Data Structures in R: Lists

Stat 133 with Gaston Sanchez

Lists

single data type

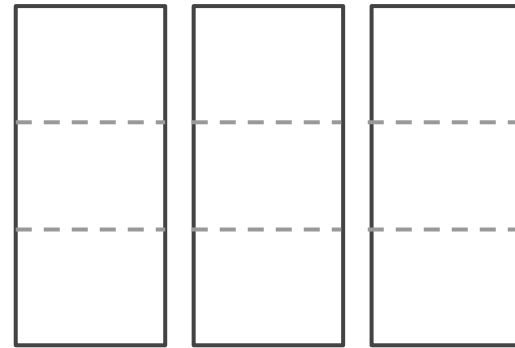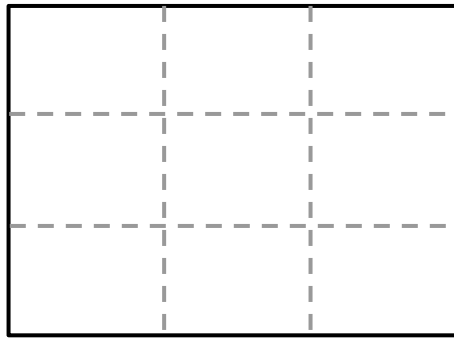multiple data types
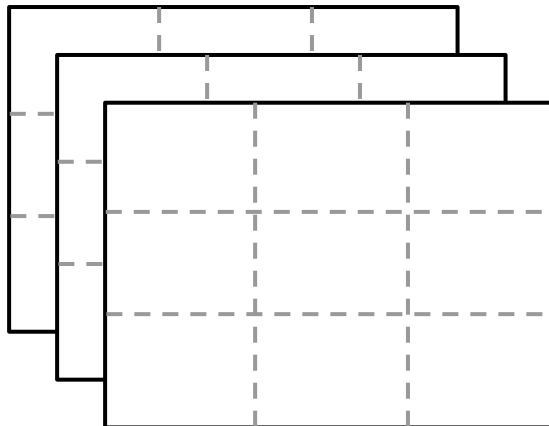
Vector

List

1D

Matrix

Data Frame

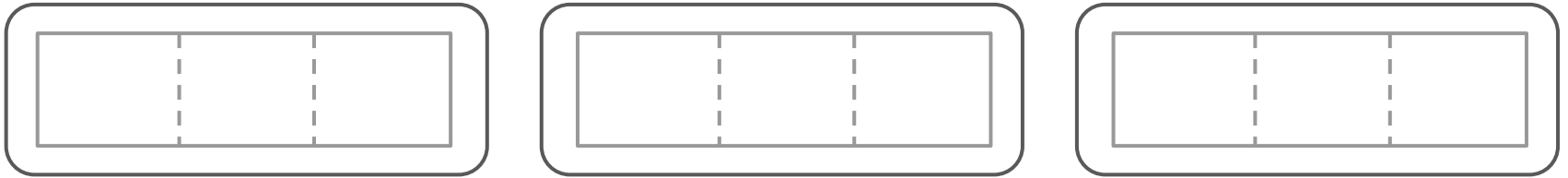dimensions

2D

Array

non-atomic objects

nD

3

R lists

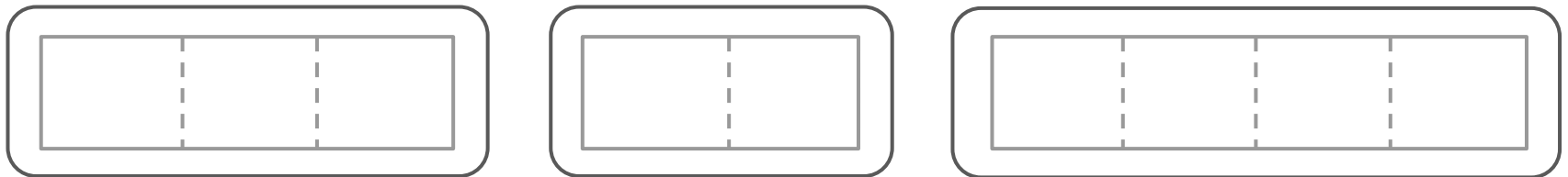A list is the most general data structure in R

Lists can contain any other type of data structure
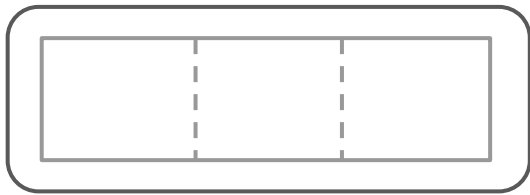
Lists can even contain other lists
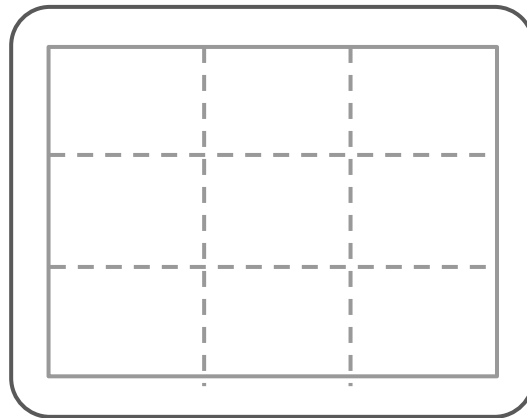
List of Vectors (of equal length)

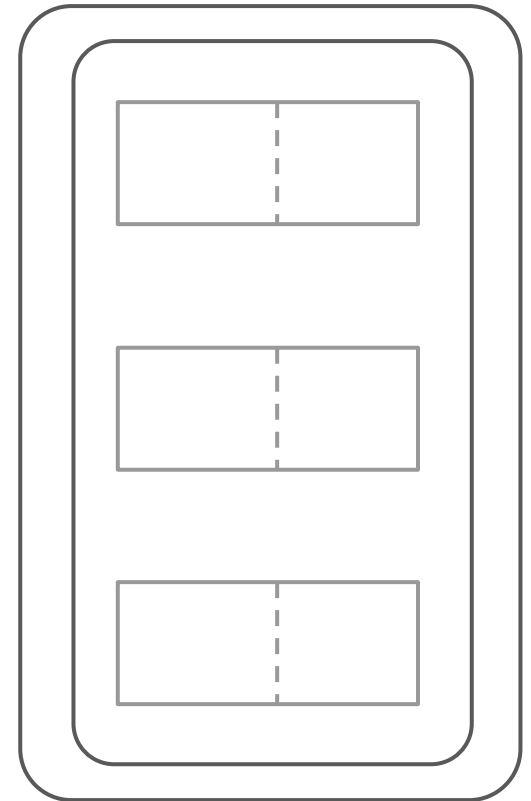# List of Vectors (of different length)

List of various objects

vector

matrix

Other lists

R lists

Lists are a special type of vector

```
lst <- vector(mode = "list")
```

Lists are vectors in the sense of being a one-dimensional object

Lists are NOT atomic structures
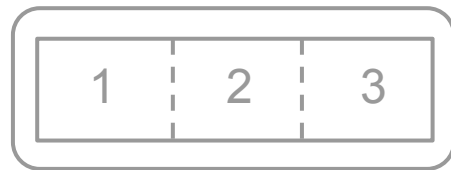
Subsetting and Indexing

Bracket Notation System

To extract values from R objects use brackets: [ ]

