

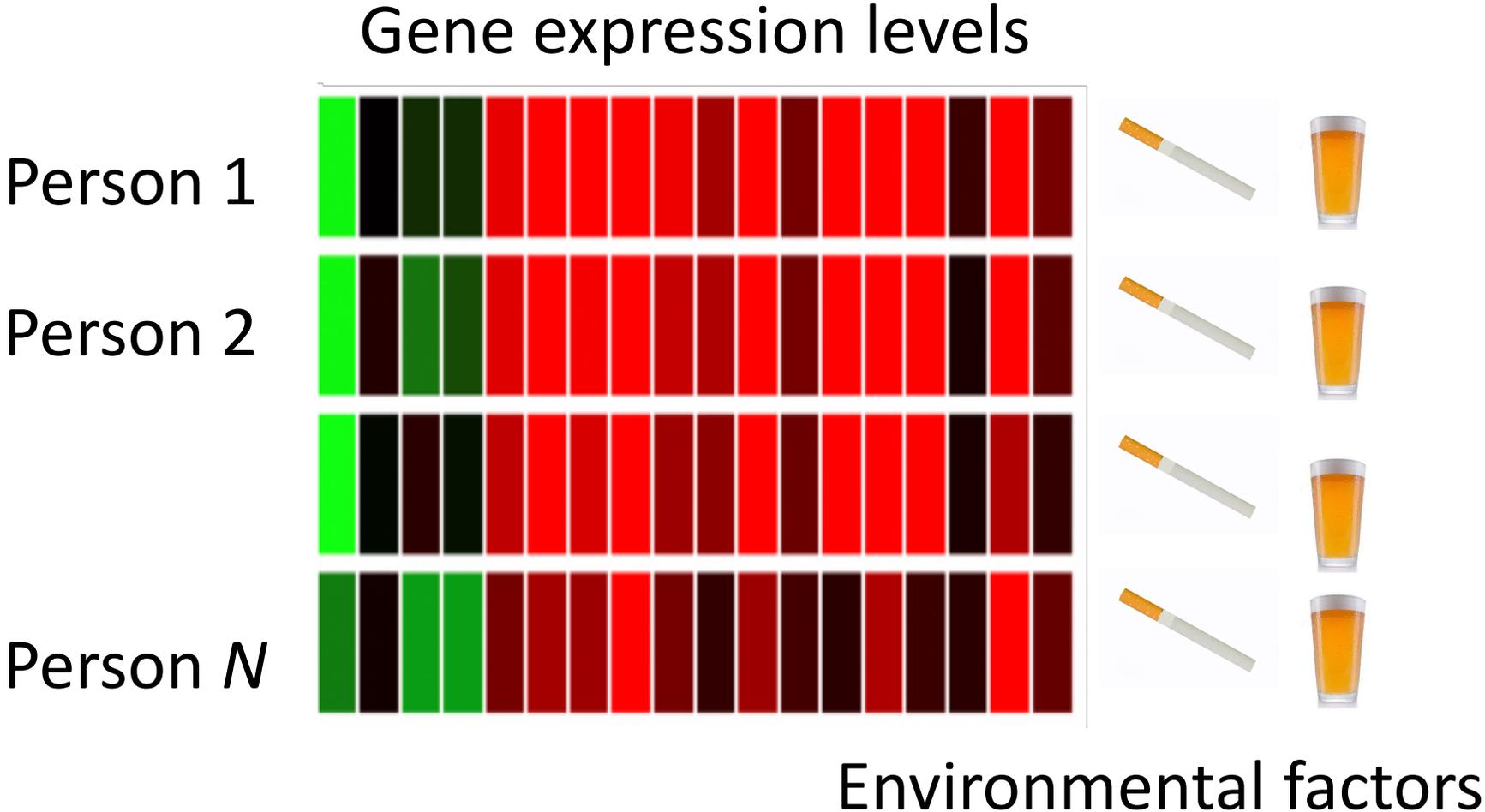
The Kernel Interaction Trick: Fast Bayesian Discovery of Pairwise Interactions

[**Raj Agrawal**, Jonathan Huggins,
Brian Trippe, Tamara Broderick]

