

# conditions for anova

## Conditions for ANOVA

1. ***Independence:***
  - ✓ **within groups:** sampled observations must be independent
  - ✓ **between groups:** the groups must be independent of each other (non-paired)
2. ***Approximate normality:*** distributions should be nearly normal within each group
3. ***Equal variance:*** groups should have roughly equal variability



# (I) independence

**within:** sampled observations must be independent of each other

- ▶ random sample / assignment
- ▶ each  $n_j$  less than 10% of respective population
- ▶ always important, but sometimes difficult to check

**between:** groups must be independent of each other

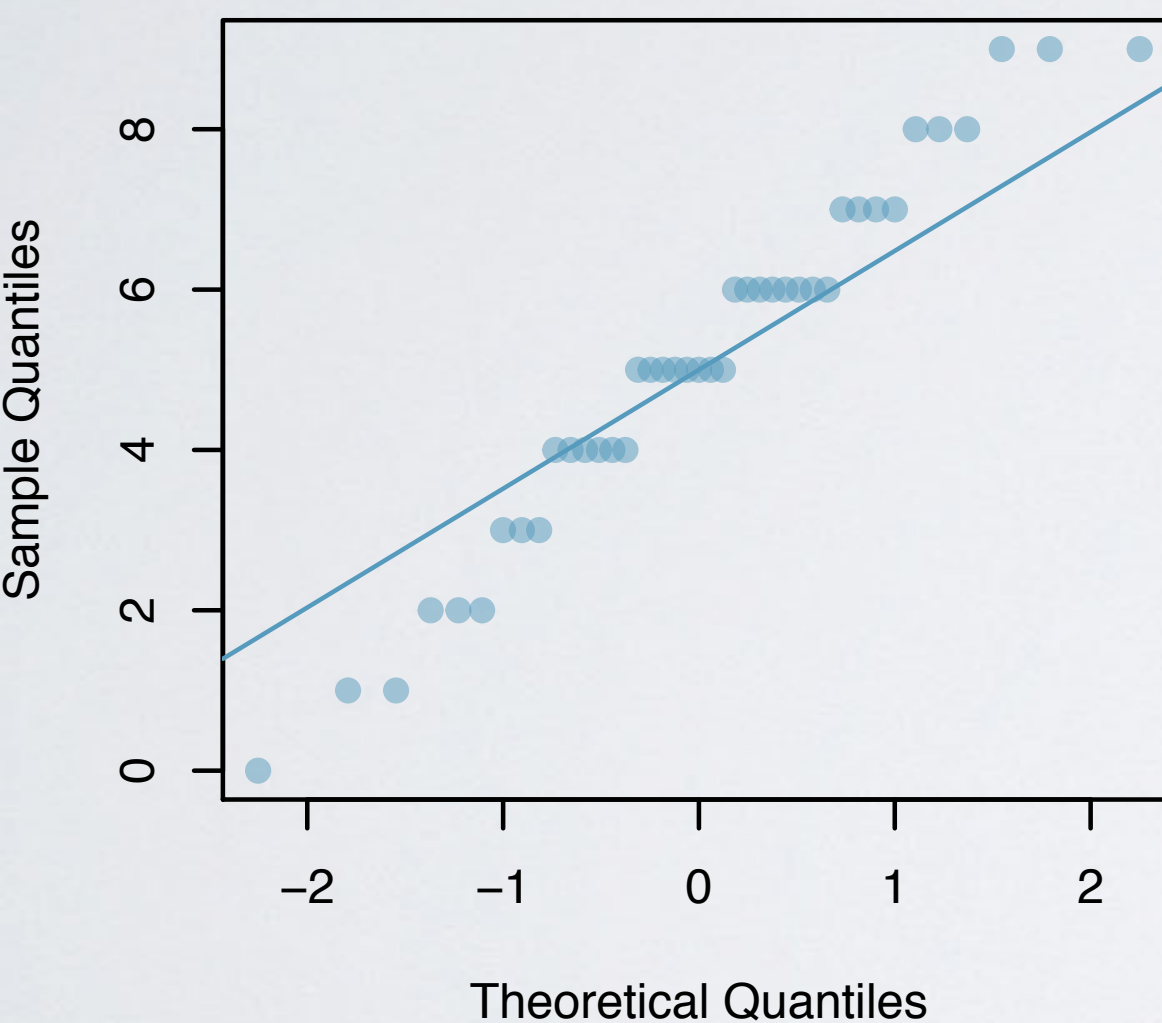
- ▶ carefully consider whether the groups may be dependent

