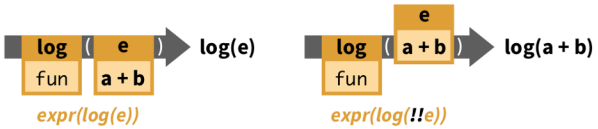
Quasiquotation (!!, !!!, :=)

QUOTATION

Storing an expression without evaluating it.
e <- expr(a + b)

QUASIQUOTATION

Quoting *some* parts of an expression while evaluating and then inserting the results of others (**unquoting** others).
e <- expr(a + b)

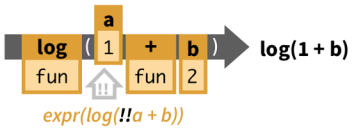


rlang provides **!!**, **!!!**, and **:=** for doing quasiquotation.

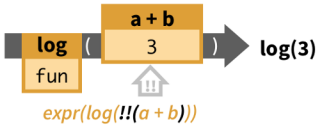
!!, **!!!**, and **:=** are not functions but syntax (symbols recognized by the functions they are passed to). Compare this to how

. is used by magrittr::**%>%()**
. is used by stats::**lm()**
.x is used by purrr::**map()**, and so on.

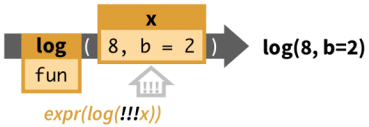
!!, **!!!**, and **:=** are only recognized by some rlang functions and functions that use those functions (such as tidyverse functions).



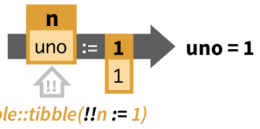
!! Unquotes the symbol or call that follows. Pronounced "unquote" or "bang-bang." *a <- 1; b <- 2*
expr(log(!!a + b))



Combine **!!** with **()** to unquote a longer expression.
a <- 1; b <- 2
expr(log(!!(a + b)))



!!! Unquotes a vector or list and splices the results as arguments into the surrounding call. Pronounced "unquote splice" or "bang-bang-bang."
x <- list(8, b = 2)
expr(log(!!!x))



:= Replaces an = to allow unquoting within the name that appears on the left hand side of the =. Use with **!!**
n <- expr(uno)
tibble::tibble(!!n := 1)

RStudio

Programming Recipes

Quoting function- A function that quotes any of its arguments internally for delayed evaluation in a chosen environment. You must take **special steps to program safely** with a quoting function.

How to spot a quoting function?
A function quotes an argument if the argument returns an error when run on its own.

Many tidyverse functions are quoting functions: e.g. **filter**, **select**, **mutate**, **summarise**, etc.

dplyr::filter(cars, **speed = = 25**)

speed	dist
1	25
	85

speed == 25
Error!

WRITE A FUNCTION THAT RECOGNIZES QUASIQUOTATION (!!,!!!,:=)

1. Capture the quasiquotation-aware argument with rlang::**enquo**.
2. Evaluate the arg with rlang::**eval_tidy**.

```
add1 <- function(x) {
  q <- rlang::enquo(x)          1
  rlang::eval_tidy(q) + 1       2
}
```

PROGRAM WITH A QUOTING FUNCTION

```
data_mean <- function(data, var) {
  require(dplyr)
  var <- rlang::enquo(var)                  1
  data %>%
    summarise(mean = mean(!!var))           2
}
```

1. Capture user argument that will be quoted with rlang::**enquo**.
2. Unquote the user argument into the quoting function with **!!**.

PASS MULTIPLE ARGUMENTS TO A QUOTING FUNCTION

```
group_mean <- function(data, var, …) {
  require(dplyr)
  var <- rlang::enquo(var)
  group_vars <- rlang::enquos(…)            1
  data %>%
    group_by(!!!group_vars) %>%             2
    summarise(mean = mean(!!var))
}
```

1. Capture user arguments that will be quoted with rlang::**enquos**.
2. Unquote splice the user arguments into the quoting function with **!!!**.

PASS TO ARGUMENT NAMES OF A QUOTING FUNCTION

```
named_mean <- function(data, var) {
  require(dplyr)
  var <- rlang::ensym(var)                  1
  data %>%
    summarise(!!name := mean(!!var))        2
}
```

1. Capture user argument that will be quoted with rlang::**ensym**.
2. Unquote the name into the quoting function with **!!** and **:=**.

MODIFY USER ARGUMENTS

```
my_do <- function(f, v, df) {
  f <- rlang::enquo(f)                      1
  v <- rlang::enquo(v)
  todo <- rlang::quo((!!f)(!!v))            2
  rlang::eval_tidy(todo, df)                3
}
```

1. Capture user arguments with rlang::**enquo**.
2. **Unquote** user arguments into a new expression or quosure to use
3. **Evaluate** the new expression/ quosure instead of the original argument

APPLY AN ARGUMENT TO A DATA FRAME

```
subset2 <- function(df, rows) {
  rows <- rlang::enquo(rows)                1
  vals <- rlang::eval_tidy(rows, data = df)
  df[vals, , drop = FALSE]                  2
}
```

1. Capture user argument with rlang::**enquo**.
2. Evaluate the argument with rlang::**eval_tidy**. Pass the data frame to **data** to use as a data mask.
3. **Suggest** in your documentation that your users use the **.data** and **.env** pronouns.

PASS CRAN CHECK

```
#' @importFrom rlang .data                  1
mutate_y <- function(df) {
  dplyr::mutate(df, y = .data$a +1)         2
}
```

Quoted arguments in tidyverse functions can trigger an **R CMD check** NOTE about undefined global variables. To avoid this:

1. Import rlang::**.data** to your package, perhaps with the roxygen2 tag **@importFrom rlang .data**
2. Use the **.data$** pronoun in front of variable names in tidyverse functions