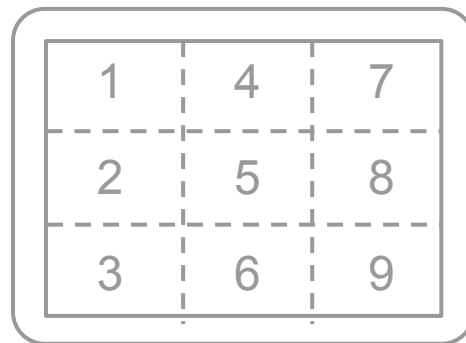Inside the brackets specify vector(s) of indices

Use as many indices, separated by commas, as dimensions in the object

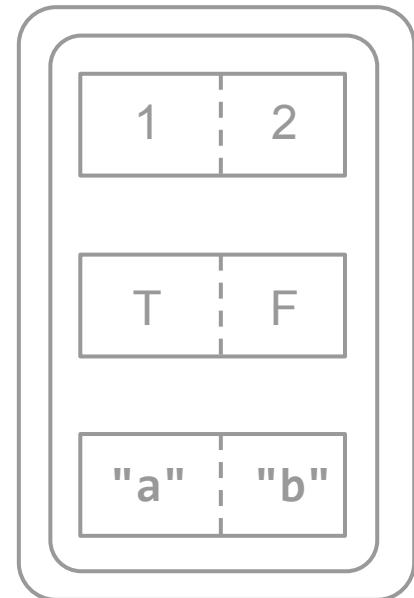Vector(s) of indices can be numbers, logicals, and sometimes names

```
lst <- list(
  c(1, 2, 3),
  matrix(1:9, nrow = 3, ncol = 3),
  list(1:2, c(TRUE, FALSE), c("a", "b"))
)
```
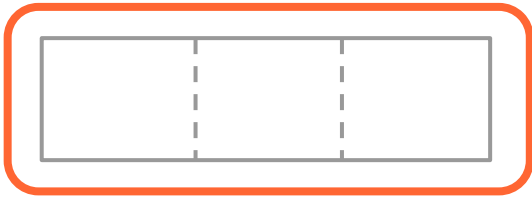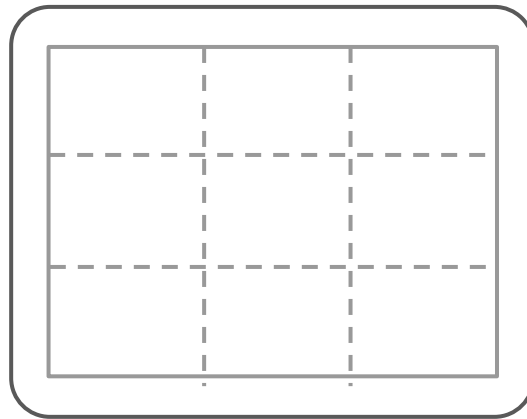
| 1 | 2 | 3 |

vector

1	4	7
2	5	8
3	6	9

matrix

| 1 | 2 |

| T | F |

| "a" | "b" |

list of vectors
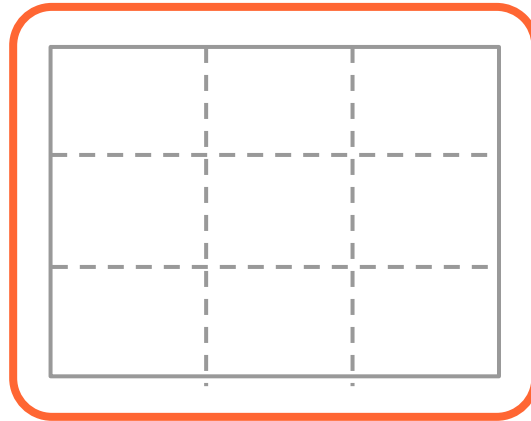
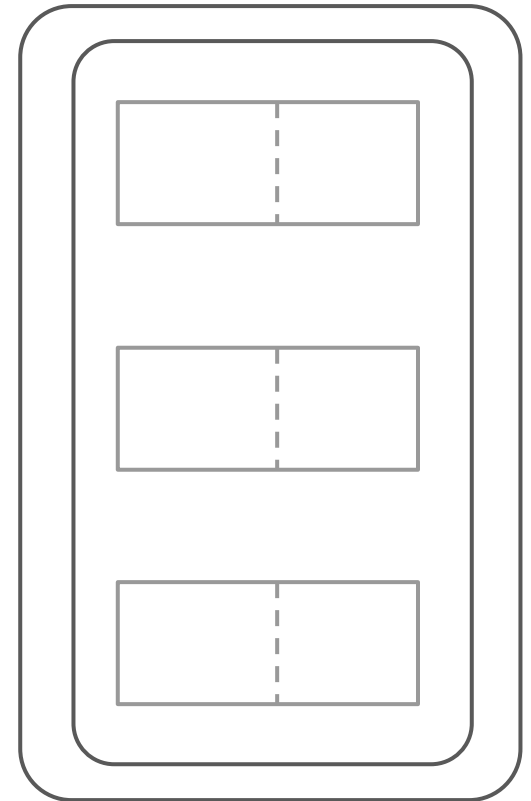access list element(s)
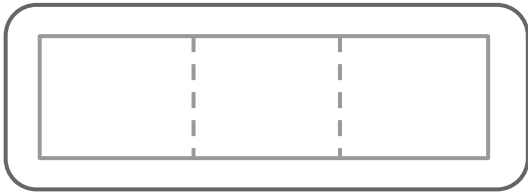
`list[elem]`

