

# Package ‘forcats’

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**Title** Tools for Working with Categorical Variables (Factors)

**Version** 0.5.2

**Description** Helpers for reordering factor levels (including moving specified levels to front, ordering by first appearance, reversing, and randomly shuffling), and tools for modifying factor levels (including collapsing rare levels into other, 'anonymising', and manually 'recoding').

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<https://github.com/tidyverse/forcats>

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---

as_factor	<i>Convert input to a factor</i>
-----------	----------------------------------

---

**Description**

Compared to base R, when `x` is a character, this function creates levels in the order in which they appear, which will be the same on every platform. (Base R sorts in the current locale which can vary from place to place.) When `x` is numeric, the ordering is based on the numeric value and consistent with base R.

**Usage**

```
as_factor(x, ...)
```

```
## S3 method for class 'factor'
```

```
as_factor(x, ...)
```

```
## S3 method for class 'character'  
as_factor(x, ...)  
  
## S3 method for class 'numeric'  
as_factor(x, ...)  
  
## S3 method for class 'logical'  
as_factor(x, ...)
```

### Arguments

x	Object to coerce to a factor.
...	Other arguments passed down to method.

### Details

This is a generic function.

### Examples

```
# Character object  
x <- c("a", "z", "g")  
as_factor(x)  
as.factor(x)  
  
# Character object containing numbers  
y <- c("1.1", "11", "2.2", "22")  
as_factor(y)  
as.factor(y)  
  
# Numeric object  
z <- as.numeric(y)  
as_factor(z)  
as.factor(z)
```

---

fct

*Create a factor*

---

### Description

fct() is a stricter version of [factor\(\)](#) that errors if your specification of levels is inconsistent with the values in x.

### Usage

```
fct(x = character(), levels = NULL, na = character())
```

**Arguments**

x	A character vector. Values must occur in either levels or na.
levels	A character vector of known levels. If not supplied, will be computed from the unique values of x, in the order in which they occur.
na	A character vector of values that should become missing values.

**Value**

A factor.

**Examples**

```
# Use factors when you know the set of possible values a variable might take
x <- c("A", "0", "0", "AB", "A")
fct(x, levels = c("0", "A", "B", "AB"))

# If you don't specify the levels, fct will create from the data
# in the order that they're seen
fct(x)

# Differences with base R -----
# factor() silently generates NAs
x <- c("a", "b", "c")
factor(x, levels = c("a", "b"))
# fct() errors
try(fct(x, levels = c("a", "b")))
# Unless you explicitly supply NA:
fct(x, levels = c("a", "b"), na = "c")

# factor() sorts default levels:
factor(c("y", "x"))
# fct() uses in order of appearance:
fct(c("y", "x"))
```

---

fct\_anon

*Anonymise factor levels*


---

**Description**

Replaces factor levels with arbitrary numeric identifiers. Neither the values nor the order of the levels are preserved.

**Usage**

```
fct_anon(f, prefix = "")
```

**Arguments**

f                    A factor.

prefix              A character prefix to insert in front of the random labels.

**Examples**

```
gss_cat$relig %>% fct_count()
gss_cat$relig %>%
  fct_anon() %>%
  fct_count()
gss_cat$relig %>%
  fct_anon("X") %>%
  fct_count()
```

---

fct_c	<i>Concatenate factors, combining levels</i>
-------	--

---

**Description**

This is a useful way of patching together factors from multiple sources that really should have the same levels but don't.

**Usage**

```
fct_c(...)
```

**Arguments**

...                    [<dynamic-dots>](#) Individual factors. Uses tidy dots, so you can splice in a list of factors with !!!.

**Examples**

```
fa <- factor("a")
fb <- factor("b")
fab <- factor(c("a", "b"))

c(fa, fb, fab)
fct_c(fa, fb, fab)

# You can also pass a list of factors with !!!
fs <- list(fa, fb, fab)
fct_c(!!!fs)
```

---

fct_collapse	<i>Collapse factor levels into manually defined groups</i>
--------------	--

---

**Description**

Collapse factor levels into manually defined groups

**Usage**

```
fct_collapse(.f, ..., other_level = NULL, group_other = "DEPRECATED")
```

**Arguments**

.f	A factor (or character vector).
...	<a href="#">&lt;dynamic-dots&gt;</a> A series of named character vectors. The levels in each vector will be replaced with the name.
other_level	Value of level used for "other" values. Always placed at end of levels.
group_other	Deprecated. Replace all levels not named in ... with "Other"?

