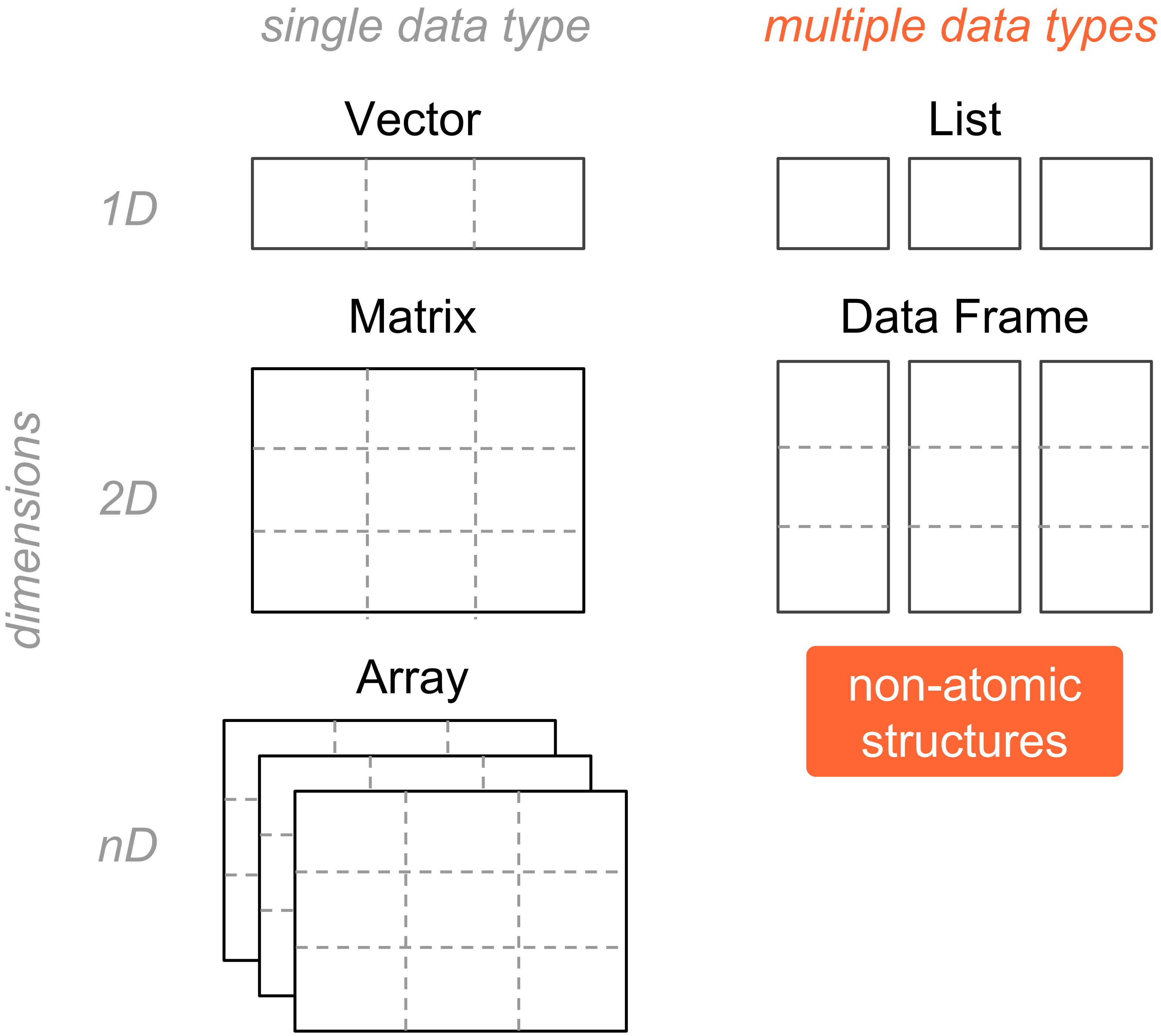
Data Structures in R: Lists

Stat 133 by Gaston Sanchez

Lists



single data type

multiple data types

dimensions

1D

Vector

List

2D

Matrix

Data Frame

nD

Array

non-atomic structures

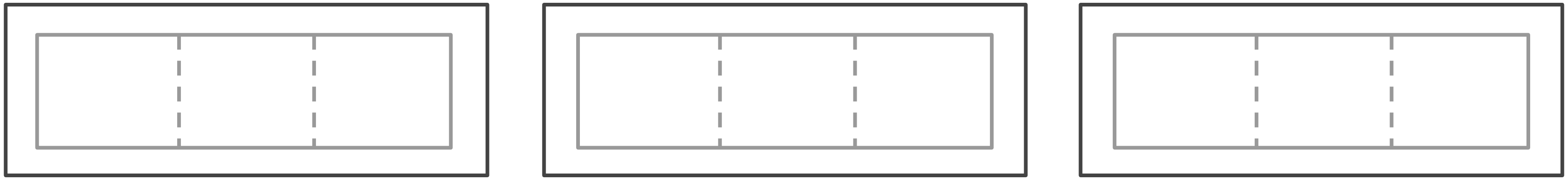