→ *repeated measures anova*

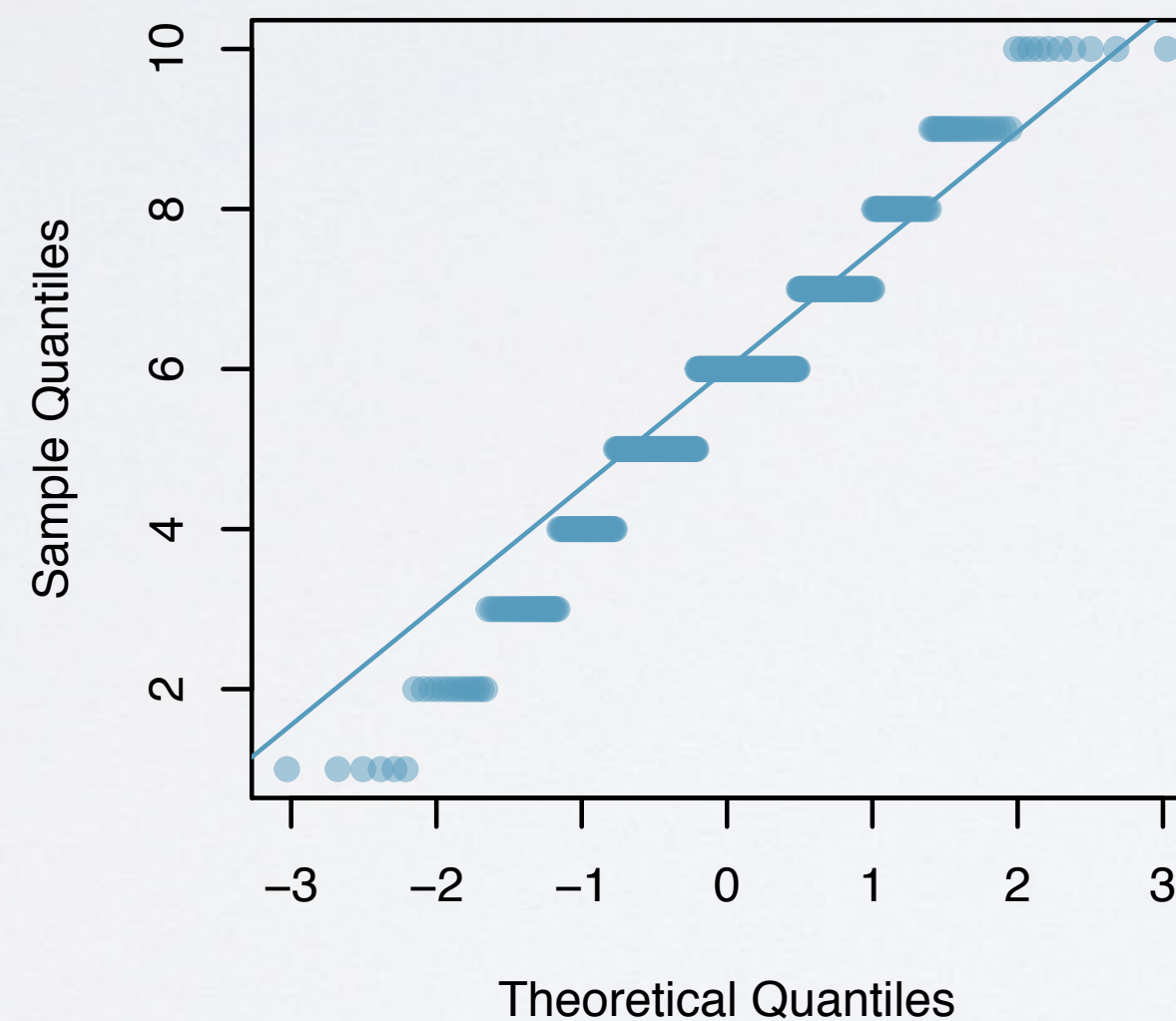
## (2) approximately normal

- ▶ distribution of response variable within each group should be approximately normal
- ▶ especially important when sample sizes are small

