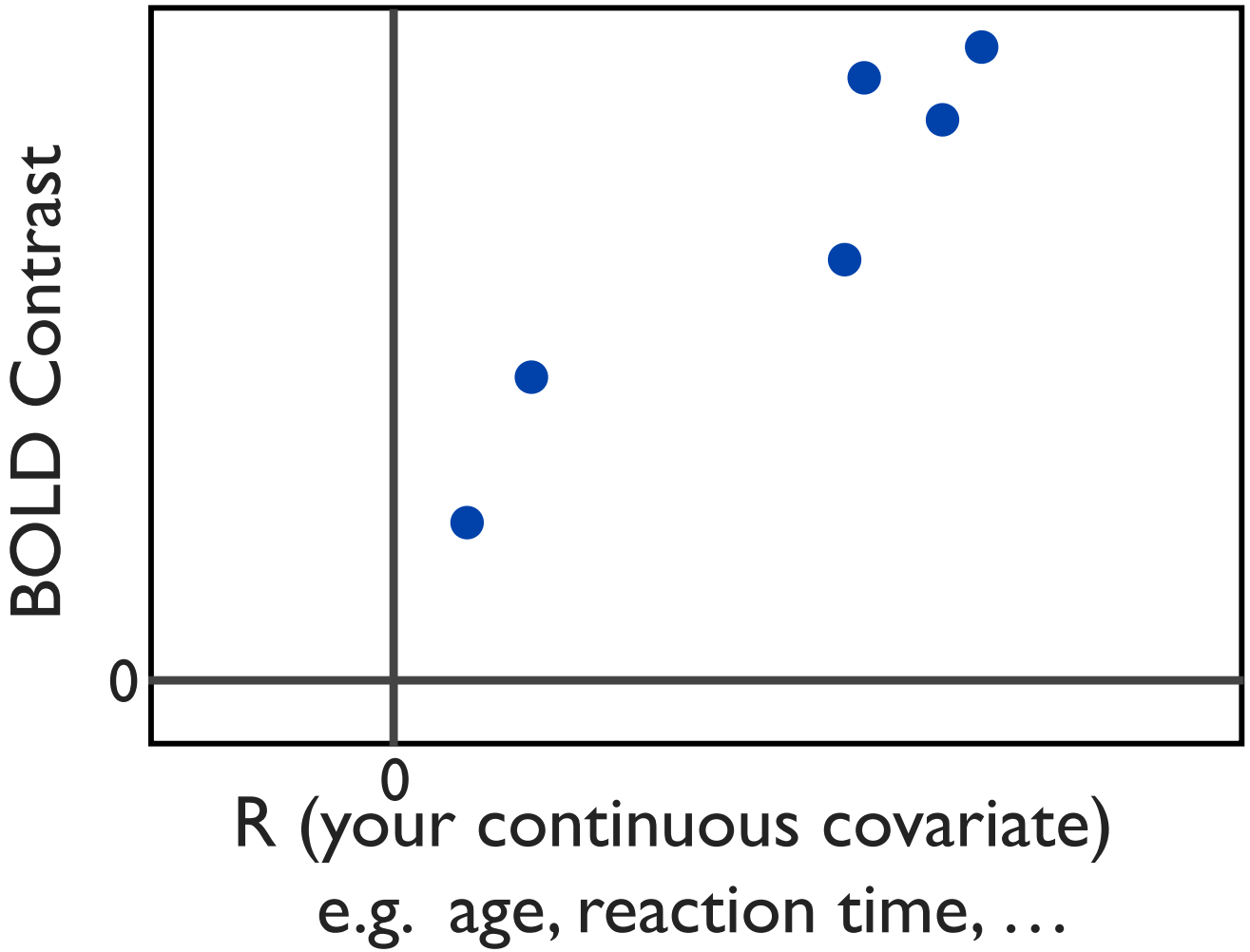
Demeaning EVs

Demeaning at the group level

$$\begin{pmatrix} 1 & r_1 \\ 1 & r_2 \\ 1 & r_3 \\ 1 & r_4 \\ 1 & r_5 \\ 1 & r_6 \end{pmatrix}$$