**Examples**

```
fct_count(gss_cat$partyid)

partyid2 <- fct_collapse(gss_cat$partyid,
  missing = c("No answer", "Don't know"),
  other = "Other party",
  rep = c("Strong republican", "Not str republican"),
  ind = c("Ind,near rep", "Independent", "Ind,near dem"),
  dem = c("Not str democrat", "Strong democrat")
)
fct_count(partyid2)
```

---

fct_count	<i>Count entries in a factor</i>
-----------	----------------------------------

---

**Description**

Count entries in a factor

**Usage**

```
fct_count(f, sort = FALSE, prop = FALSE)
```

**Arguments**

f	A factor (or character vector).
sort	If TRUE, sort the result so that the most common values float to the top.
prop	If TRUE, compute the fraction of marginal table.

**Value**

A tibble with columns f, n and p, if prop is TRUE.

**Examples**

```
f <- factor(sample(letters)[rpois(1000, 10)])
table(f)
fct_count(f)
fct_count(f, sort = TRUE)
fct_count(f, sort = TRUE, prop = TRUE)
```

---

fct_cross	<i>Combine levels from two or more factors to create a new factor</i>
-----------	---

---

**Description**

Computes a factor whose levels are all the combinations of the levels of the input factors.

**Usage**

```
fct_cross(..., sep = ":", keep_empty = FALSE)
```

**Arguments**

...	<dynamic-dots> Additional factors or character vectors.
sep	A character string to separate the levels
keep_empty	If TRUE, keep combinations with no observations as levels

**Value**

The new factor

**Examples**

```
fruit <- factor(c("apple", "kiwi", "apple", "apple"))
colour <- factor(c("green", "green", "red", "green"))
eaten <- c("yes", "no", "yes", "no")
fct_cross(fruit, colour)
fct_cross(fruit, colour, eaten)
fct_cross(fruit, colour, keep_empty = TRUE)
```

---

fct_drop	<i>Drop unused levels</i>
----------	---------------------------

---

**Description**

Compared to `base::droplevels()`, does not drop NA levels that have values.

**Usage**

```
fct_drop(f, only)
```

**Arguments**

f	A factor (or character vector).
only	A character vector restricting the set of levels to be dropped. If supplied, only levels that have no entries and appear in this vector will be removed.

**See Also**

[fct\\_expand\(\)](#) to add additional levels to a factor.

**Examples**

```
f <- factor(c("a", "b"), levels = c("a", "b", "c"))
f
fct_drop(f)

# Set only to restrict which levels to drop
fct_drop(f, only = "a")
fct_drop(f, only = "c")
```

---

fct_expand	<i>Add additional levels to a factor</i>
------------	--

---

**Description**

Add additional levels to a factor

**Usage**

```
fct_expand(f, ...)
```

**Arguments**

f	A factor (or character vector).
...	Additional levels to add to the factor. Levels that already exist will be silently ignored.



**See Also**

[fct\\_drop\(\)](#) to drop unused factor levels.

**Examples**

```
f <- factor(sample(letters[1:3], 20, replace = TRUE))
f
fct_expand(f, "d", "e", "f")
fct_expand(f, letters[1:6])
```

---

fct_explicit_na	<i>Make missing values explicit</i>
-----------------	-------------------------------------

---

**Description**

This gives missing values an explicit factor level, ensuring that they appear in summaries and on plots.

**Usage**

```
fct_explicit_na(f, na_level = "(Missing)")
```

**Arguments**

f	A factor (or character vector).
na_level	Level to use for missing values: this is what NAs will be changed to.

**Examples**

```
f1 <- factor(c("a", "a", NA, NA, "a", "b", NA, "c", "a", "c", "b"))
fct_count(f1)
table(is.na(f1))

f2 <- fct_explicit_na(f1)
fct_count(f2)
table(is.na(f2))
```

---

fct_inorder	<i>Reorder factor levels by first appearance, frequency, or numeric order</i>
-------------	---

---

### Description

This family of functions changes only the order of the levels.

