

Bayesian model averaging

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model uncertainty

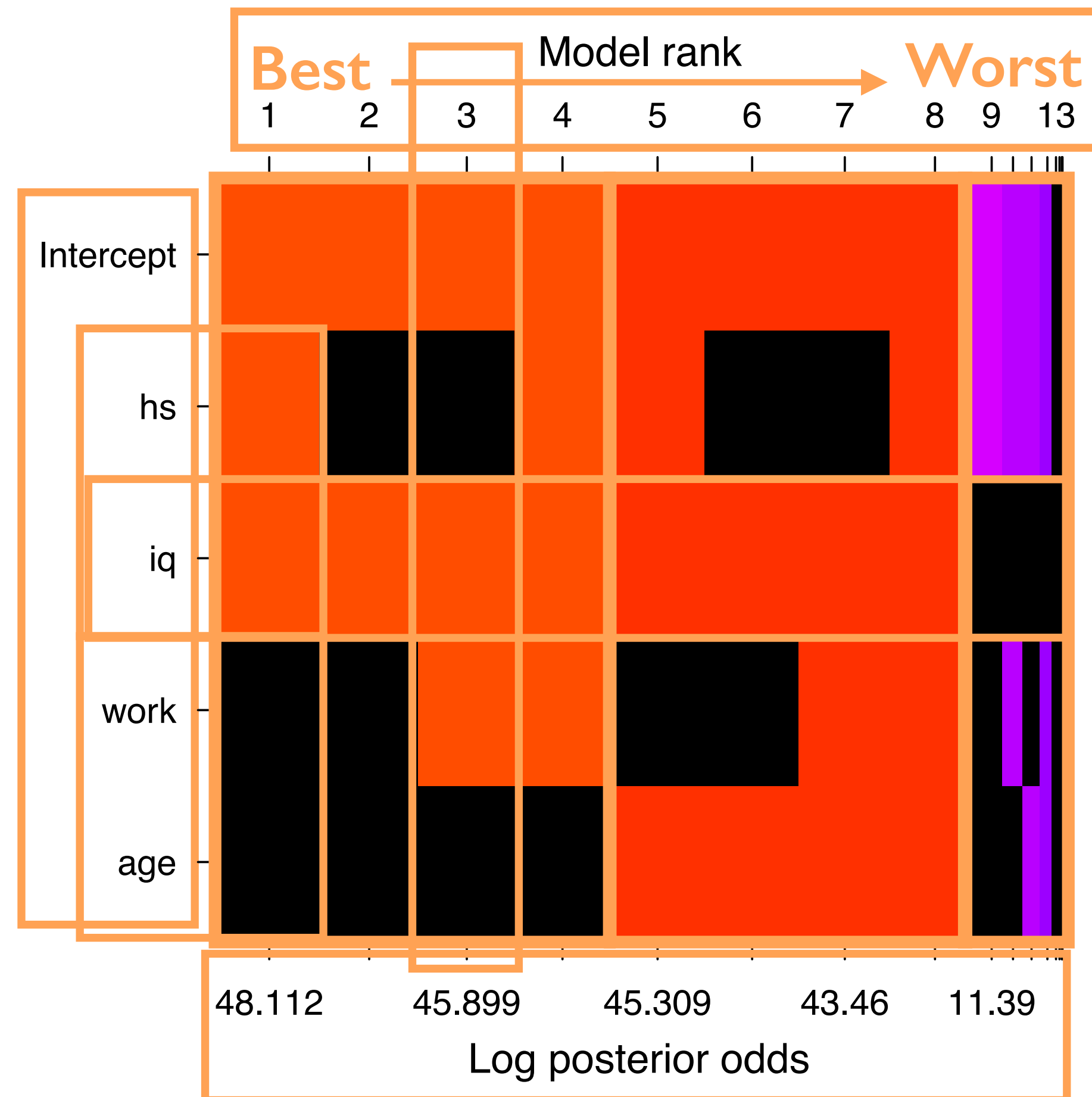
$kid_score \sim hs + iq + work + age$

- ▶ p predictors (4)
- ▶ 2^p possible models (16)

visualizing model uncertainty

R

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> image(cog_bas, rotate = F)
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Bayesian model averaging

- ▶ let Δ be a quantity of interest

Y^* , β_j , γ_j indicator variable j is included, $p(\beta_j \mid \text{data})$

$$p(\Delta \mid \text{data}) = \sum_m^{2^p} p(\Delta \mid \mathcal{M}_m, \text{data}) p(\mathcal{M}_m \mid \text{data})$$

$$E[\Delta \mid \text{data}] = \sum_m^{2^p} E[\Delta \mid \mathcal{M}_m, \text{data}] p(\mathcal{M}_m \mid \text{data})$$

