

Model-Driven Engineering of RNA Devices to Quantitatively Program Gene Expression

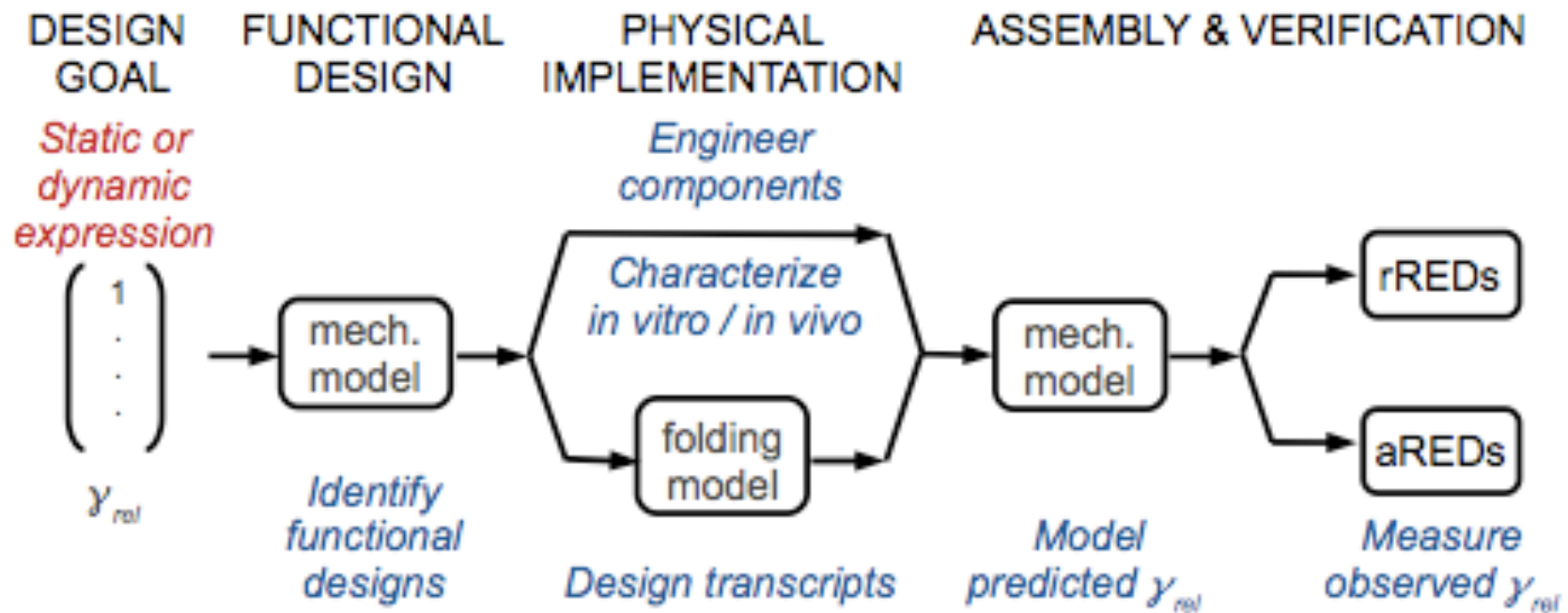