- `fct_inorder()`: by the order in which they first appear.
- `fct_infreq()`: by number of observations with each level (largest first)
- `fct_inseq()`: by numeric value of level.

### Usage

```
fct_inorder(f, ordered = NA)
```

```
fct_infreq(f, ordered = NA)
```

```
fct_inseq(f, ordered = NA)
```

### Arguments

f	A factor
ordered	A logical which determines the "ordered" status of the output factor. NA preserves the existing status of the factor.

### Examples

```
f <- factor(c("b", "b", "a", "c", "c", "c"))
f
fct_inorder(f)
fct_infreq(f)

f <- factor(1:3, levels = c("3", "2", "1"))
f
fct_inseq(f)
```

---

fct_lump	<i>Lump together factor levels into "other"</i>
----------	---

---

**Description**

A family for lumping together levels that meet some criteria.

- `fct_lump_min()`: lumps levels that appear fewer than `min` times.
- `fct_lump_prop()`: lumps levels that appear in fewer `prop * n` times.
- `fct_lump_n()` lumps all levels except for the `n` most frequent (or least frequent if `n < 0`)
- `fct_lump_lowfreq()` lumps together the least frequent levels, ensuring that "other" is still the smallest level.

`fct_lump()` exists primarily for historical reasons, as it automatically picks between these different methods depending on its arguments. We no longer recommend that you use it.

**Usage**

```
fct_lump(
  f,
  n,
  prop,
  w = NULL,
  other_level = "Other",
  ties.method = c("min", "average", "first", "last", "random", "max")
)
```

```
fct_lump_min(f, min, w = NULL, other_level = "Other")
```

```
fct_lump_prop(f, prop, w = NULL, other_level = "Other")
```

```
fct_lump_n(
  f,
  n,
  w = NULL,
  other_level = "Other",
  ties.method = c("min", "average", "first", "last", "random", "max")
)
```

```
fct_lump_lowfreq(f, other_level = "Other")
```

**Arguments**

<code>f</code>	A factor (or character vector).
<code>n</code>	Positive <code>n</code> preserves the most common <code>n</code> values. Negative <code>n</code> preserves the least common <code>-n</code> values. If there are ties, you will get at least <code>abs(n)</code> values.
<code>prop</code>	Positive <code>prop</code> lumps values which do not appear at least <code>prop</code> of the time. Negative <code>prop</code> lumps values that do not appear at most <code>-prop</code> of the time.
<code>w</code>	An optional numeric vector giving weights for frequency of each value (not level) in <code>f</code> .
<code>other_level</code>	Value of level used for "other" values. Always placed at end of levels.

`ties.method` A character string specifying how ties are treated. See `rank()` for details.

`min` Preserve levels that appear at least `min` number of times.

### See Also

`fct_other()` to convert specified levels to other.

### Examples

```
x <- factor(rep(LETTERS[1:9], times = c(40, 10, 5, 27, 1, 1, 1, 1, 1)))
x %>% table()
x %>%
  fct_lump_n(3) %>%
  table()
x %>%
  fct_lump_prop(0.10) %>%
  table()
x %>%
  fct_lump_min(5) %>%
  table()
x %>%
  fct_lump_lowfreq() %>%
  table()

x <- factor(letters[rpois(100, 5)])
x
table(x)
table(fct_lump_lowfreq(x))

# Use positive values to collapse the rarest
fct_lump_n(x, n = 3)
fct_lump_prop(x, prop = 0.1)

# Use negative values to collapse the most common
fct_lump_n(x, n = -3)
fct_lump_prop(x, prop = -0.1)

# Use weighted frequencies
w <- c(rep(2, 50), rep(1, 50))
fct_lump_n(x, n = 5, w = w)

# Use ties.method to control how tied factors are collapsed
fct_lump_n(x, n = 6)
fct_lump_n(x, n = 6, ties.method = "max")

# Use fct_lump_min() to lump together all levels with fewer than `n` values
table(fct_lump_min(x, min = 10))
table(fct_lump_min(x, min = 15))
```

---

fct_match	<i>Test for presence of levels in a factor</i>
-----------	--

---

**Description**

Do any of lvl<sub>s</sub> occur in f? Compared to `%in%`, this function validates lvl<sub>s</sub> to ensure that they're actually present in f. In other words, `x %in% "not present"` will return FALSE, but `fct_match(x, "not present")` will throw an error.