- ▶ weighted average of model specific quantities
- ▶ BMA predictions $\hat{Y}^* = \sum \hat{Y}_m^* p(\mathcal{M}_m \mid \text{data})$

coefficient summaries

R

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> cog_coef
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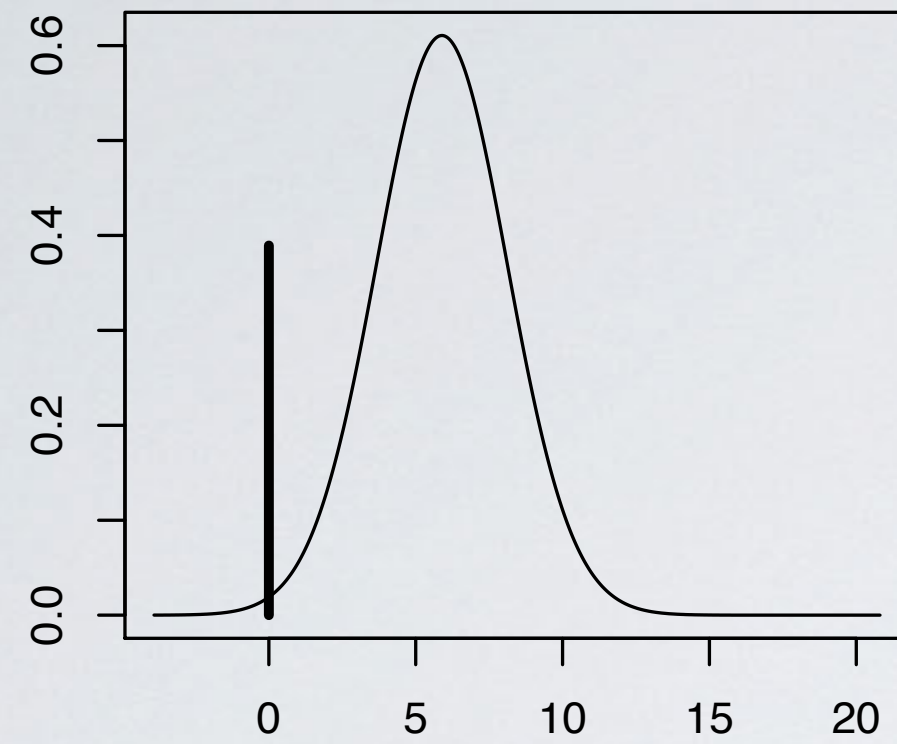
Marginal Posterior Summaries of Coefficients:

	post mean	post SD	post p(B != 0)
Intercept	86.79724	0.87287	1.00000
hs	3.59494	3.35643	0.61064
iq	0.58101	0.06363	1.00000
work	0.36696	1.30939	0.11210
age	0.02089	0.11738	0.06898

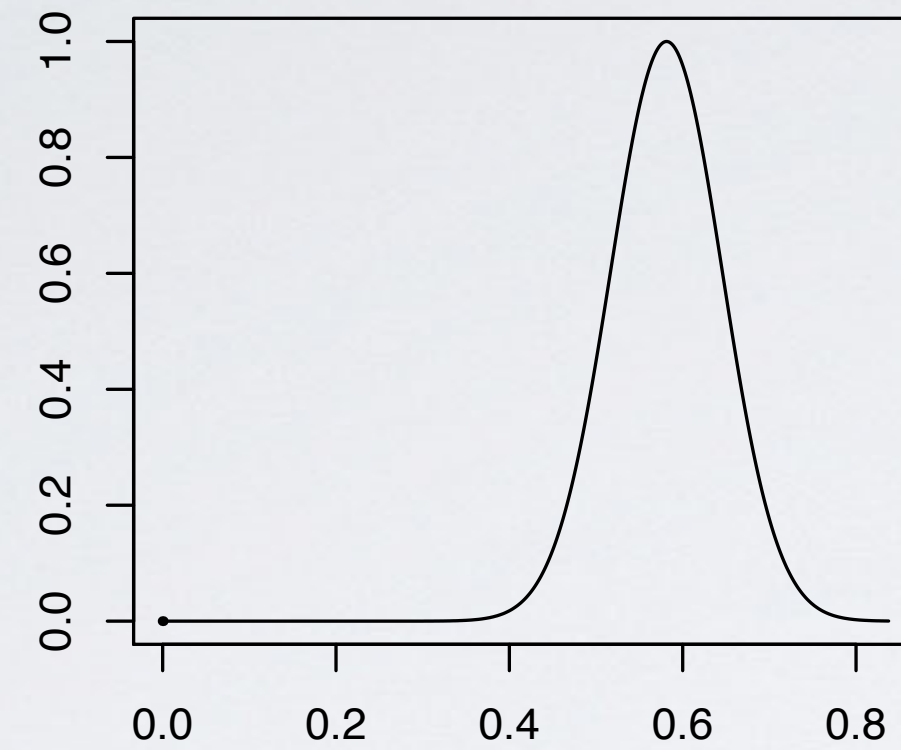
► $P(\beta_{age} = 0 \mid \text{data}) = 0.931$