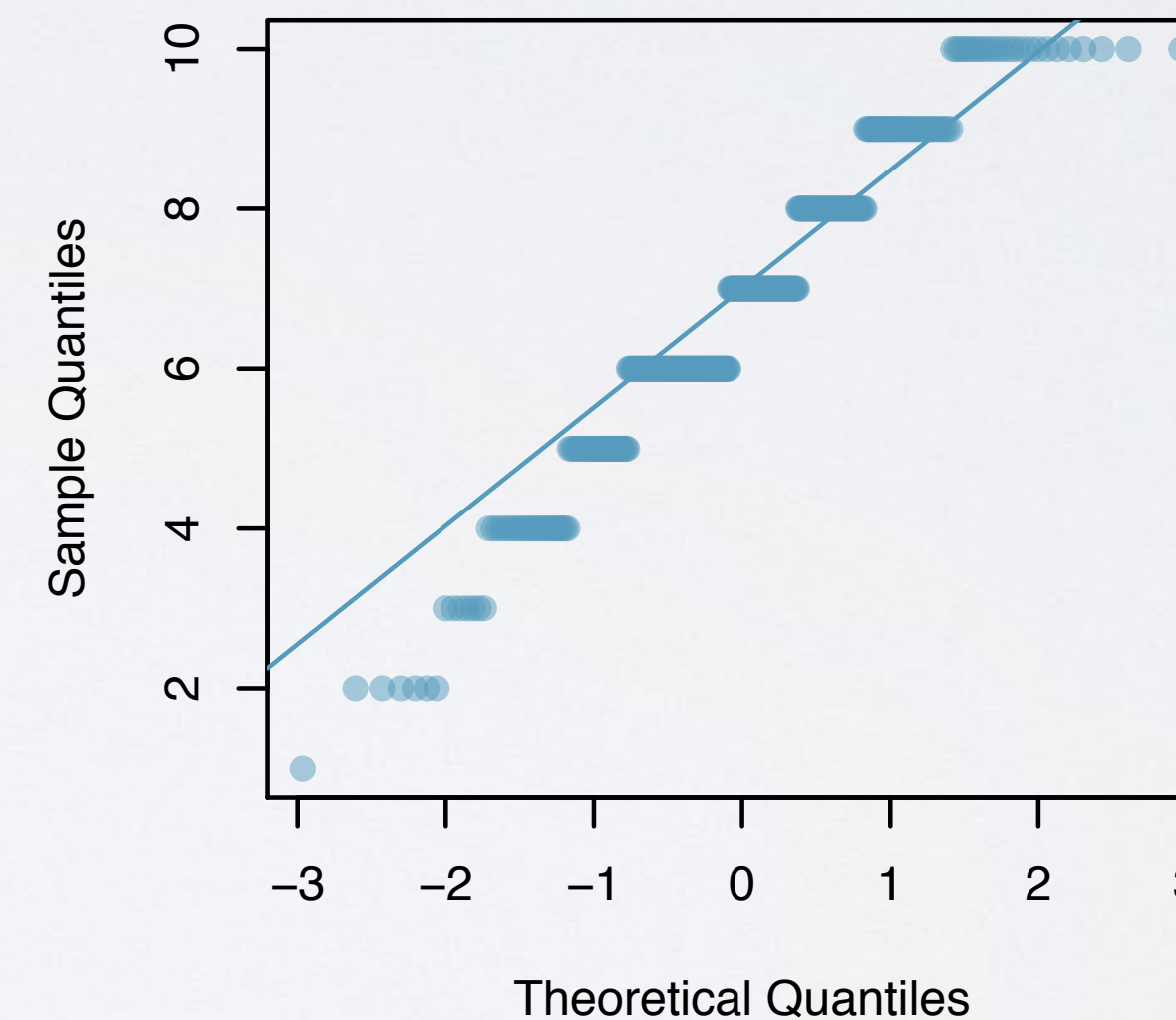
**Lower class**



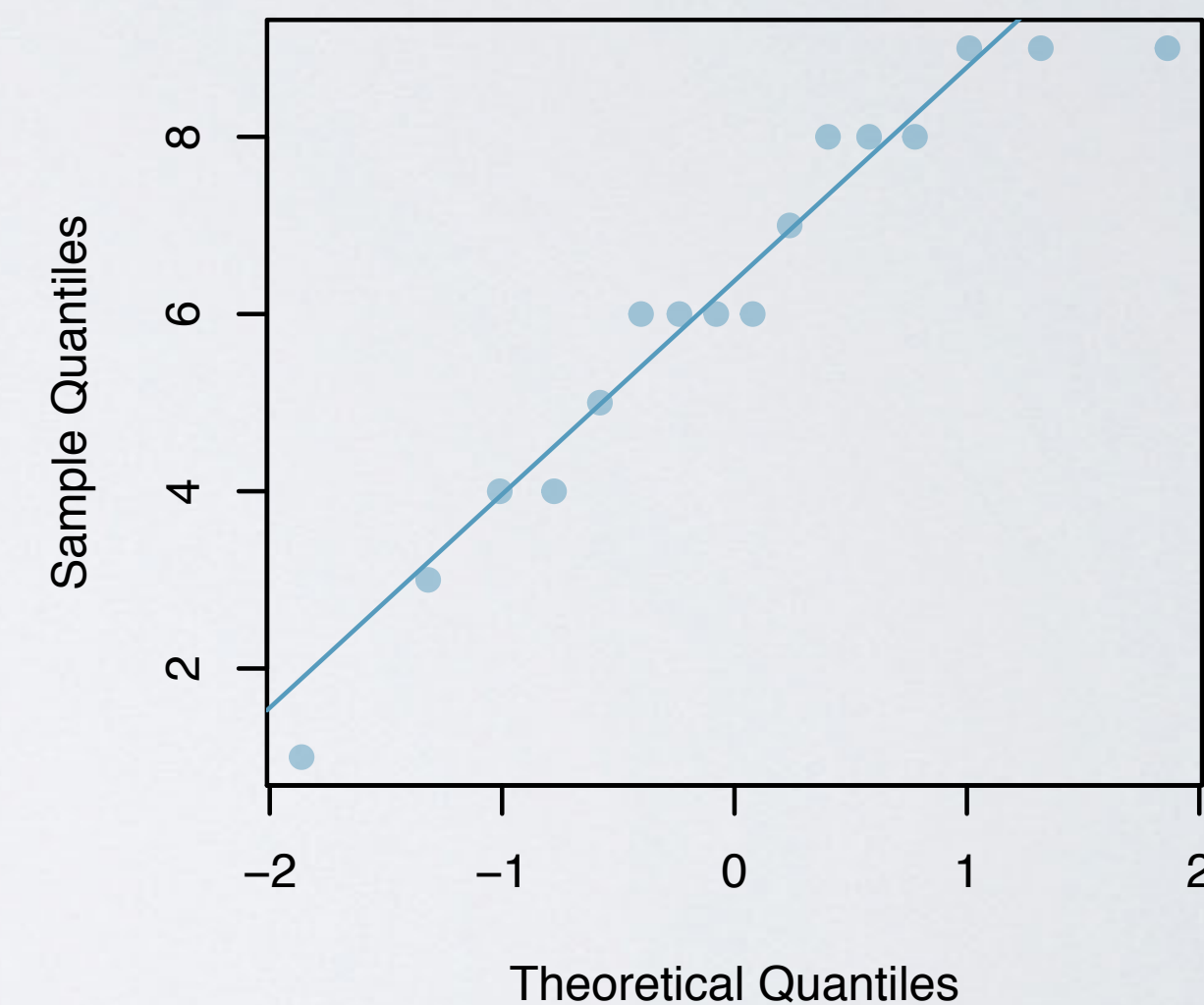
**Working class**



**Middle class**



**Upper class**





### (3) constant variance

- ▶ variability should be consistent across groups: **homoscedastic** groups
- ▶ especially important when sample sizes differ between groups

	<b>n</b>	<b>sd</b>
<b>lower class</b>	41	2.24
<b>working class</b>	407	1.87
<b>middle class</b>	331	1.89
<b>upper class</b>	16	2.34
<b>overall</b>	795	1.98