**Usage**

```
fct_match(f, lvls)
```

**Arguments**

f	A factor (or character vector).
lvl <sub>s</sub>	A character vector specifying levels to look for.

**Value**

A logical vector

**Examples**

```
table(fct_match(gss_cat$marital, c("Married", "Divorced")))

# Compare to %in%, misspelled levels throw an error
table(gss_cat$marital %in% c("Maried", "Davorced"))
## Not run:
table(fct_match(gss_cat$marital, c("Maried", "Davorced")))

## End(Not run)
```

---

fct_other	<i>Replace levels with "other"</i>
-----------	------------------------------------

---

**Description**

Replace levels with "other"

**Usage**

```
fct_other(f, keep, drop, other_level = "Other")
```

**Arguments**

f	A factor (or character vector).
keep, drop	Pick one of keep and drop: <ul style="list-style-type: none"> <li>• keep will preserve listed levels, replacing all others with other_level.</li> <li>• drop will replace listed levels with other_level, keeping all as is.</li> </ul>
other_level	Value of level used for "other" values. Always placed at end of levels.

**See Also**

[fct\\_lump\(\)](#) to automatically convert the rarest (or most common) levels to "other".

**Examples**

```
x <- factor(rep(LETTERS[1:9], times = c(40, 10, 5, 27, 1, 1, 1, 1, 1)))
fct_other(x, keep = c("A", "B"))
fct_other(x, drop = c("A", "B"))
```

---

fct\_recode

*Change factor levels by hand*


---

**Description**

Change factor levels by hand

**Usage**

```
fct_recode(.f, ...)
```

**Arguments**

.f	A factor (or character vector).
...	<a href="#">&lt;dynamic-dots&gt;</a> A sequence of named character vectors where the name gives the new level, and the value gives the old level. Levels not otherwise mentioned will be left as is. Levels can be removed by naming them NULL.

**Examples**

```
x <- factor(c("apple", "bear", "banana", "dear"))
fct_recode(x, fruit = "apple", fruit = "banana")

# If you make a mistake you'll get a warning
fct_recode(x, fruit = "apple", fruit = "bananana")

# If you name the level NULL it will be removed
fct_recode(x, NULL = "apple", fruit = "banana")
```

```
# Wrap the left hand side in quotes if it contains special variables
fct_recode(x, "an apple" = "apple", "a bear" = "bear")

# When passing a named vector to rename levels use !!! to splice
x <- factor(c("apple", "bear", "banana", "dear"))
levels <- c(fruit = "apple", fruit = "banana")
fct_recode(x, !!!levels)
```

---

fct\_relabel

*Automatically relabel factor levels, collapse as necessary*


---

## Description

Automatically relabel factor levels, collapse as necessary

## Usage

```
fct_relabel(.f, .fun, ...)
```

## Arguments

<code>.f</code>	A factor (or character vector).
<code>.fun</code>	A function to be applied to each level. Must accept one character argument and return a character vector of the same length as its input. You can also use <code>~</code> to create as shorthand (in the style of purrr). <code>~paste(., "x")</code> is equivalent to <code>function(.) paste(., "x")</code>
<code>...</code>	Additional arguments to fun.

## Examples

```
gss_cat$partyid %>% fct_count()
gss_cat$partyid %>%
  fct_relabel(~ gsub(",", " ", ".x")) %>%
  fct_count()

convert_income <- function(x) {
  regex <- "^(?:Lt |)[$]([0-9]+).*$"
  is_range <- grepl(regex, x)
  num_income <- as.numeric(gsub(regex, "\\1", x[is_range]))
  num_income <- trunc(num_income / 5000) * 5000
  x[is_range] <- paste0("Gt $", num_income)
  x
}
fct_count(gss_cat$rincome)
convert_income(levels(gss_cat$rincome))
rincome2 <- fct_relabel(gss_cat$rincome, convert_income)
fct_count(rincome2)
```

fct\_relevel

*Reorder factor levels by hand***Description**

This is a generalisation of `stats::relevel()` that allows you to move any number of levels to any location.

