Model formulae

Model formulae: shorthand notation for design matrix

Inclusion of the intercept is implied:

`y ~ x`

is equivalent to:

`y ~ 1 + x`

Model with intercept only:

`y ~ 1`

Model without intercept:

`y ~ -1 + x`   or   `y ~ x - 1`   or   `y ~ 0 + x`

Model formulae

The star operator:

```
y ~ x1 * x2
```

is equivalent to:

```
y ~ x1 + x2 + x1:x2
```

You can subtract terms:

```
y ~ x1 * x2 - x2
```

is equivalent to:

```
y ~ x1 + x1:x2
```

Model formulae

Multiple terms with the star operator:

```
y ~ x1 * x2 * x3
```

is equivalent to:

```
y ~ x1 + x2 + x3 +
    x1:x2 + x1:x3 + x2:x3 +
    x1:x2:x3
```

In other words, the star operator expands to all the higher order interactions

Model formulae

The nested operator:

```
y ~ x1 / x2
```

is equivalent to:

```
y ~ x1 + x1:x2
```

This is useful for categorical variables that define groups within groups. The interaction ensures that the groups in the nested group (`x2`) are uniquely labeled.

Model formulae

Multiple nesting:

```
y ~ x1 / x2 / x3
```

is equivalent to:

```
y ~ x1 + x1:x2 + x1:x2:x3
```

Notice how the interaction term leads to the nested groups (x2 and x3) being uniquely labeled.

Model formulae

More information and some other handy but less common things to know:

```
?formula
```