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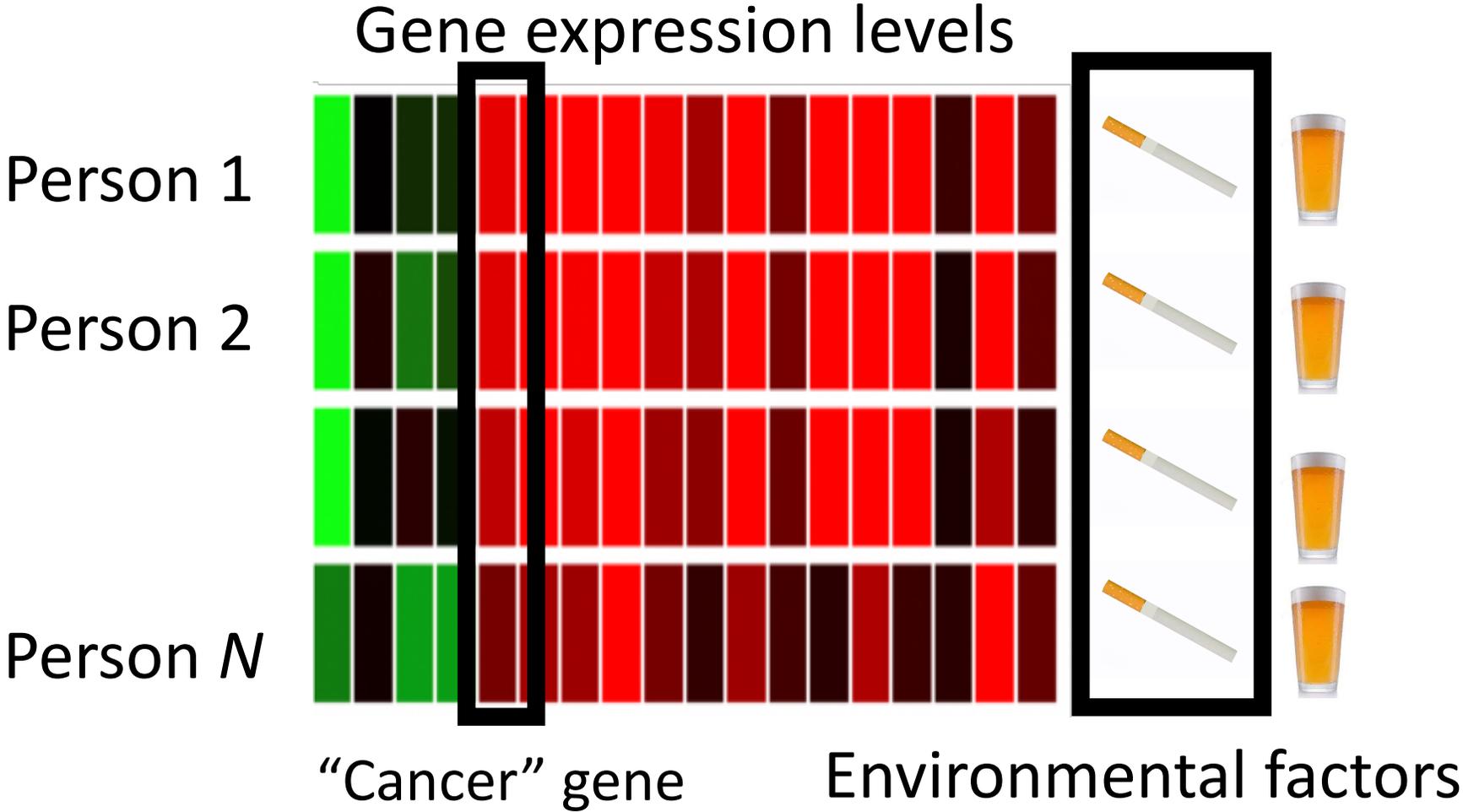


