Types of Data

```
> # Use "class()" to check
```

R class	Other terms	Examples
Numeric	Real, continuous, quantitative	1.34, 2.87, 1,000,005
Integer	Count data	1, 2, 3, 184
Factor (ordered)	Ordinal, categorical, discrete	Good, better, best; Large, extra large, grande
Factor (unordered)	Categorical, nominal, discrete	Red, green, blue; Alps, Rockies, Rainier
Date		11/12/2010*
Character		"accidentally smooshed", "fell asleep"

*Time-based data can get complicated in terms of formatting. See *Data Manipulation with R*, by Phil Spector, for an in-depth treatment of the topic if applicable.

Sample Spreadsheet

Order	Family	Insect	Life Stage	Feeding Type	Insect %P	Insect N (%)	Plant %P	Plant %N	Insect
Diptera	Drosophilidae	Drosophila arizonae	adult	generalist	0.995	8.800	0.576	3.720	Drosophila arizonae
Diptera	Drosophilidae	Drosophila hydei	adult	generalist	0.880	7.650	0.576	3.720	Drosophila hydei
Diptera	Drosophilidae	Drosophila nigrospiracula	adult	generalist	0.850	7.900	0.020	0.829	Drosophila nigrospiracula
Diptera	Drosophilidae	Drosophila pseudoobscura	adult	generalist	1.000	8.850	0.576	3.720	Drosophila pseudoobscura
Diptera	Drosophilidae	Drosophila simulans	adult	generalist	1.090	9.500	0.576	3.720	Drosophila simulans
Orthoptera	Acrididae	Melanoplus bilituratus	adult	generalist	0.700	-	0.250	4.000	Melanoplus bilituratus
Orthoptera	Acrididae	Hesperotettix speciosus	multiple instars	generalist	0.631	11.080	0.249	1.643	Hesperotettix speciosus
Orthoptera	Acrididae	Melanoplus bivittatus	multiple instars	generalist	0.560	10.775	0.238	2.424	Melanoplus bivittatus
Orthoptera	Acrididae	Melanoplus keeleri	multiple instars	generalist	0.633	10.680	0.258	1.995	Melanoplus keeleri
Orthoptera	Acrididae	Mermiria bivittata	-	generalist	0.470	10.000	0.194	1.124	Mermiria bivittata
Orthoptera	Acrididae	Schistocerca americana	-	generalist	0.693	9.792	0.234	2.426	Schistocerca americana
Orthoptera	Acrididae	Melanoplus packardii	multiple instars	generalist (:	0.628	10.980	0.190	2.099	Melanoplus packardii
Orthoptera	Acrididae	Schistocerca gregaria	-	generalist (g	0.903	9.430	0.260	2.555	Schistocerca gregaria
Lepidoptera	Tortricidae	Choristoneura fumiferana	-	specialist	0.855	8.700	0.220	1.422	Choristoneura fumiferana
Diptera	Drosophilidae	Drosophila mojavensis	adult	specialist	0.840	6.700	0.190	0.800	Drosophila mojavensis
Diptera	Drosophilidae	Drosophila pachea	adult	specialist	0.815	6.700	0.180	1.440	Drosophila pachea
Lepidoptera	Sphingidae	Manduca sexta	larvae	specialist	1.124	9.500	0.209	4.500	Manduca sexta
Lepidoptera	Noctuidae	Spodoptera exempta	pupa	specialist	1.086	8.765	0.433	2.990	Spodoptera exempta
Hymenoptera	Diprionidae	Neodiprion sertifer	-	specialist	0.640	7.270	0.117	1.303	Neodiprion sertifer
Coleoptera	Chrysomelidae	Paropsis atomaria	larvae	specialist	0.929	6.693	0.236	1.175	Paropsis atomaria
Coleoptera	Curculionidae	Sabinia setosa	adult	specialist	0.557	-	0.220	2.750	Sabinia setosa