`lst[1]`

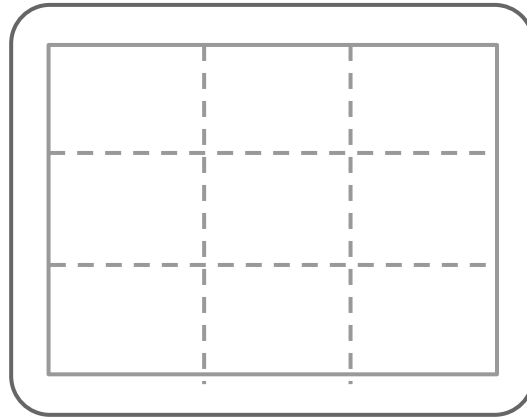vector

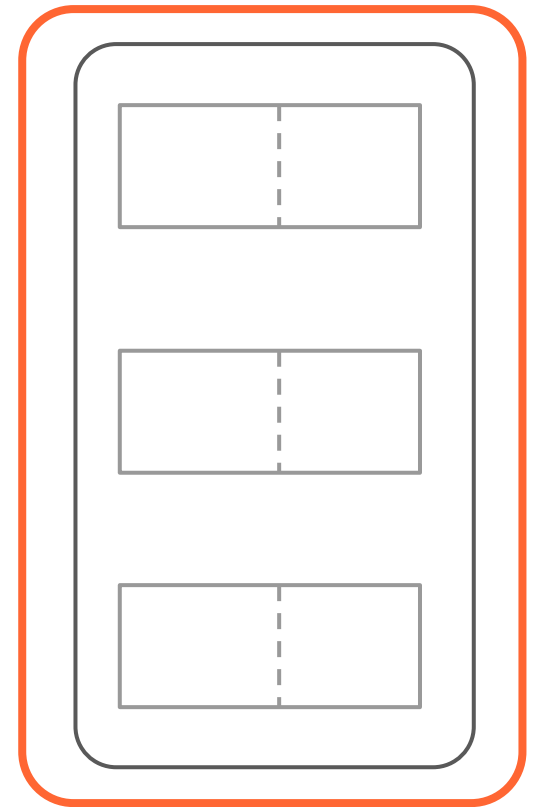matrix

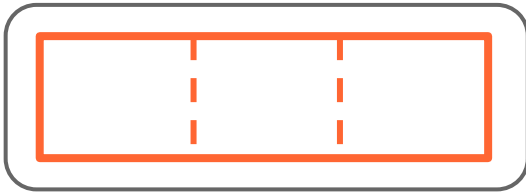another list

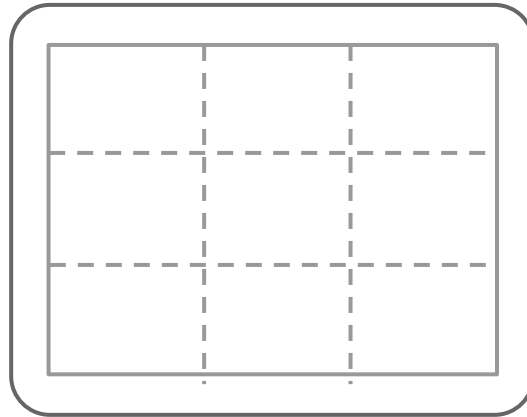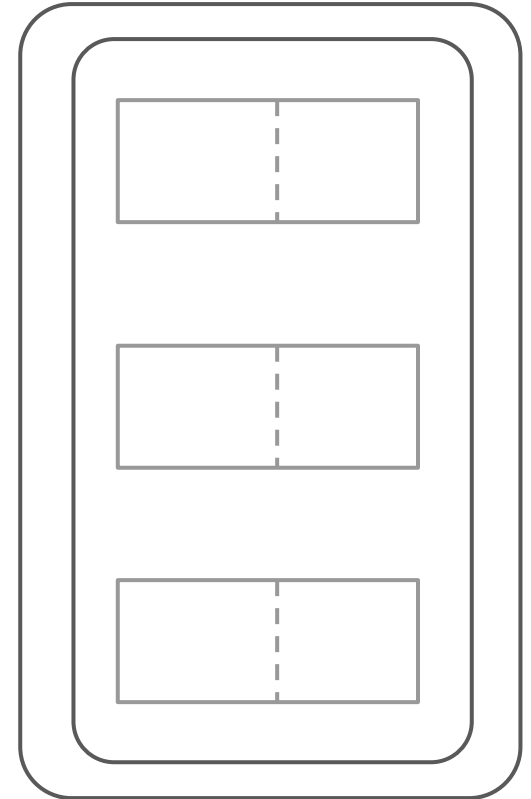# lst[2]

vector

matrix

another list

lst[3]

vector

matrix

another list

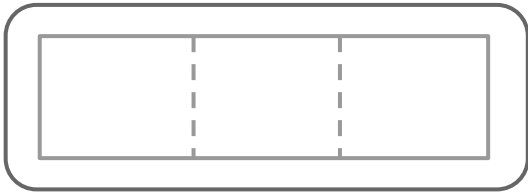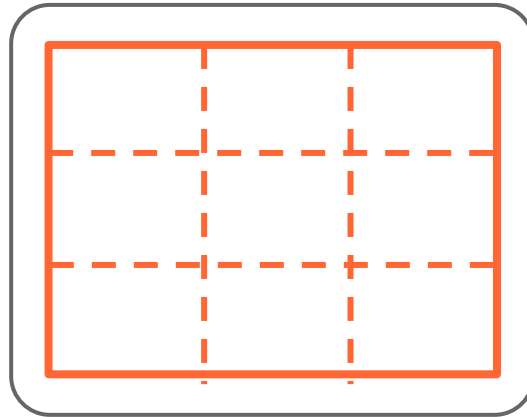# access object of list element

`list[[`*elem*`]]`

lst[[1]]

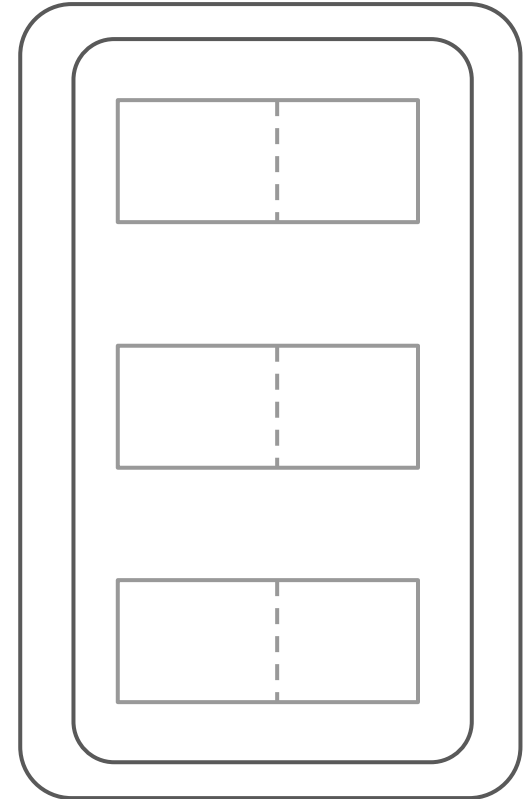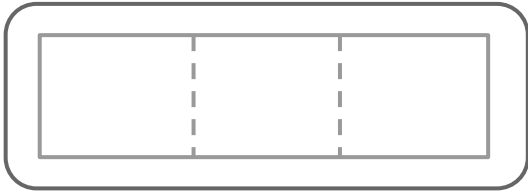vector
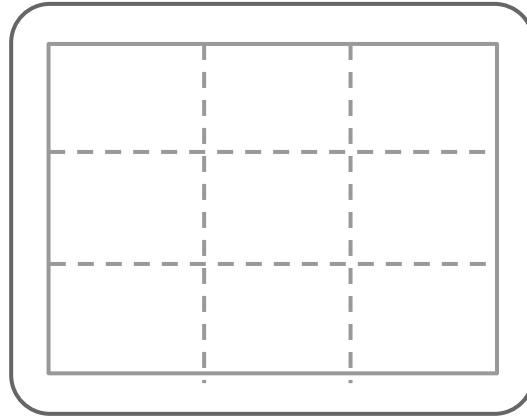
matrix