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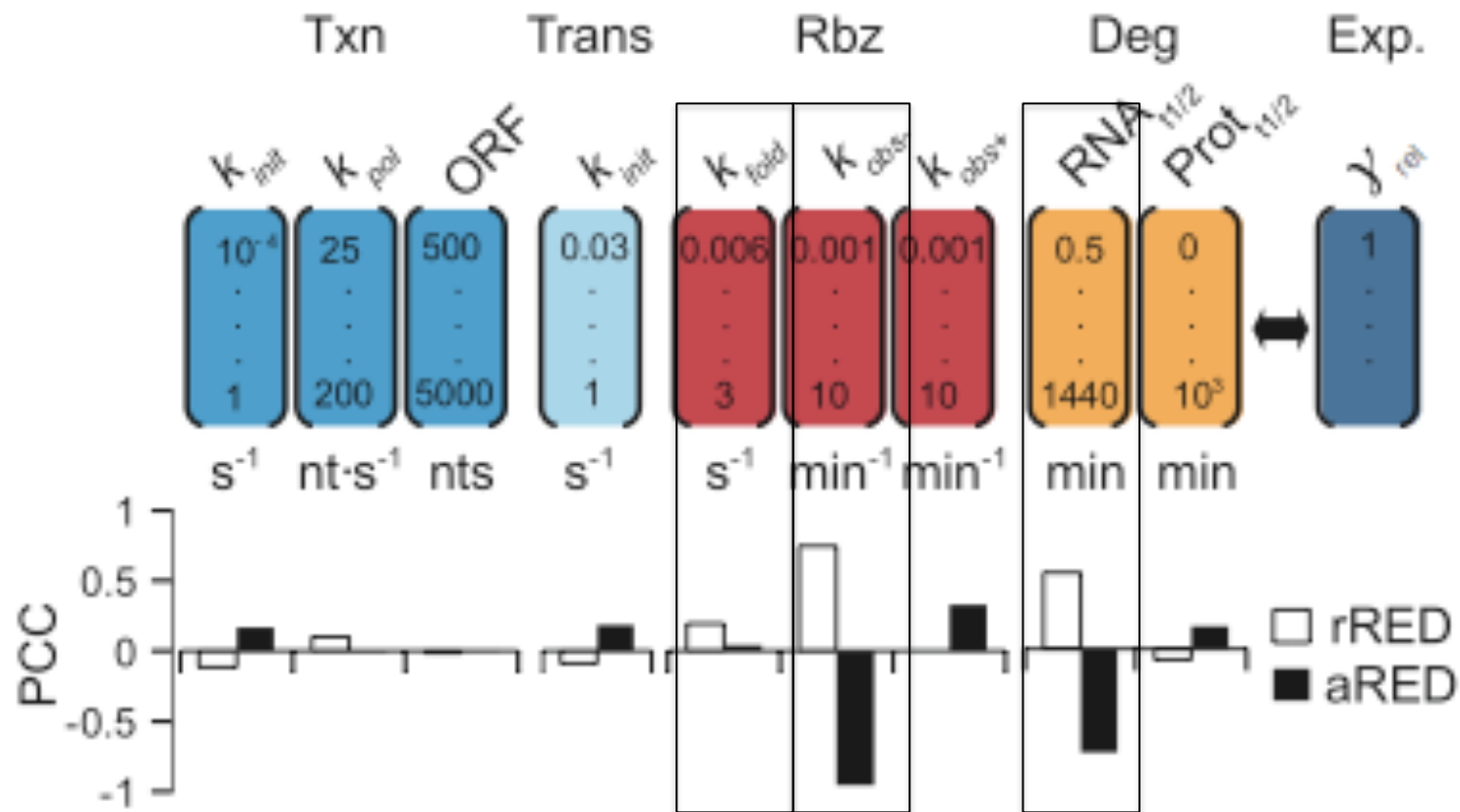
Goal