**Usage**

```
fct_relevel(.f, ..., after = 0L)
```

**Arguments**

<code>.f</code>	A factor (or character vector).
<code>...</code>	Either a function (or formula), or character levels. A function will be called with the current levels as input, and the return value (which must be a character vector) will be used to relevel the factor. Any levels not mentioned will be left in their existing order, by default after the explicitly mentioned levels. Supports tidy dots.
<code>after</code>	Where should the new values be placed?

**Examples**

```
f <- factor(c("a", "b", "c", "d"), levels = c("b", "c", "d", "a"))
fct_relevel(f)
fct_relevel(f, "a")
fct_relevel(f, "b", "a")

# Move to the third position
fct_relevel(f, "a", after = 2)

# Relevel to the end
fct_relevel(f, "a", after = Inf)
fct_relevel(f, "a", after = 3)

# Relevel with a function
fct_relevel(f, sort)
fct_relevel(f, sample)
fct_relevel(f, rev)

# Using 'Inf' allows you to relevel to the end when the number
# of levels is unknown or variable (e.g. vectorised operations)
df <- forcats::gss_cat[, c("rincome", "denom")]
lapply(df, levels)

df2 <- lapply(df, fct_relevel, "Don't know", after = Inf)
lapply(df2, levels)
```



```
# You'll get a warning if the levels don't exist
fct_relevel(f, "e")
```

---

fct_reorder	<i>Reorder factor levels by sorting along another variable</i>
-------------	--

---

## Description

`fct_reorder()` is useful for 1d displays where the factor is mapped to position; `fct_reorder2()` for 2d displays where the factor is mapped to a non-position aesthetic. `last2()` and `first2()` are helpers for `fct_reorder2()`; `last2()` finds the last value of `y` when sorted by `x`; `first2()` finds the first value.

## Usage

```
fct_reorder(.f, .x, .fun = median, ..., .desc = FALSE)

fct_reorder2(.f, .x, .y, .fun = last2, ..., .desc = TRUE)

last2(.x, .y)

first2(.x, .y)
```

## Arguments

<code>.f</code>	A factor (or character vector).
<code>.x, .y</code>	The levels of <code>f</code> are reordered so that the values of <code>.fun(.x)</code> (for <code>fct_reorder()</code> ) and <code>fun(.x, .y)</code> (for <code>fct_reorder2()</code> ) are in ascending order.
<code>.fun</code>	<code>n</code> summary function. It should take one vector for <code>fct_reorder</code> , and two vectors for <code>fct_reorder2</code> , and return a single value.
<code>...</code>	Other arguments passed on to <code>.fun</code> . A common argument is <code>na.rm = TRUE</code> .
<code>.desc</code>	Order in descending order? Note the default is different between <code>fct_reorder</code> and <code>fct_reorder2</code> , in order to match the default ordering of factors in the legend.

## Examples

```
df <- tibble::tribble(
  ~color, ~a, ~b,
  "blue", 1, 2,
  "green", 6, 2,
  "purple", 3, 3,
  "red", 2, 3,
  "yellow", 5, 1
)
df$color <- factor(df$color)
```

```
fct_reorder(df$color, df$a, min)
fct_reorder2(df$color, df$a, df$b)

boxplot(Sepal.Width ~ Species, data = iris)
boxplot(Sepal.Width ~ fct_reorder(Species, Sepal.Width), data = iris)
boxplot(Sepal.Width ~ fct_reorder(Species, Sepal.Width, .desc = TRUE), data = iris)

chks <- subset(ChickWeight, as.integer(Chick) < 10)
chks <- transform(chks, Chick = fct_shuffle(Chick))

if (require("ggplot2")) {
  ggplot(chks, aes(Time, weight, colour = Chick)) +
    geom_point() +
    geom_line()

  # Note that lines match order in legend
  ggplot(chks, aes(Time, weight, colour = fct_reorder2(Chick, Time, weight))) +
    geom_point() +
    geom_line() +
    labs(colour = "Chick")
}
```

---

fct\_rev

*Reverse order of factor levels*

---

## Description

This is sometimes useful when plotting a factor.