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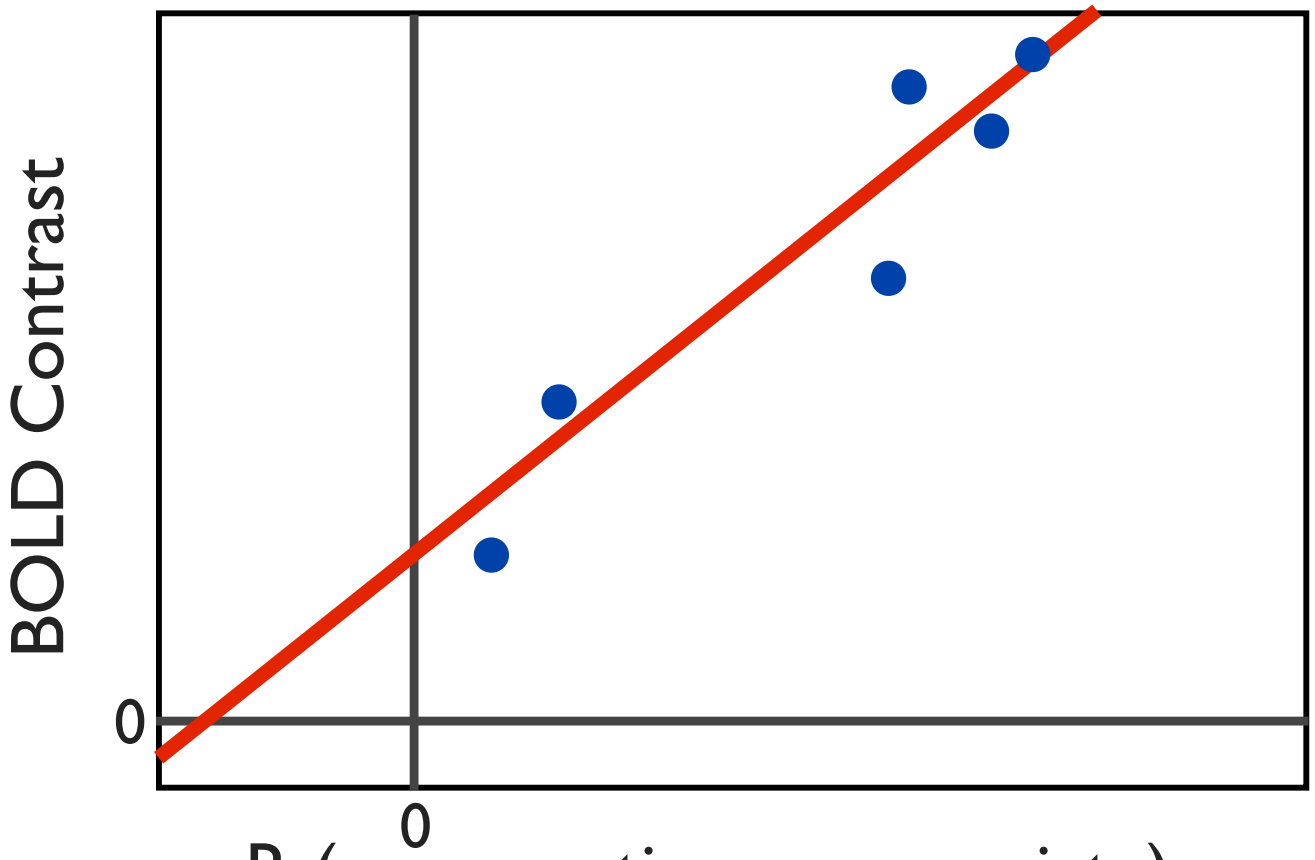
Demeaning

$$\begin{pmatrix} 1 & r_1 \\ 1 & r_2 \\ 1 & r_3 \\ 1 & r_4 \\ 1 & r_5 \\ 1 & r_6 \end{pmatrix}$$



