

Contrasts

Peter von Rohr

2023-03-27

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
3	481	Simmental
4	470	Angus
5	496	Simmental
6	491	Simmental
7	518	Limousin
8	511	Limousin
9	510	Limousin
10	541	Limousin

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             1
## 4             1             0             0
## 5             1             0             1
## 6             1             0             1
## 7             1             1             0
## 8             1             1             0
## 9             1             1             0
## 10            1             1             0
## 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