R lists

A list is the most general data structure in R

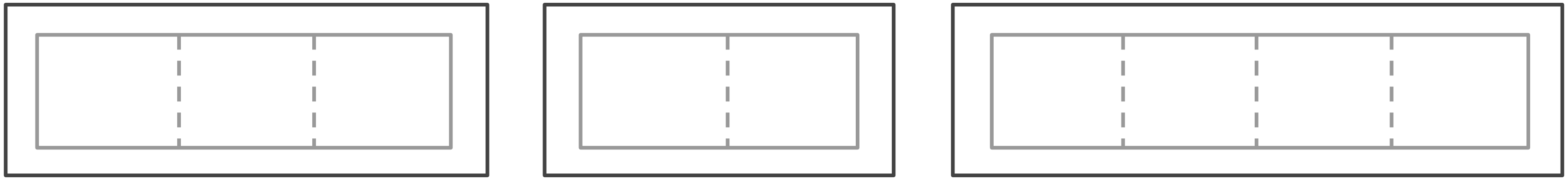
Lists can contain any other type of data structure

Lists can even contain other lists

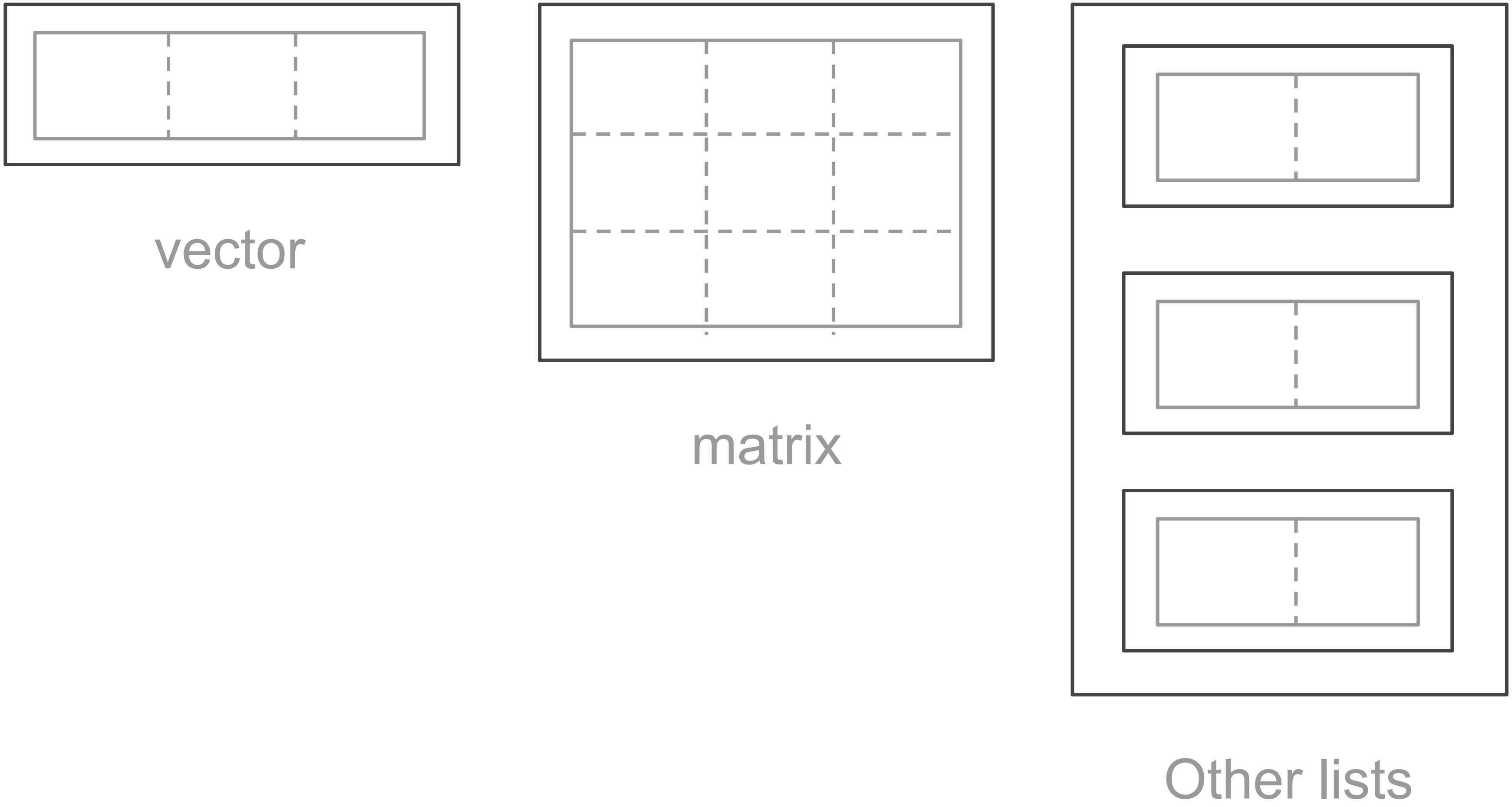
List of Vectors (of equal length)