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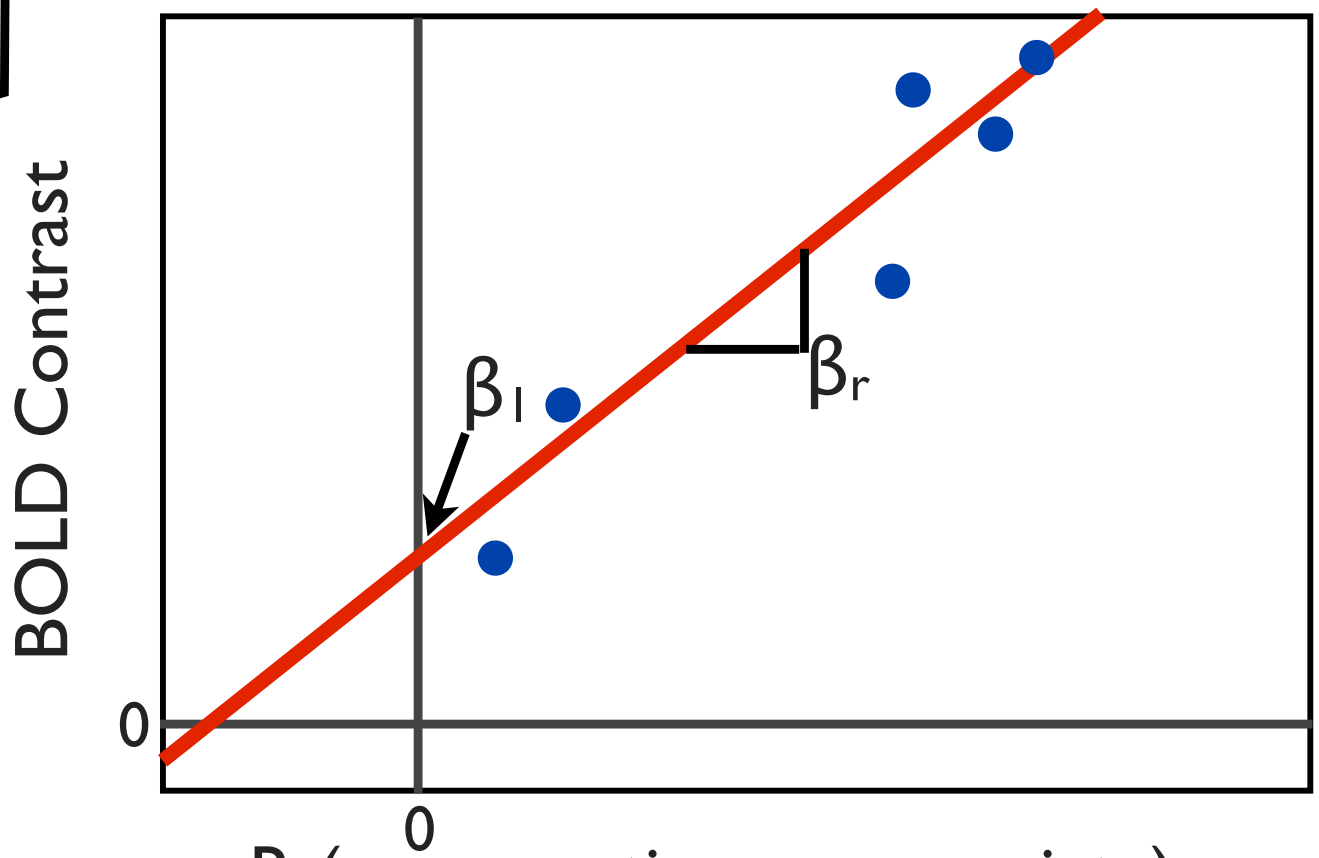
Demeaning