plausible values of coefficients

mom_hsyas

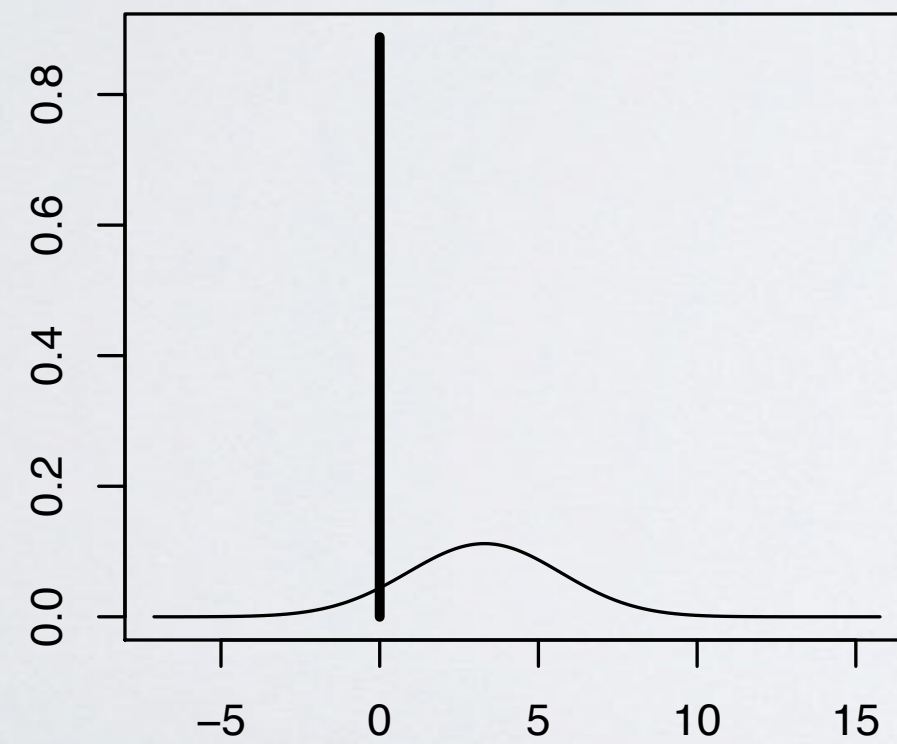


mom_iq

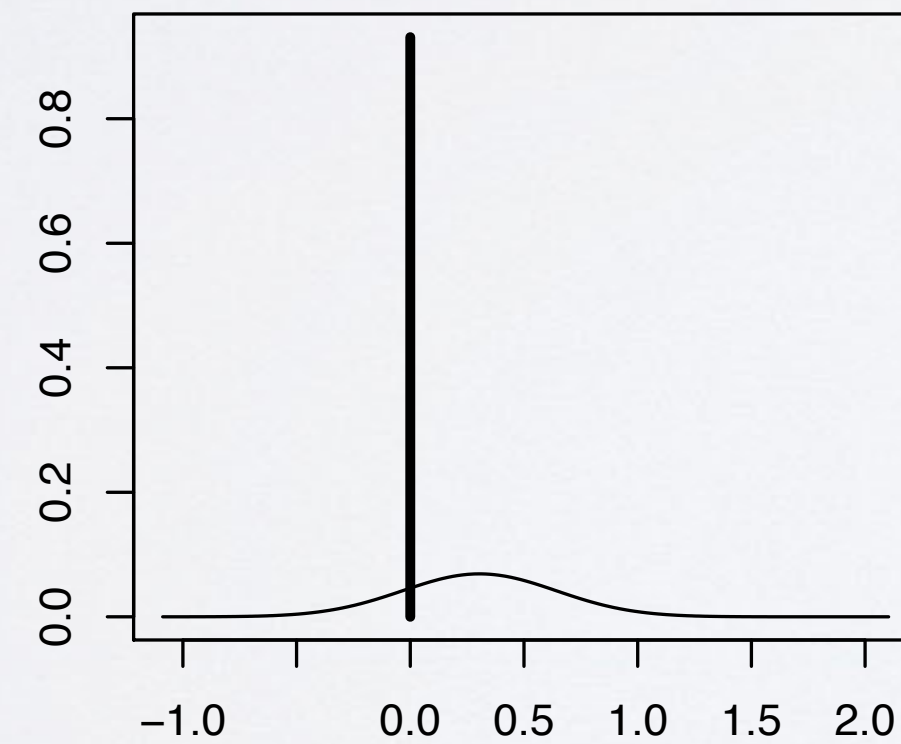


- ▶ spike represents probability coefficient is 0

mom_workyes



mom_age



- ▶ distribution of coefficient if it is not 0

summary

- ▶ BMA accounts for model uncertainty
- ▶ software
- ▶ use BIC and reference prior

next:

- ▶ prior sensitivity