- RNA-regulated devices with predictable activity
 - Allow programmable pathways/circuits
- Ribozyme-regulated expression devices (rREDs)
- Aptamer-regulated expression devices (aREDs)

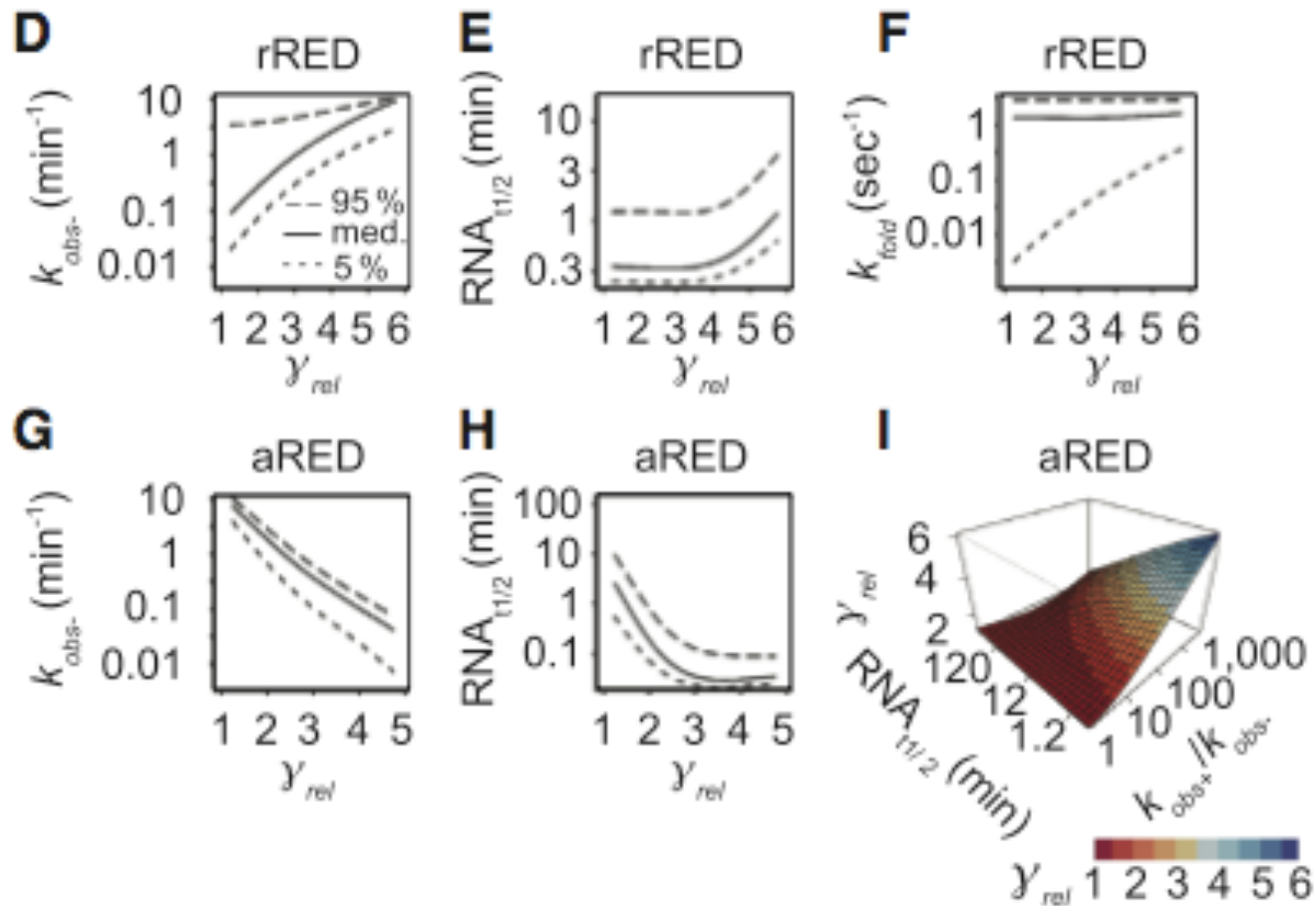
Design-Driven Engineering



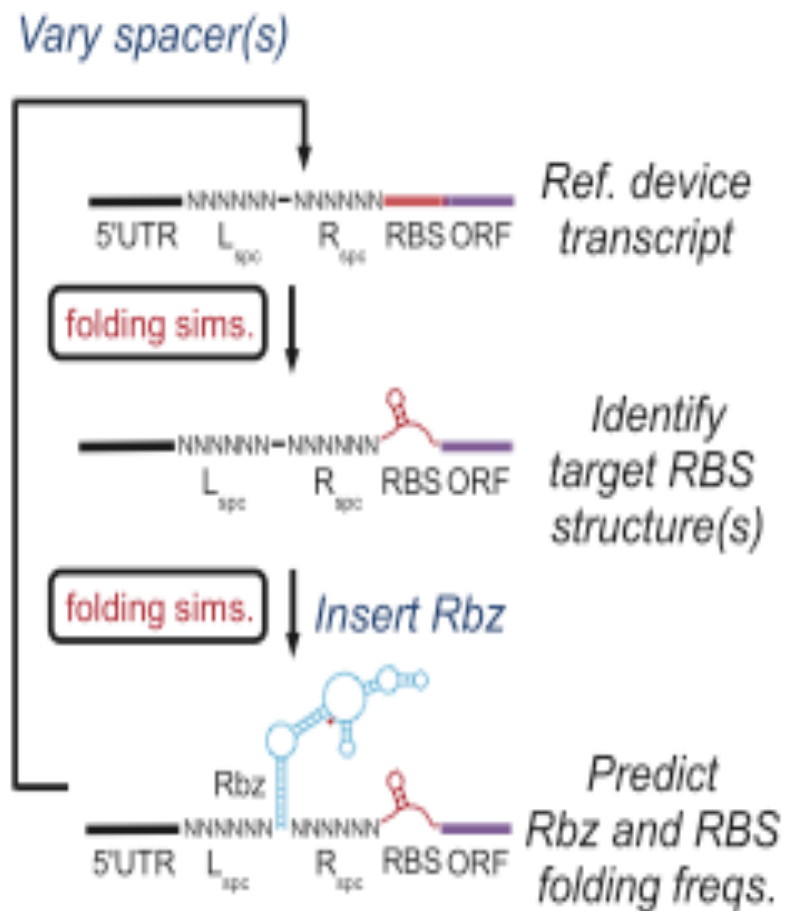
