

# Rank selection in HCP data

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Q: why does the test error monotonically decrease with rank? Is it a coincidence in this specific datasets, or something more fundamental?

Possible explanations: does this phenomenon depend on loss function (continuous vs. discrete)? sample vs. parameter ratio? choice of model complexity?

Take-away message:

- Same thing also happens in ridge regression. → rule out the first explanation.
- Depends crucially on the sample vs. parameter ratio. → confirm the second explanation.
- Perhaps in the over-parameterized region we should use other measure of model complexity. → confirm the third explanation.
- If the ground truth is low-rank, will full-rankness still lead to best prediction error? → Yes, the biased estimator may outperform the unbiased one in terms of prediction error. How about MSE? still better? → MSE for what? no right notion of parameters in the non-parametric framework.
- Adding noise is essential for U-shape testing error. Otherwise, no variance components in the the bias-variance trade-off.
- sample size vs. parameter size

rh-inferiortempora – rh-superiorparietal

rh-inferiortempora - rh-middletemporal