression of a set of fluorescent reporter proteins. Studying this gene expression mechanism allows for an understanding of higher order behavior of gene expression networks.

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