## Usage

```
fct_rev(f)
```

## Arguments

f                    A factor (or character vector).

## Examples

```
f <- factor(c("a", "b", "c"))
fct_rev(f)
```

---

fct_shift	<i>Shift factor levels to left or right, wrapping around at end</i>
-----------	---

---

**Description**

This is useful when the levels of an ordered factor are actually cyclical, with different conventions on the starting point.

**Usage**

```
fct_shift(f, n = 1L)
```

**Arguments**

f	A factor.
n	Positive values shift to the left; negative values shift to the right.

**Examples**

```
x <- factor(
  c("Mon", "Tue", "Wed"),
  levels = c("Sun", "Mon", "Tue", "Wed", "Thu", "Fri", "Sat"),
  ordered = TRUE
)
x
fct_shift(x)
fct_shift(x, 2)
fct_shift(x, -1)
```

---

fct_shuffle	<i>Randomly permute factor levels</i>
-------------	---------------------------------------

---

**Description**

Randomly permute factor levels

**Usage**

```
fct_shuffle(f)
```

**Arguments**

f	A factor (or character vector).
---	---------------------------------

**Examples**

```
f <- factor(c("a", "b", "c"))
fct_shuffle(f)
fct_shuffle(f)
```

---

fct_unify	<i>Unify the levels in a list of factors</i>
-----------	--

---

**Description**

Unify the levels in a list of factors

**Usage**

```
fct_unify(fs, levels = lvl_union(fs))
```

**Arguments**

fs	A list of factors
levels	Set of levels to apply to every factor. Default to union of all factor levels

**Examples**

```
fs <- list(factor("a"), factor("b"), factor(c("a", "b")))
fct_unify(fs)
```

---

fct_unique	<i>Unique values of a factor</i>
------------	----------------------------------

---

**Description**

Unique values of a factor

**Usage**

```
fct_unique(f)
```

**Arguments**

f	A factor.
---	-----------

**Examples**

```
f <- factor(letters[rpois(100, 10)])

unique(f)      # in order of appearance
fct_unique(f) # in order of levels
```

---

`gss_cat`*A sample of categorical variables from the General Social survey*

---

**Description**

A sample of categorical variables from the General Social survey

**Usage**`gss_cat`**Format**

**year** year of survey, 2000–2014 (every other year)

**age** age. Maximum age truncated to 89.

**marital** marital status

**race** race

**rincome** reported income

**partyid** party affiliation

**relig** religion

**denom** denomination

**tvhours** hours per day watching tv

**Source**

Downloaded from <https://gssdataexplorer.norc.org/>.

**Examples**`gss_cat`

```
fct_count(gss_cat$relig)
fct_count(fct_lump(gss_cat$relig))
```

---

**lvls***Low-level functions for manipulating levels*

---

**Description**

`lvls_reorder` leaves values as they are, but changes the order. `lvls_revalue` changes the values of existing levels; there must be one new level for each old level. `lvls_expand` expands the set of levels; the new levels must include the old levels.

**Usage**

```
lvls_reorder(f, idx, ordered = NA)
```

```
lvls_revalue(f, new_levels)
```

```
lvls_expand(f, new_levels)
```

**Arguments**

<code>f</code>	A factor (or character vector).
<code>idx</code>	A integer index, with one integer for each existing level.
<code>ordered</code>	A logical which determines the "ordered" status of the output factor. NA preserves the existing status of the factor.
<code>new_levels</code>	A character vector of new levels.

**Details**

These functions are less helpful than the higher-level `fct_` functions, but are safer than the very low-level manipulation of levels directly, because they are more specific, and hence can more carefully check their arguments.

**Examples**

```
f <- factor(c("a", "b", "c"))
lvls_reorder(f, 3:1)
lvls_revalue(f, c("apple", "banana", "carrot"))
lvls_expand(f, c("a", "b", "c", "d"))
```

---

lvls_union	<i>Find all levels in a list of factors</i>
------------	---

---

**Description**

Find all levels in a list of factors

**Usage**

```
lvls_union(fs)
```

**Arguments**

fs                   A list of factors.

**Examples**

```
fs <- list(factor("a"), factor("b"), factor(c("a", "b")))
lvls_union(fs)
```

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