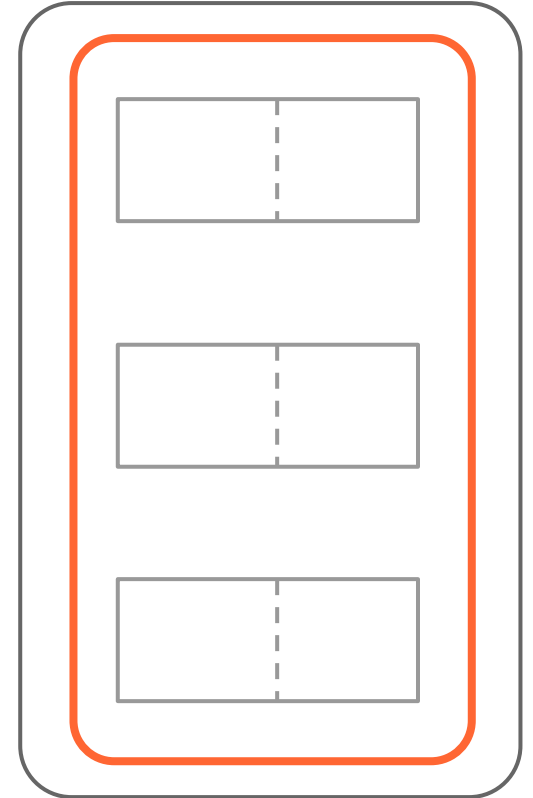another list

lst[[2]]

vector

matrix

another list

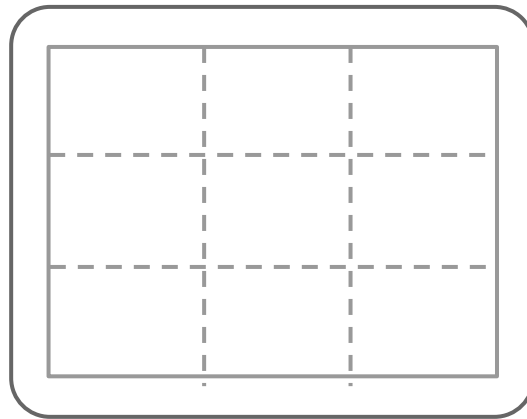# `lst[[3]]`

vector

matrix

another list

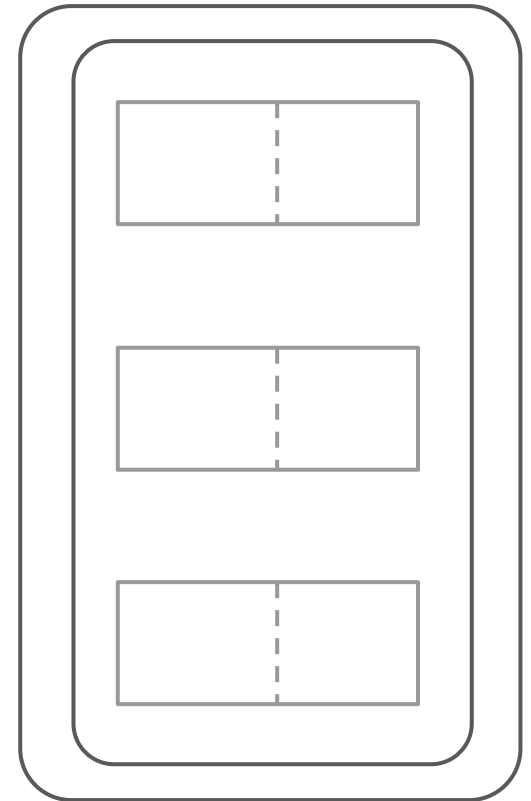access object's elements,
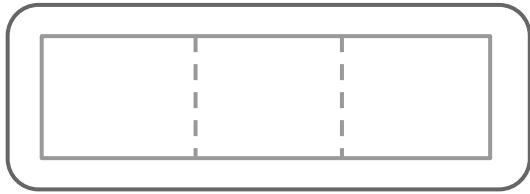of list element

list[[*elem*]][obj]

lst[[1]][2]

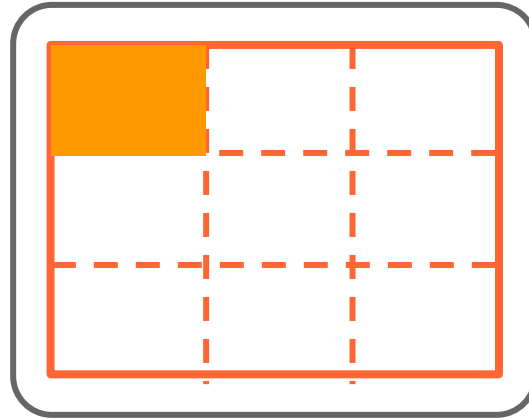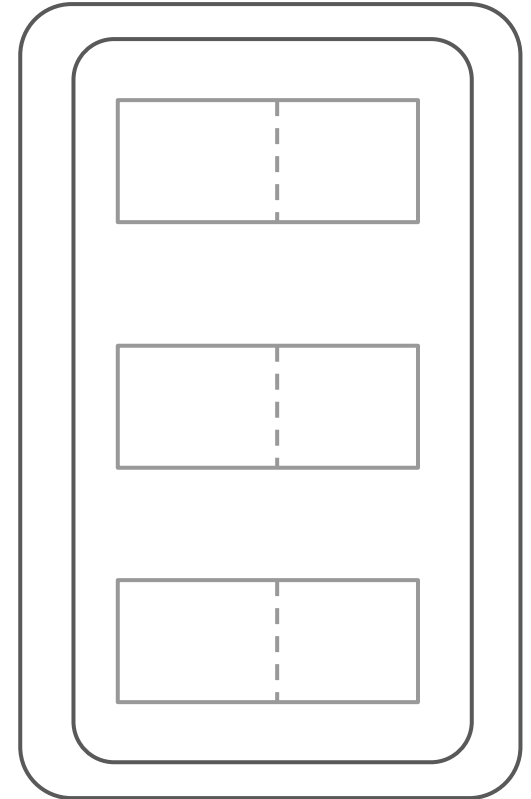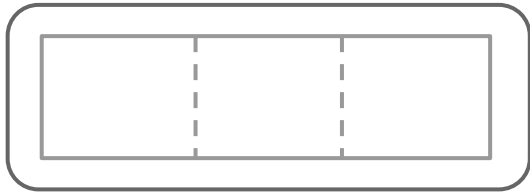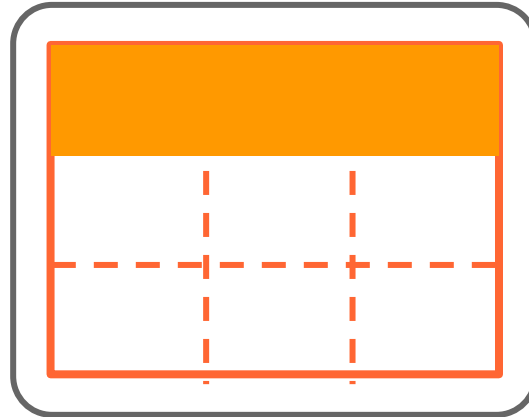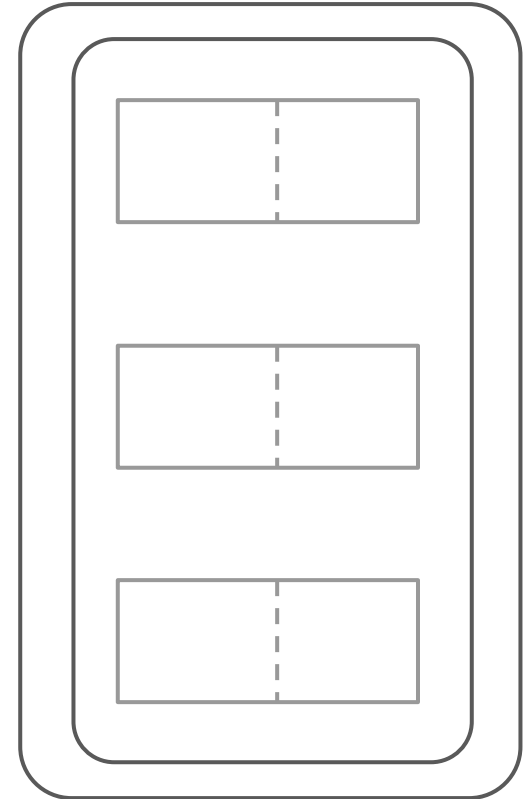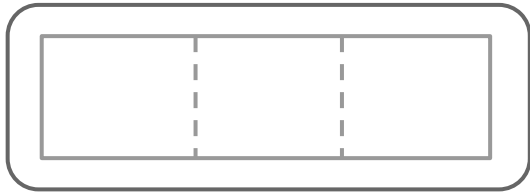vector