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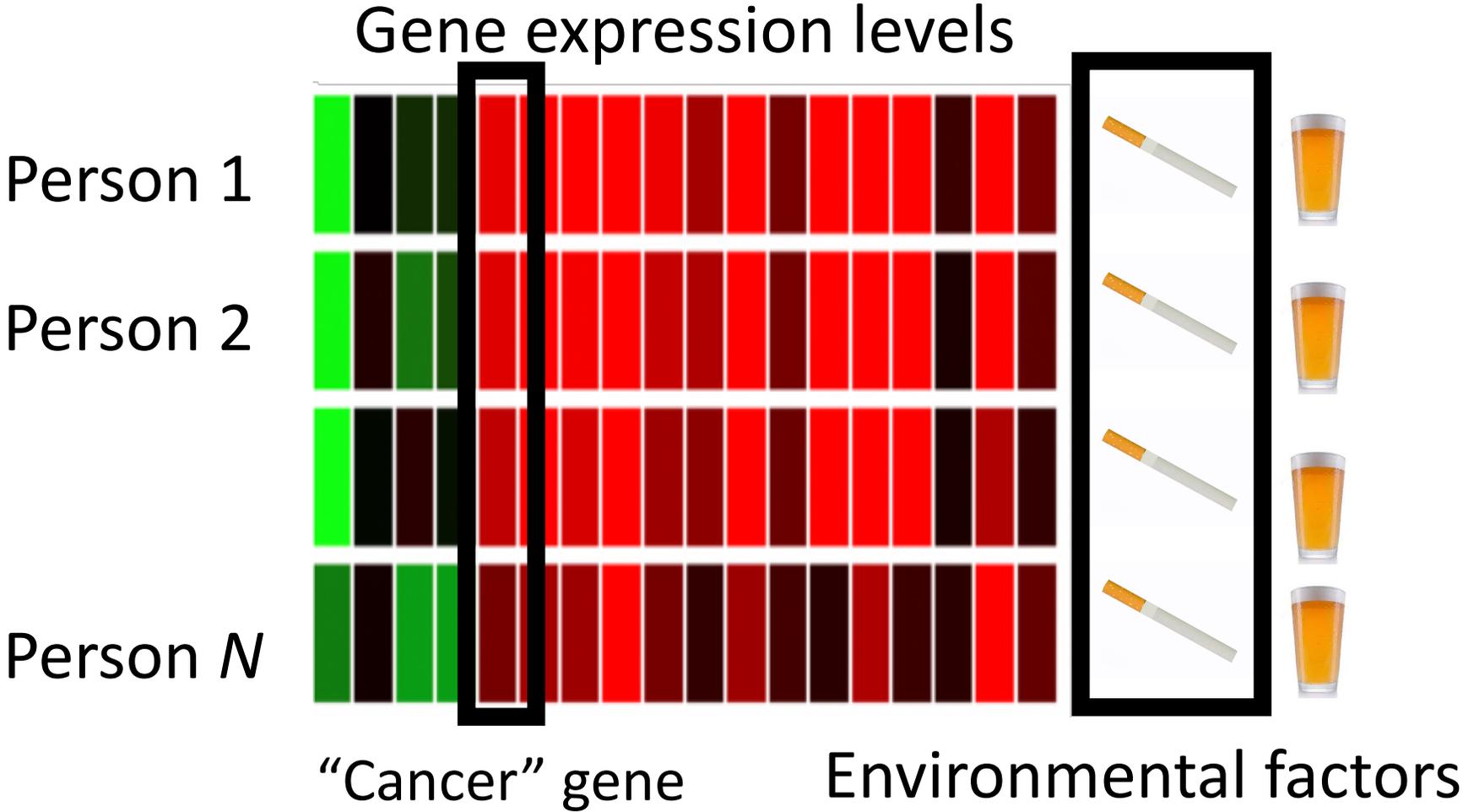
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Need to model pairwise interactions



Challenge: previous LASSO and Bayesian methods scale at least quadratically with dimension

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- Interactions have a very particular structure which allows us to represent the model **implicitly** as a Gaussian process so we can do inference in $O(\text{dimension})$ time
- Avoid the cost of reporting on **all** $O(\text{dimension}^2)$ parameters through (1) **sparsity** ($k \ll \text{dimension}$ non-zero main effects), (2) **strong-hierarchy**, and (3) $O(1)$ time to access distribution of each parameter via our **kernel interaction trick**

Better Type I and II error than LASSO Methods

Wed Jun 12th 06:30 -- 09:00 PM @ Pacific Ballroom #238

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Real data: Auto MPG has 6 covariates (15 possible interactions)

- Added 200 random noise covariates → 21,115 possible interactions

	# of original effects selected: # of fake effects selected
Our Method	4 : 0
Pairs LASSO	8 : 99
Hierarchical LASSO	10 : 84

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