

Contrasts

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Contrasts

- ▶ Linear combination of parameters
- ▶ In R used to determine which estimable functions are shown as factor level effects

Example Dataset

Table 1: Body Weight and Breed of Beef Cattle Animals

| Animal | Body Weight | Breed |
|--------|-------------|-----------|
| 1 | 471 | Angus |
| 2 | 463 | Angus |
| 4 | 470 | Angus |
| 7 | 518 | Limousin |
| 8 | 511 | Limousin |
| 9 | 510 | Limousin |
| 10 | 541 | Limousin |
| 3 | 481 | Simmental |
| 5 | 496 | Simmental |
| 6 | 491 | Simmental |

Contrasts in R

```
(mat_ctr <- contrasts(as.factor(tbl_flem_bw_breed$Breed)))
```

| ## | Limousin | Simmental |
|--------------|----------|-----------|
| ## Angus | 0 | 0 |
| ## Limousin | 1 | 0 |
| ## Simmental | 0 | 1 |

Model Matrix

```
model.matrix(lm(`Body Weight` ~ Breed, data = tbl_flem_bw_h
```

```
##      (Intercept) BreedLimousin BreedSimmental
## 1             1             0             0
## 2             1             0             0
## 3             1             0             0
## 4             1             1             0
## 5             1             1             0
## 6             1             1             0
## 7             1             1             0
## 8             1             0             1
## 9             1             0             1
## 10            1             0             1
## attr(,"assign")
## [1] 0 1 1
## attr(,"contrasts")
## attr(,"contrasts")$Breed
## [1] "contr.treatment"
```

Estimable Functions

- ▶ extend contrasts matrix by one row of all ones for the intercept

```
##           Limousin Simmental
## Angus      1         0         0
## Limousin   1         1         0
## Simmental  1         0         1
```

Estimable Functions II

- ▶ Inverse of extended contrasts matrix

| ## | Angus | Limousin | Simmental |
|--------------|-------|----------|-----------|
| ## | 1 | 0 | 0 |
| ## Limousin | -1 | 1 | 0 |
| ## Simmental | -1 | 0 | 1 |

- ▶ First row: which group means are used for intercept
- ▶ Other rows: vectors q^T representing estimable functions

Validation

...

Other Contrasts

- ▶ Helmert
- ▶ sum

Custom Contrasts