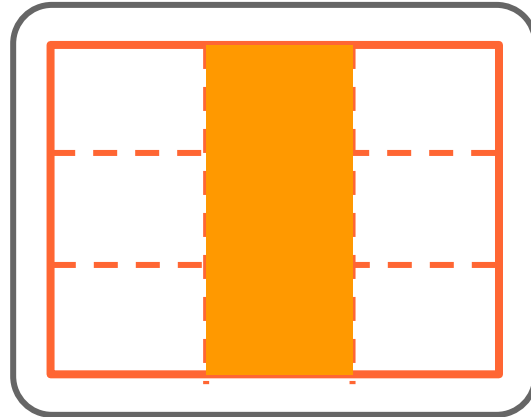matrix

another list

lst[[2]][1,1]

vector

matrix

another list

`lst[[2]][1, ]`

vector

matrix

another list

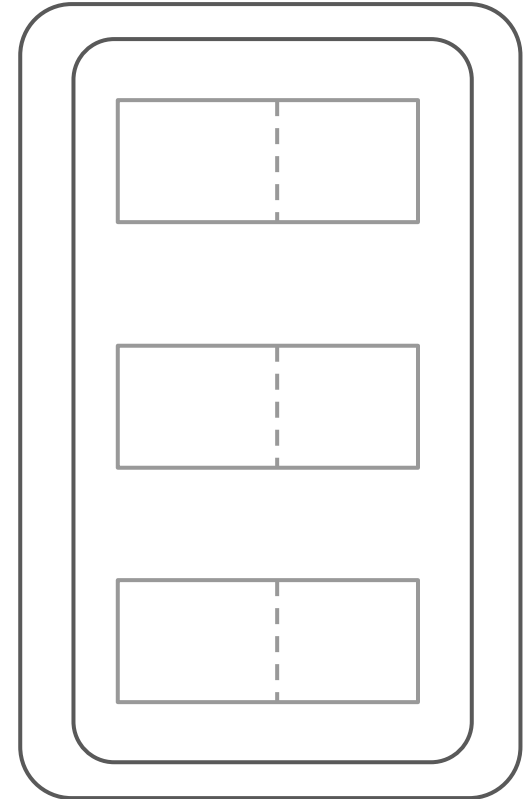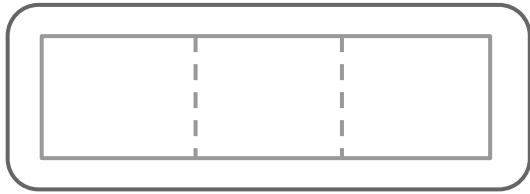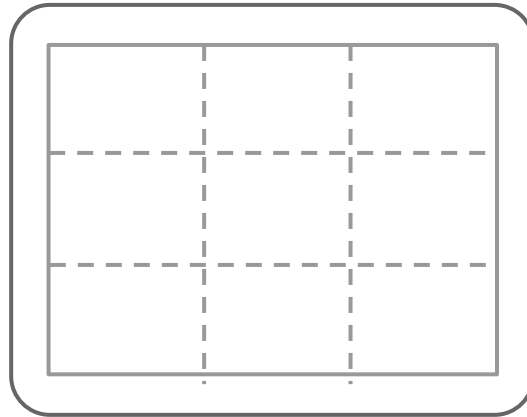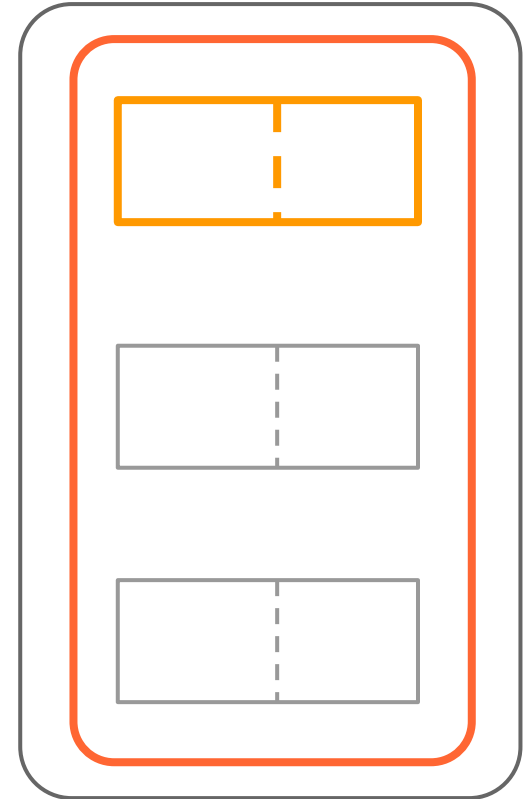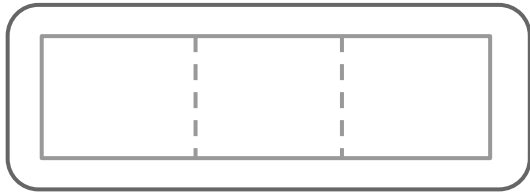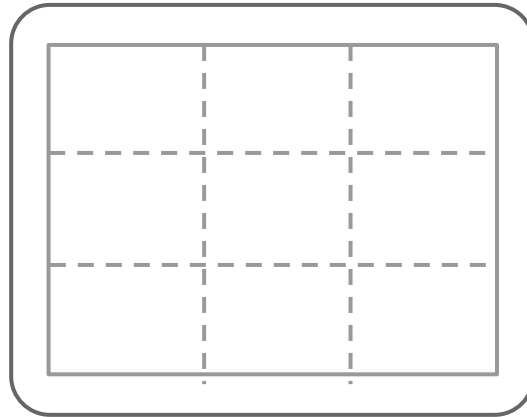# `lst[[`**2**`]][ `**,2**`]`

vector

matrix

another list

lst[[3]][1]