Impact of Design Variables



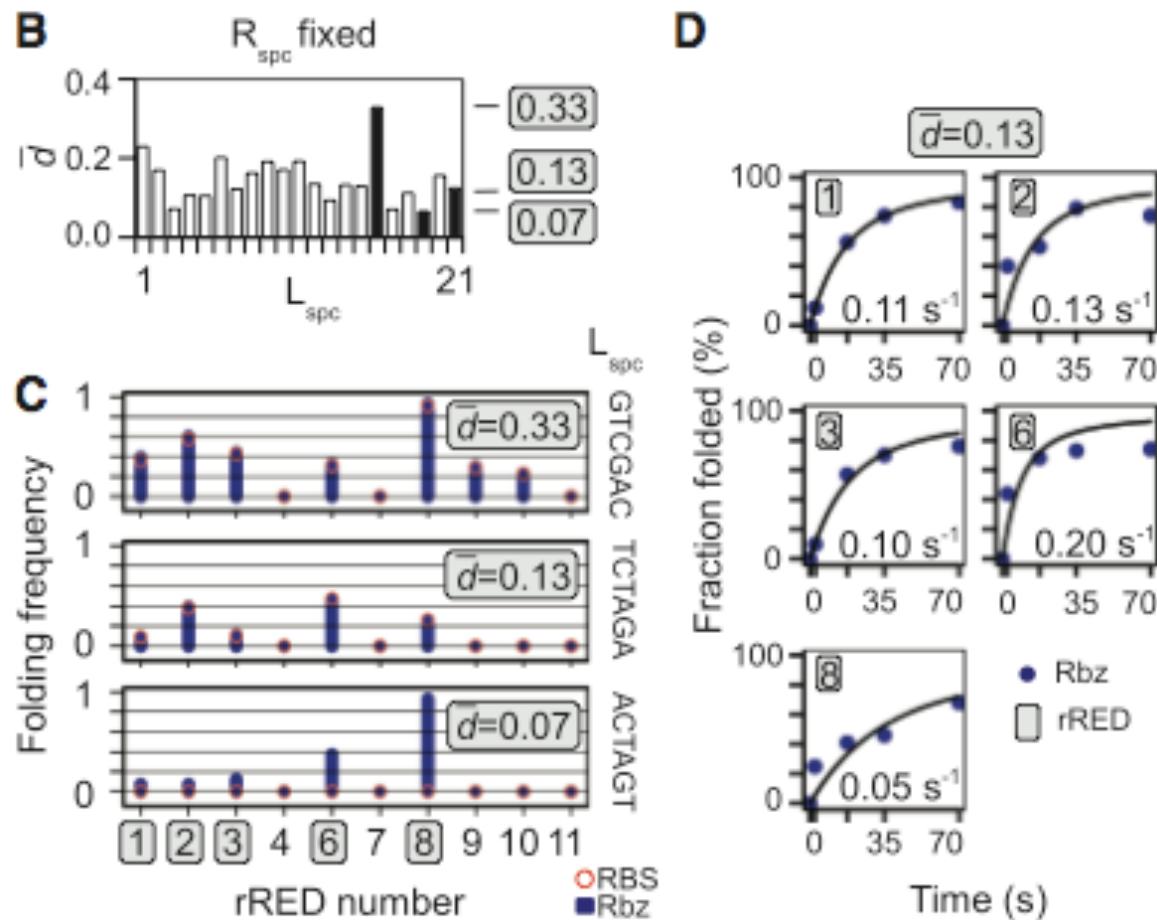
Impact of Design Variables



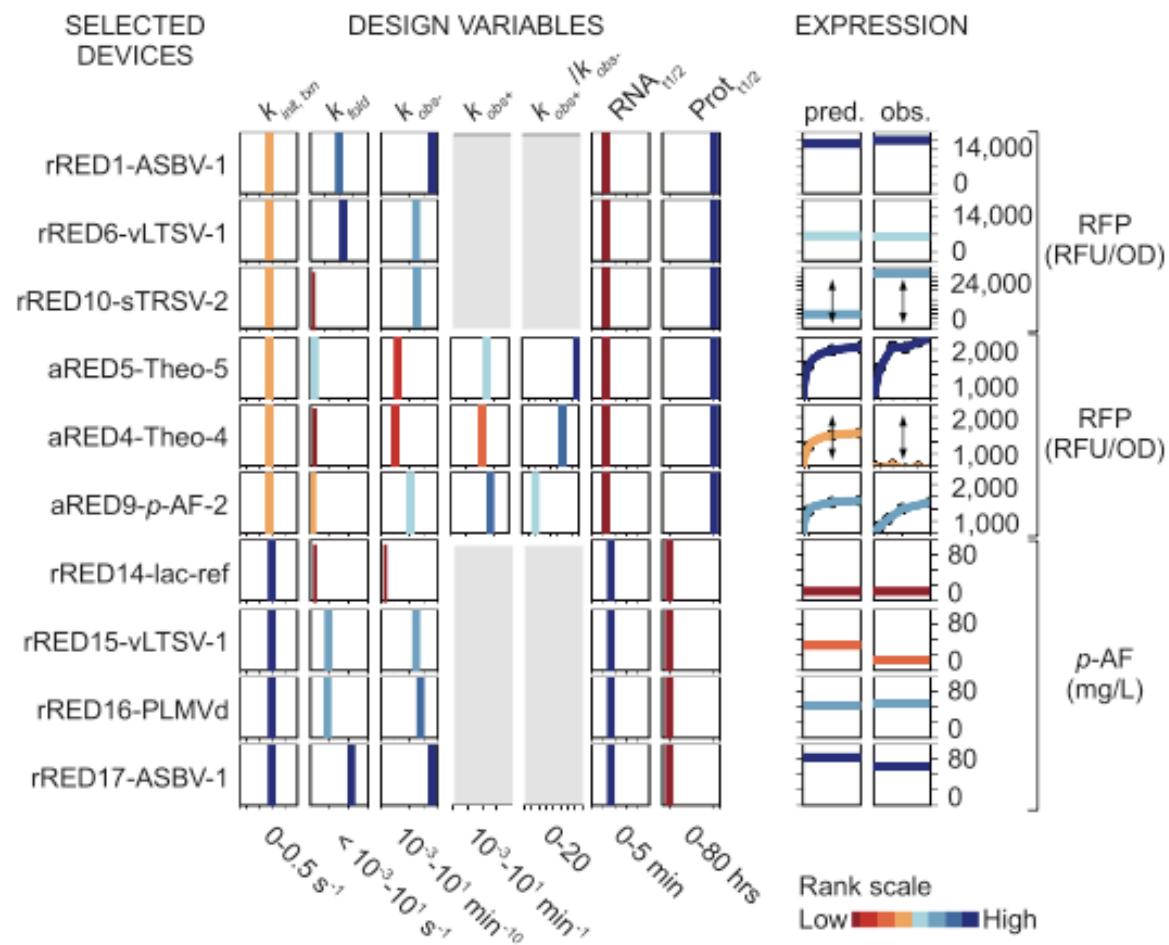
Design Method



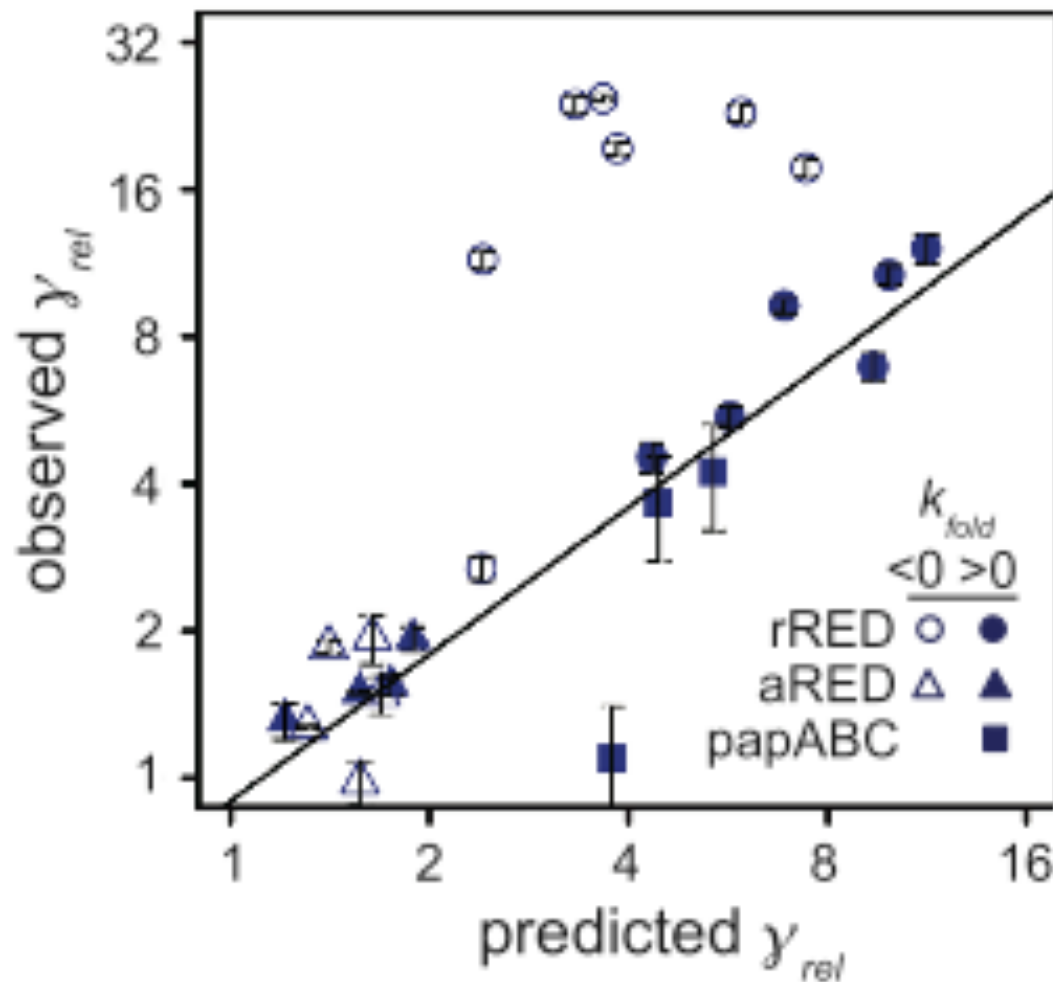
Folding Characterization



Expression Profiles



Predicted vs. Observed Expression



Conclusions

- Expression mediated by rREDs and aREDs correlated with the predicted levels
- Folding was important to programmable function
- Functional aREDs and rREDs can be made from component parts

Significance

- Program expression of large number of genes

Can be used to:

- Study natural mRNA activity
- Control engineered pathways or circuits
- Implement new genetic programs

Concerns

- Not much description on rRED/aRED mechanism
- Only characterized either rREDs or aREDs, not both
- Essential information only in supplemental material

Questions?

Identify Functional Designs

The System