$$\begin{pmatrix} 1 & r_1 \\ 1 & r_2 \\ 1 & r_3 \\ 1 & r_4 \\ 1 & r_5 \\ 1 & r_6 \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_r \end{pmatrix}$$

$$[\,1 \quad 0\,]$$



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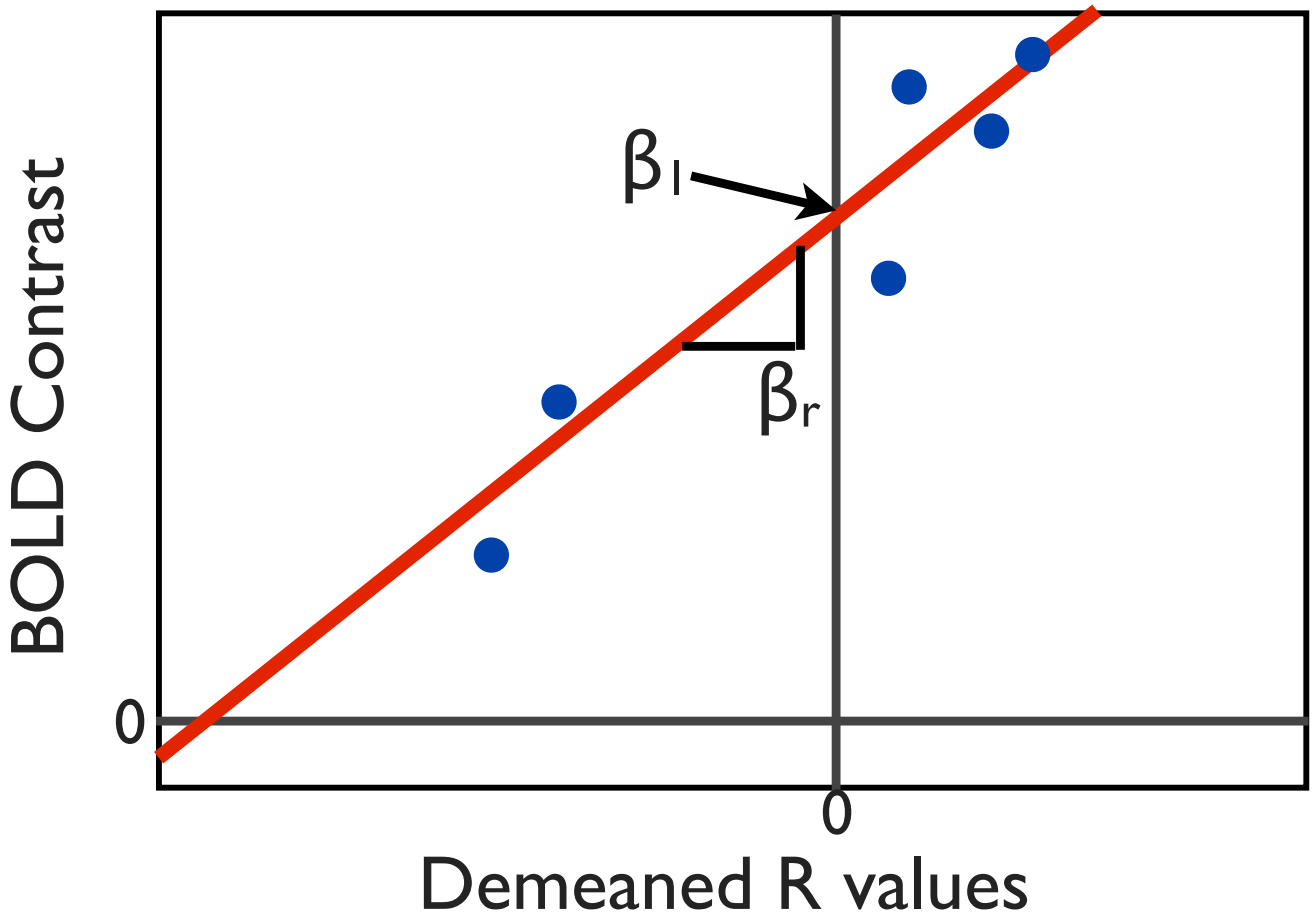
Demeaning