vector

matrix

another list

access object's elements,
of list element

`list[[elem]][[obj]]`

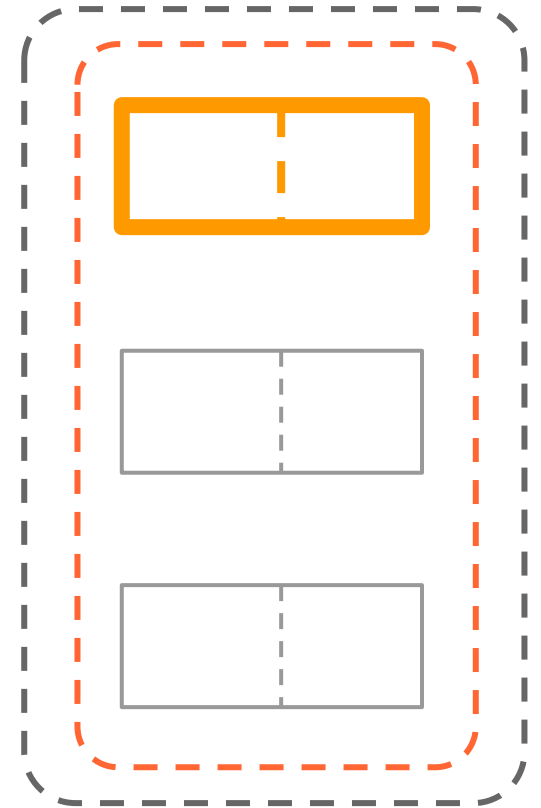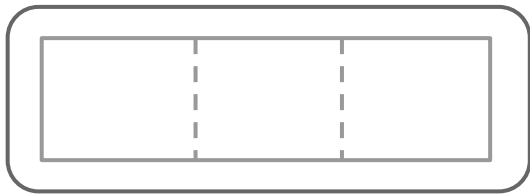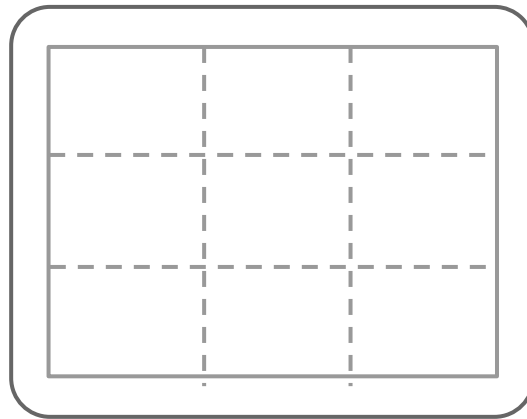# lst[[3]][[1]]

vector

matrix

another list

access element of object's elements,
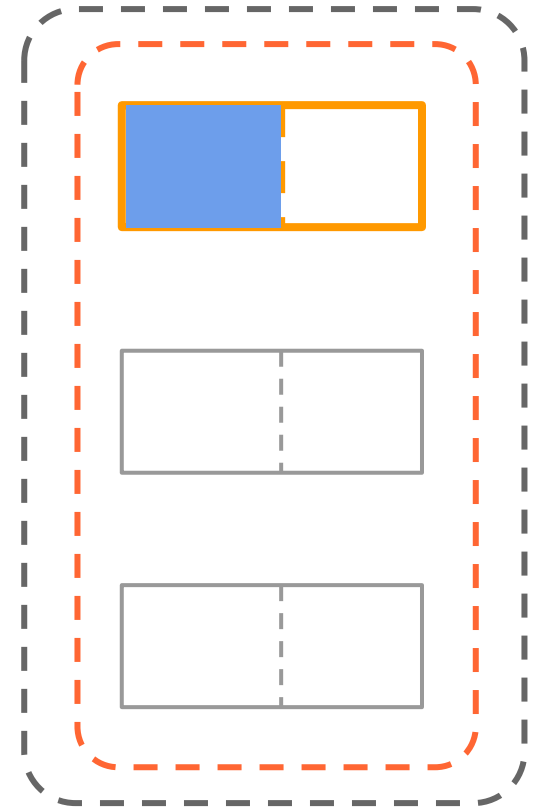of list element

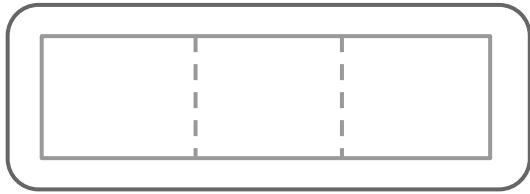`list[[elem]][[obj]][ind]`

lst[[3]][[1]][1]
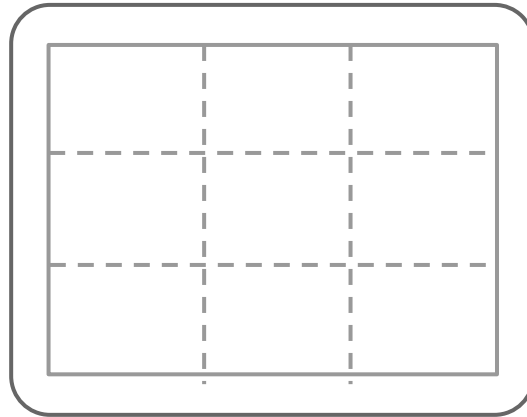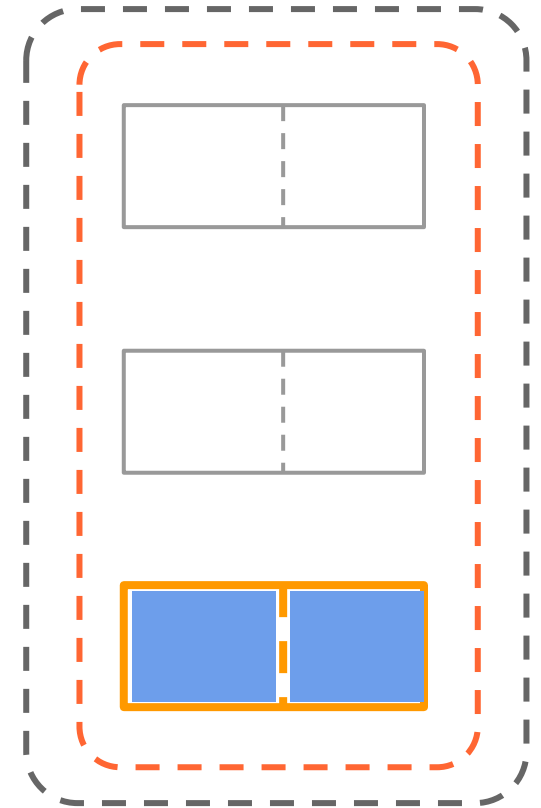
vector

matrix

another list

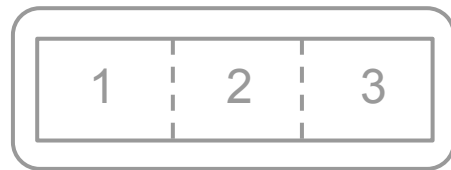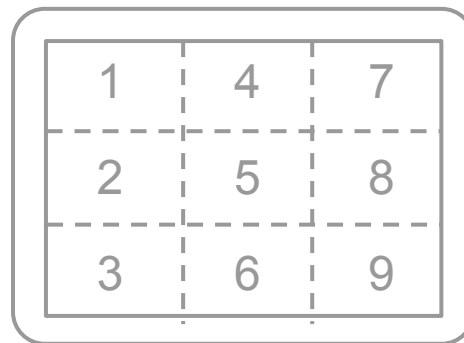# lst[[3]][[3]][c(1,2)]