1. How to handle missing data?
2. Column names

Simplified Sample Spreadsheet

Insect	Stage	Type	InsectP	InsectN	PlantP	PlantN	n
Drosophila arizc	adult	generalist	0.995	8.800	0.576	3.720	28
Drosophila hyd	adult	generalist	0.880	7.650	0.576	3.720	12
Drosophila nigr	adult	generalist	0.850	7.900	0.020	0.829	5
Drosophila pse	adult	generalist	1.000	8.850	0.576	3.720	3
Drosophila simu	adult	generalist	1.090	9.500	0.576	3.720	6
Melanoplus bilit	adult	generalist	0.700	-	0.250	4.000	8
Hesperotettix s	multiple instars	generalist	0.631	11.080	0.249	1.643	14
Melanoplus bivi	multiple instars	generalist	0.560	10.775	0.238	2.424	22
Melanoplus kee	multiple instars	generalist	0.633	10.680	0.258	1.995	21
Mermiria bivitta	-	generalist	0.470	10.000	0.194	1.124	18
Schistocerca ar	-	generalist	0.693	9.792	0.234	2.426	16
Melanoplus pac	multiple instars	generalist	0.628	10.980	0.190	2.099	32
Schistocerca gr	-	generalist	0.903	9.430	0.260	2.555	10
Choristoneura fi	-	specialist	0.855	8.700	0.220	1.422	10
Drosophila moj	adult	specialist	0.840	6.700	0.190	0.800	13
Drosophila pacl	adult	specialist	0.815	6.700	0.180	1.440	19
Manduca sexta	larvae	specialist	1.124	9.500	0.209	4.500	21
Spodoptera exe	pupa	specialist	1.086	8.765	0.433	2.990	24
Neodiprion sert	-	specialist	0.640	7.270	0.117	1.303	16
Paropsis atoma	larvae	specialist	0.929	6.693	0.236	1.175	16
Sabinia setosa	adult	specialist	0.557	-	0.220	2.750	12

What to do with the data...

Discrete

Quantitative

Categorical/Qualitative

Class in R
`class()`

Continuous
`as.numeric()`

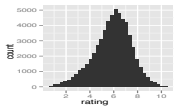
Count Data
`as.numeric()`
`as.integer()`

Ordinal
`as.ordered()`

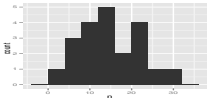
Nominal
`as.factor()`

Visual Display (one variable)
Lattice graphics
ggplot2 graphics

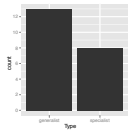
Histogram
`hist()`
`geom_histogram()`



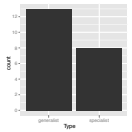
Histogram/barplot
`hist()` `barplot()`

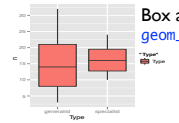


Barplot
`barplot()`
`geom_bar()`



Barplot
`barplot()`





Box and whiskers plot
`geom_boxplot()`

Table of counts
`table()`

Type	Frequency
generalist	13
specialist	8

Data Summary

counts are large and few/no zero counts

YES

normally distributed

NO

Lots of zero counts or small counts

The mean and median will be similar for normally-distributed data.

Mean ± standard deviation
`mean()` `sd()`

NOT normally distributed

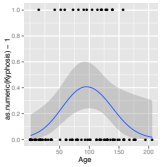
Sometimes it's possible to use transformations to normalize data instead (natural log, square root, etc), but not always

Median and quantiles
`median()` `quantile()`

What to do with the data...

Y-variable
(aka: dependent variable, response variable)

Ordinal
Nominal

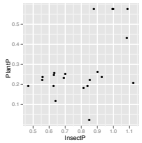


Logistic Regression
For methods, consult a book such as *A Handbook of Statistical Analyses Using R*, by Brian Everitt and Torsten Hothorn

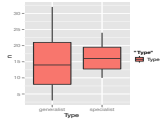
12	14
28	34

Contingency tables (χ^2)
`chisq.test()`

Continuous



Regression
`ModelName<-lm(y~x)`
`summary(ModelName)`



t-test / ANOVA
`ModelName<-lm(y~x)`
`anova(ModelName)`
`t.test(y~x)`

Continuous

Ordinal
Nominal

X-variable
(aka: independent variable, predictor variable)