β_1 now represents BOLD at group average R



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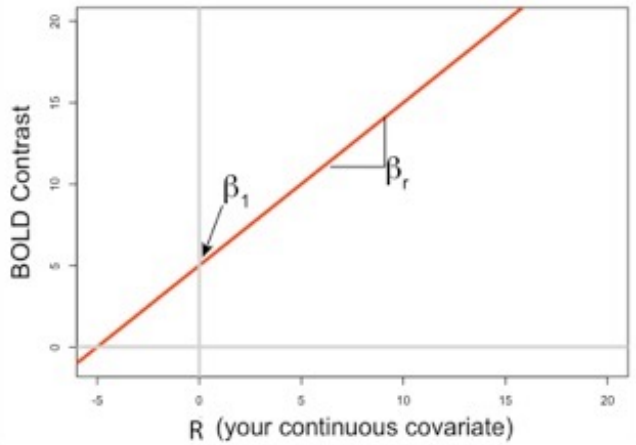
Demeaning

Design matrix	What does the fitted model look like?	Contrast	Does demeaning change the stats?	Demeaning recommended?
$\begin{pmatrix} 1 & r_1 \\ 1 & r_2 \\ 1 & r_3 \\ 1 & r_4 \\ 1 & r_5 \\ 1 & r_6 \end{pmatrix} \begin{bmatrix} \beta_1 \\ \beta_r \end{bmatrix}$		[1 0] [0 1]	YES	YES

Mean centred value = r_1 - $\bar{r}$

where $\bar{r}$ is the mean of r_1 to r_6

Adding or subtracting a mean from EV_2 (i.e. r_1 to r_6) **changes β_1**

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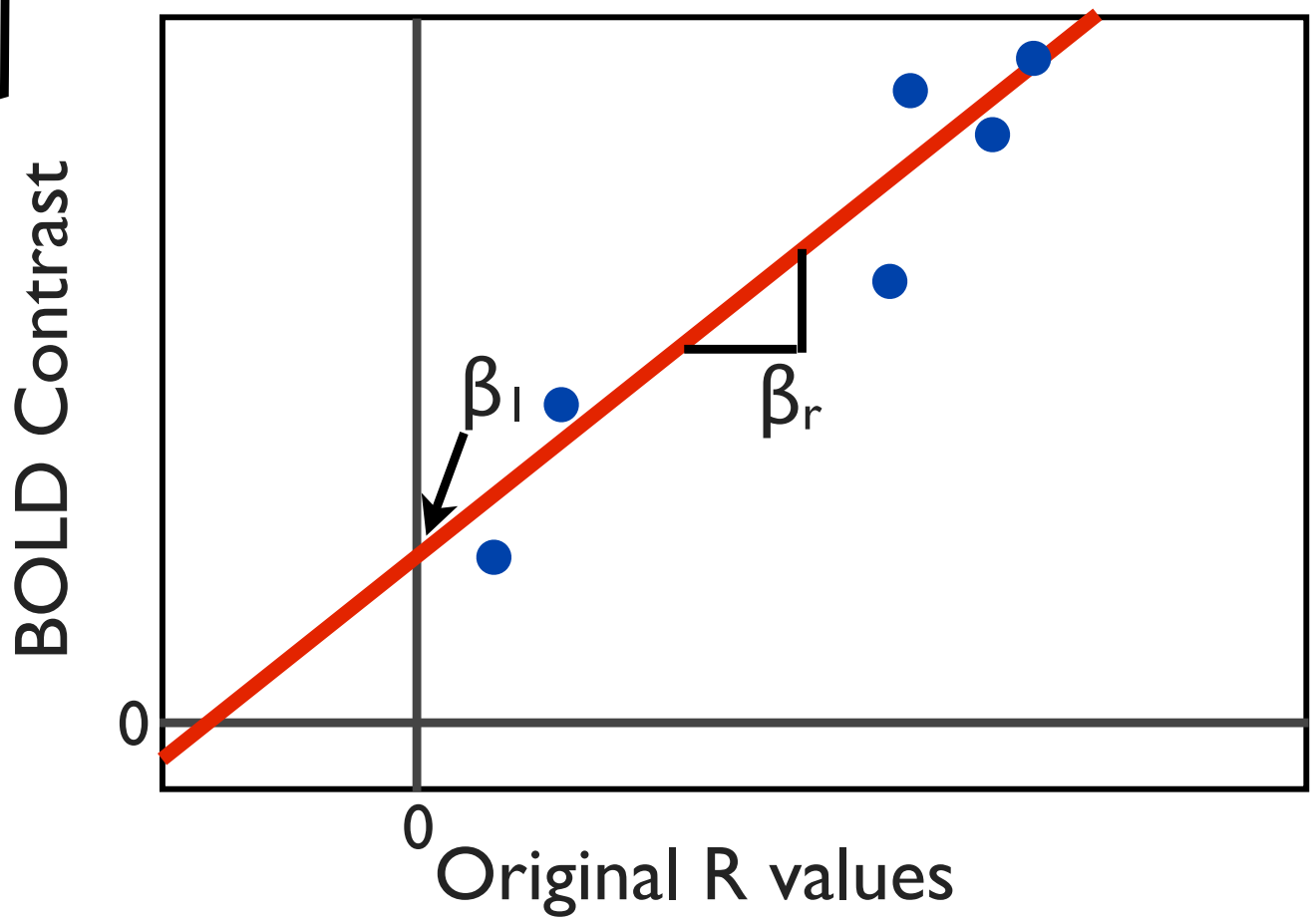
Demeaning