vector
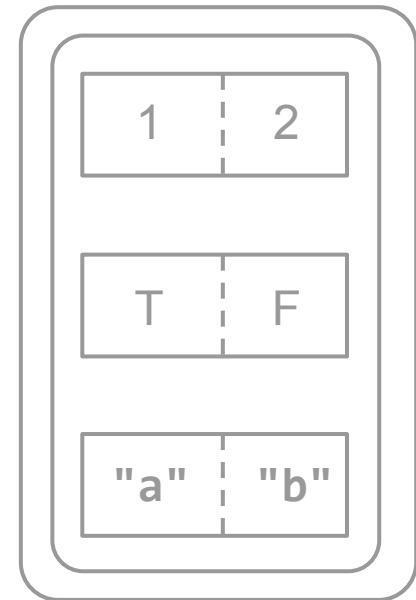
matrix

another list

Dollar Notation

```
lst <- list(
  vec = c(1, 2, 3),
  mat = matrix(1:9, nrow = 3, ncol = 3),
  lis = list(1:2, c(TRUE, FALSE), c("a", "b"))
)
```
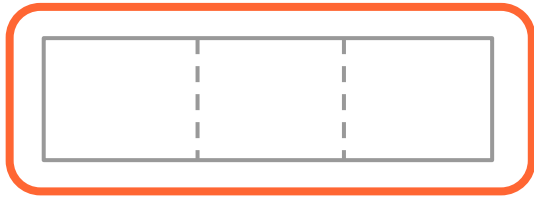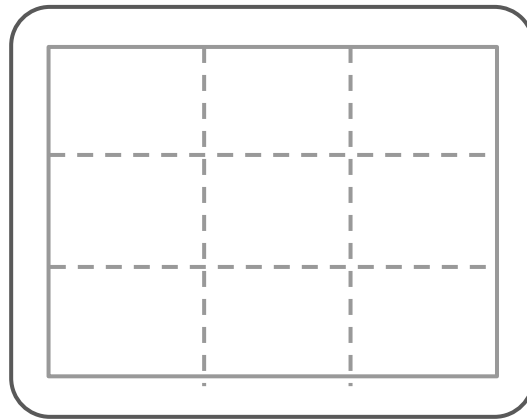

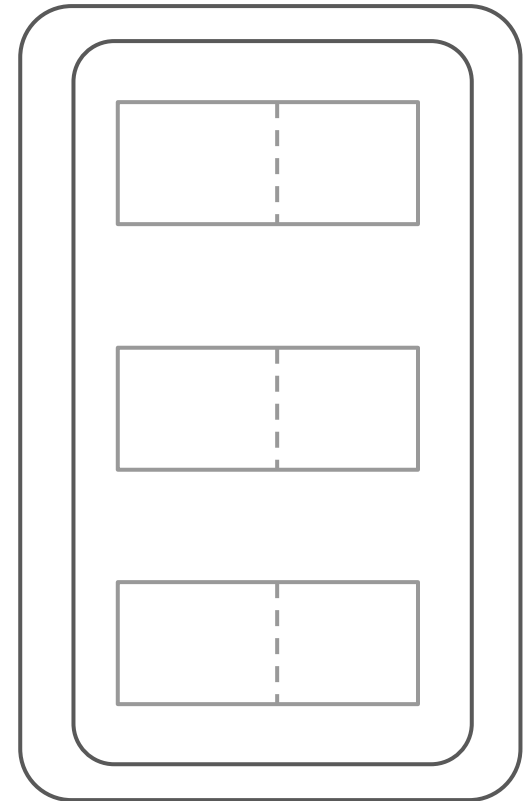"vec"

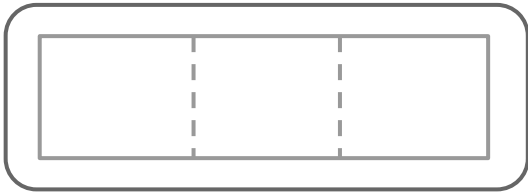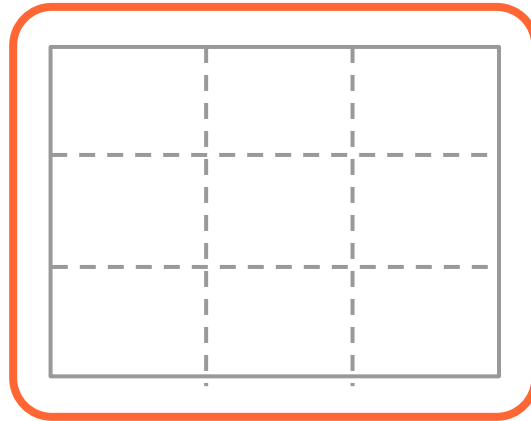"mat"

"lis"

access list named element(s)
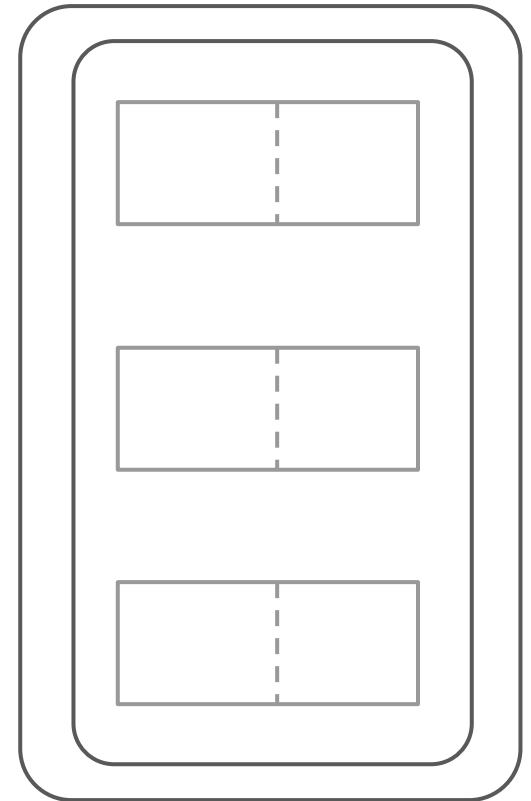
`list$`*`name`*

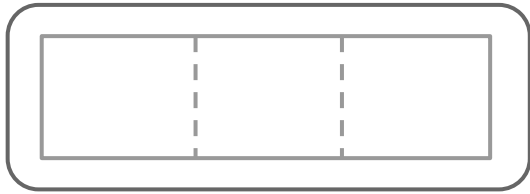# lst**$vec**

"vec"

"mat"
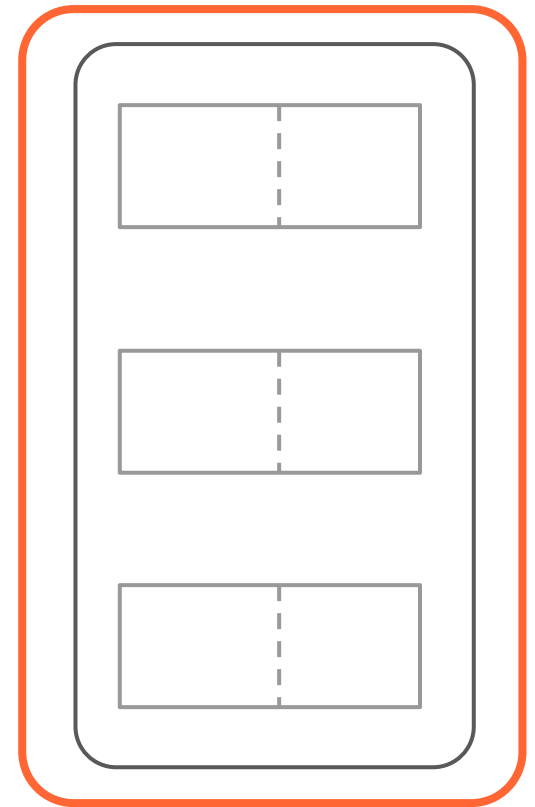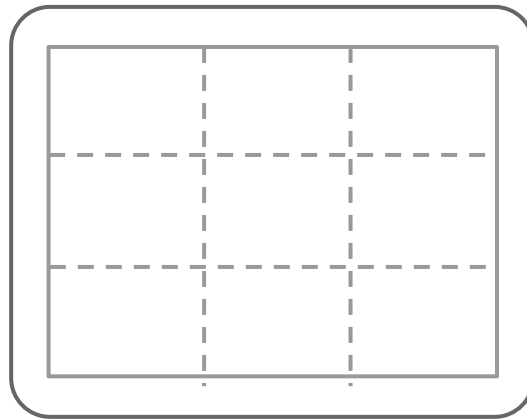
"lis"

lst$mat

"vec"