$$\begin{pmatrix} 1 & r_1 \\ 1 & r_2 \\ 1 & r_3 \\ 1 & r_4 \\ 1 & r_5 \\ 1 & r_6 \end{pmatrix} \begin{bmatrix} \beta_1 \\ \beta_r \end{bmatrix}$$

$$[\,0 \quad 1\,]$$

β_1 represents BOLD at R=0



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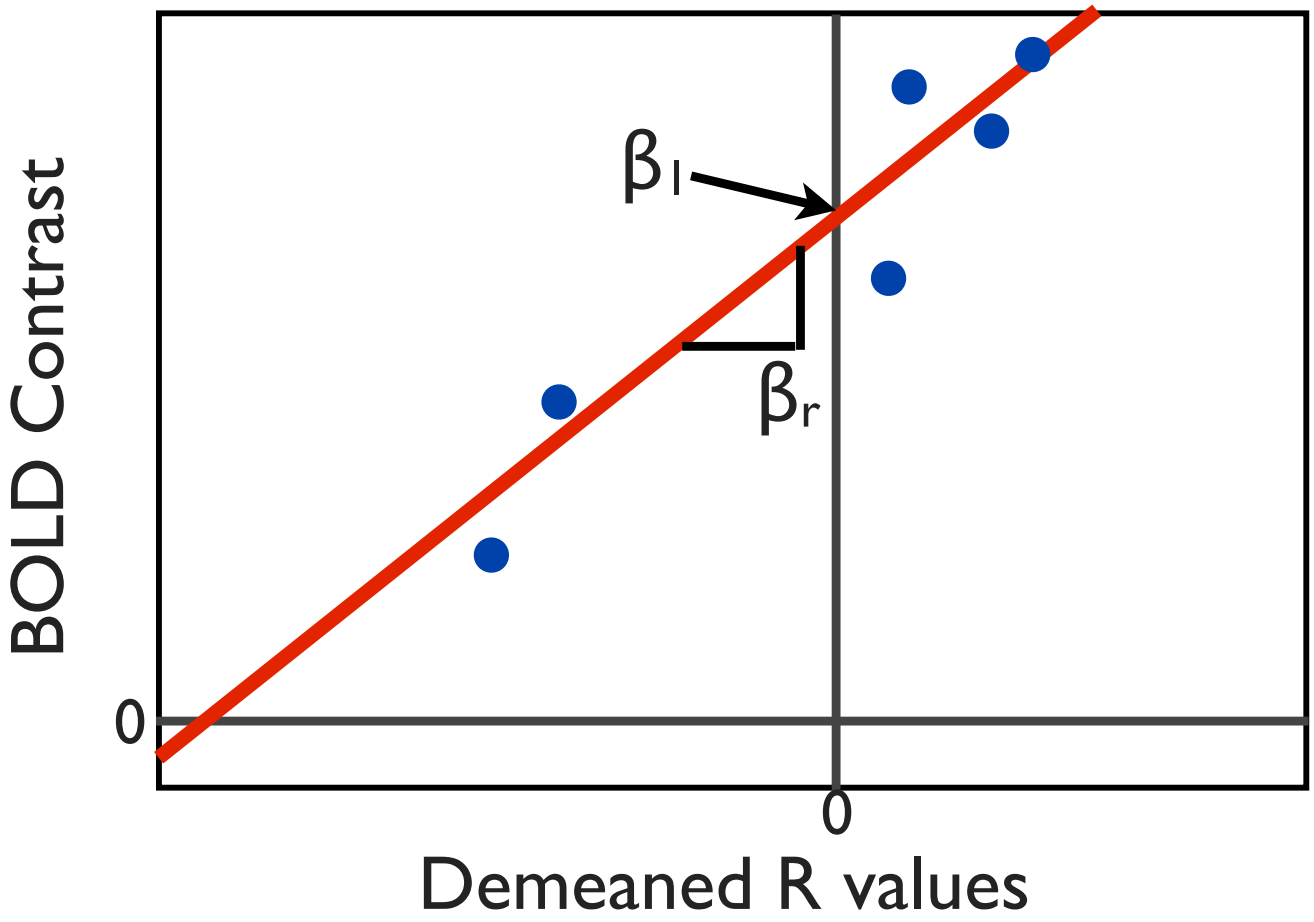
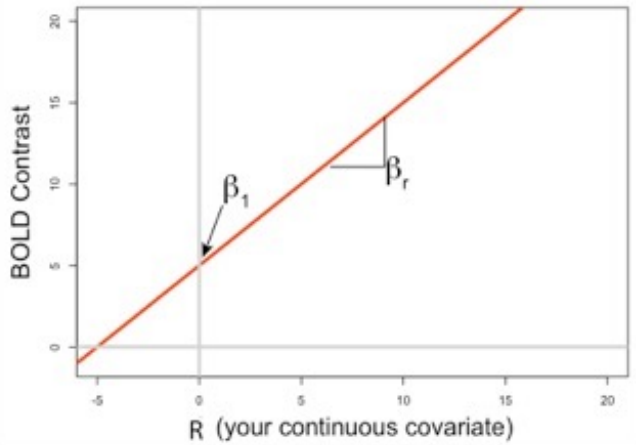
Demeaning

β_1 now represents BOLD at group average R



mumford.fmripower.org/mean_centering/

Demeaning

Design matrix	What does the fitted model look like?	Contrast	Does demeaning change the stats?	Demeaning recommended?
$\begin{pmatrix} 1 & r_1 \\ 1 & r_2 \\ 1 & r_3 \\ 1 & r_4 \\ 1 & r_5 \\ 1 & r_6 \end{pmatrix} \begin{bmatrix} \beta_1 \\ \beta_r \end{bmatrix}$		[1 0]	YES	YES
		[0 1]	NO	YES

Mean centred value = r_1 - $\bar{r}$

where $\bar{r}$ is the mean of r_1 to r_6

Adding or subtracting a mean from EV_2 (i.e. r_1 to r_6) **changes β_1**

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Demeaning EVs summary

- We can control for confound variables at the group level
- Demeaning EVs can change the interpretation of the statistics
- Demeaning EVs generally recommended