"mat"

"lis"

lst**$lis**

"vec"

"mat"
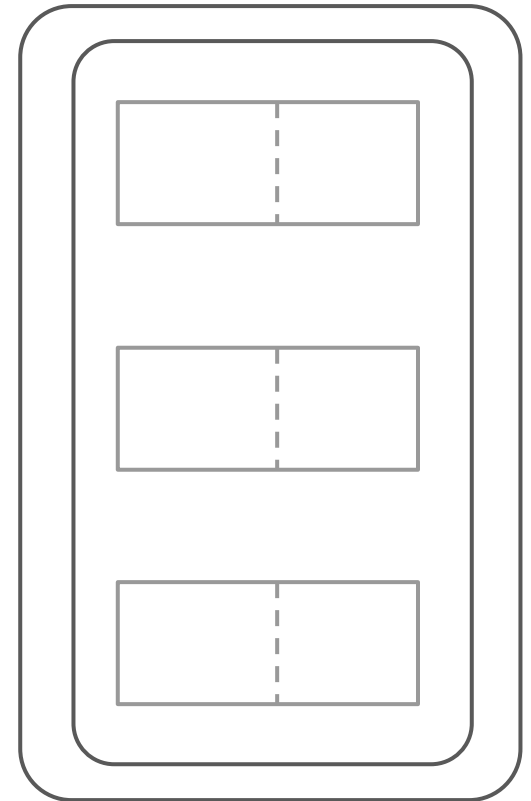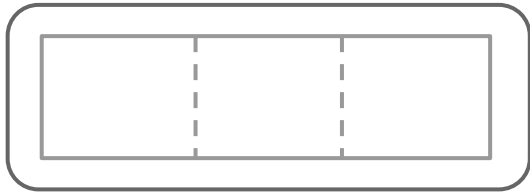
"lis"

access list named element(s)
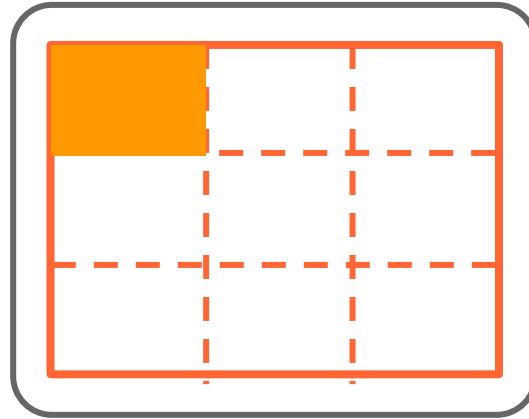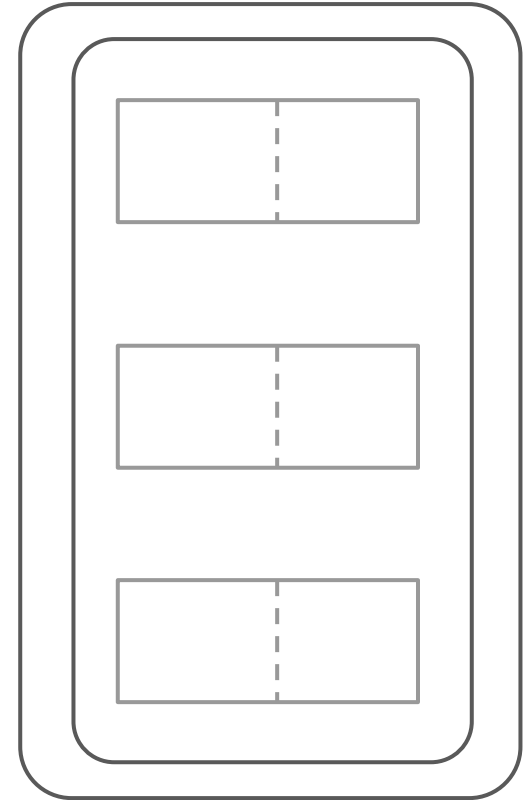
`list$`*`name`*`[ind]`

```
lst$vec[2]
```

"vec"

"mat"

"lis"

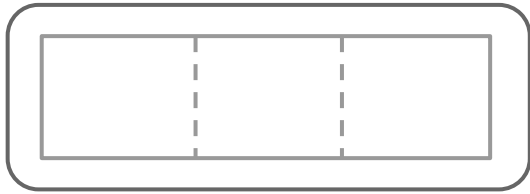# lst$mat[1,1]

"vec"

"mat"
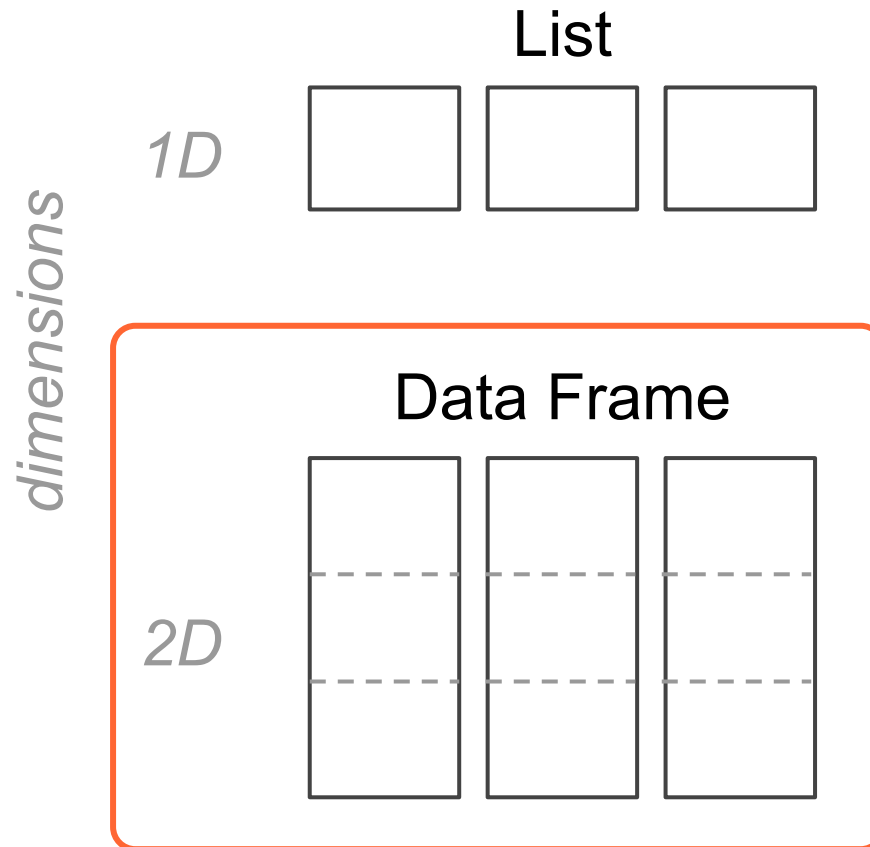
"lis"

lst$lis[[1]]

"vec"

"mat"

"lis"

Special list:
Data Frames

multiple data types

List

1D

dimensions

Data Frame

2D

We'll talk about data frames later