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

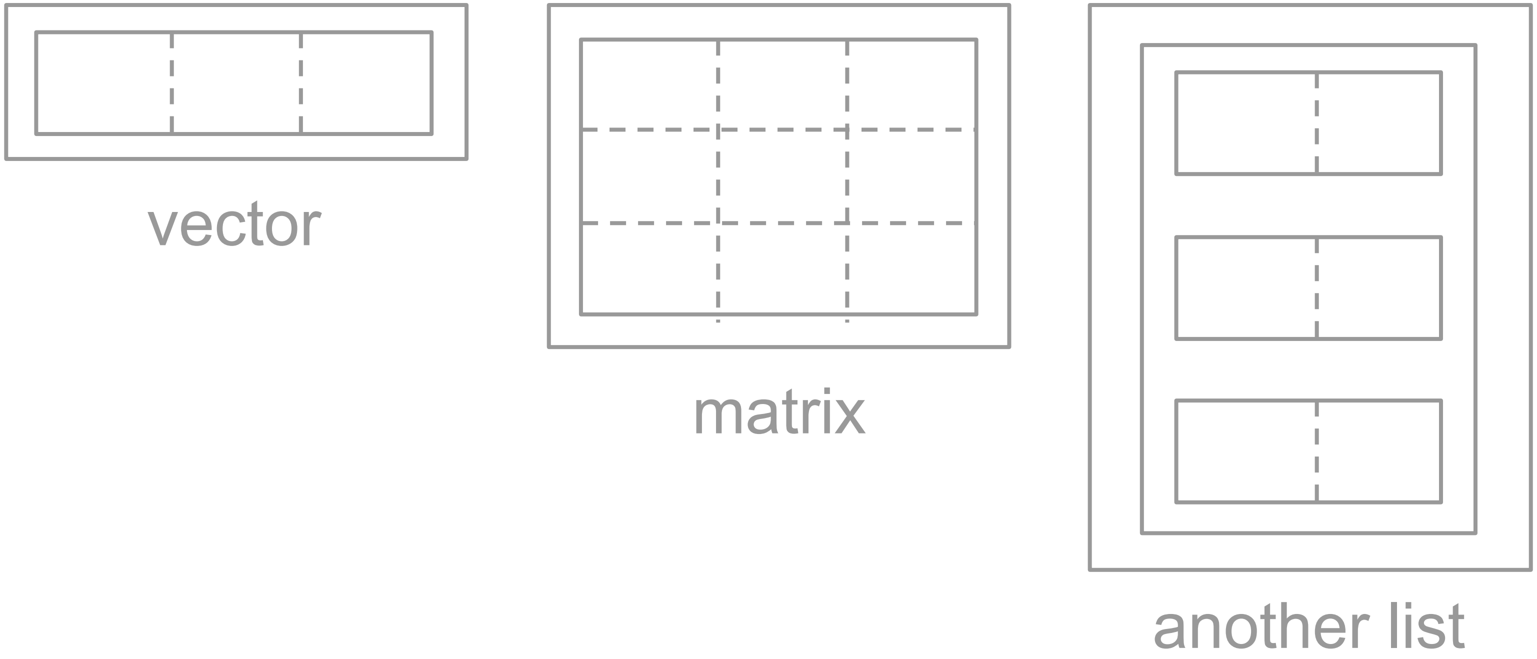
To extract values from R objects use brackets: [ ]

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

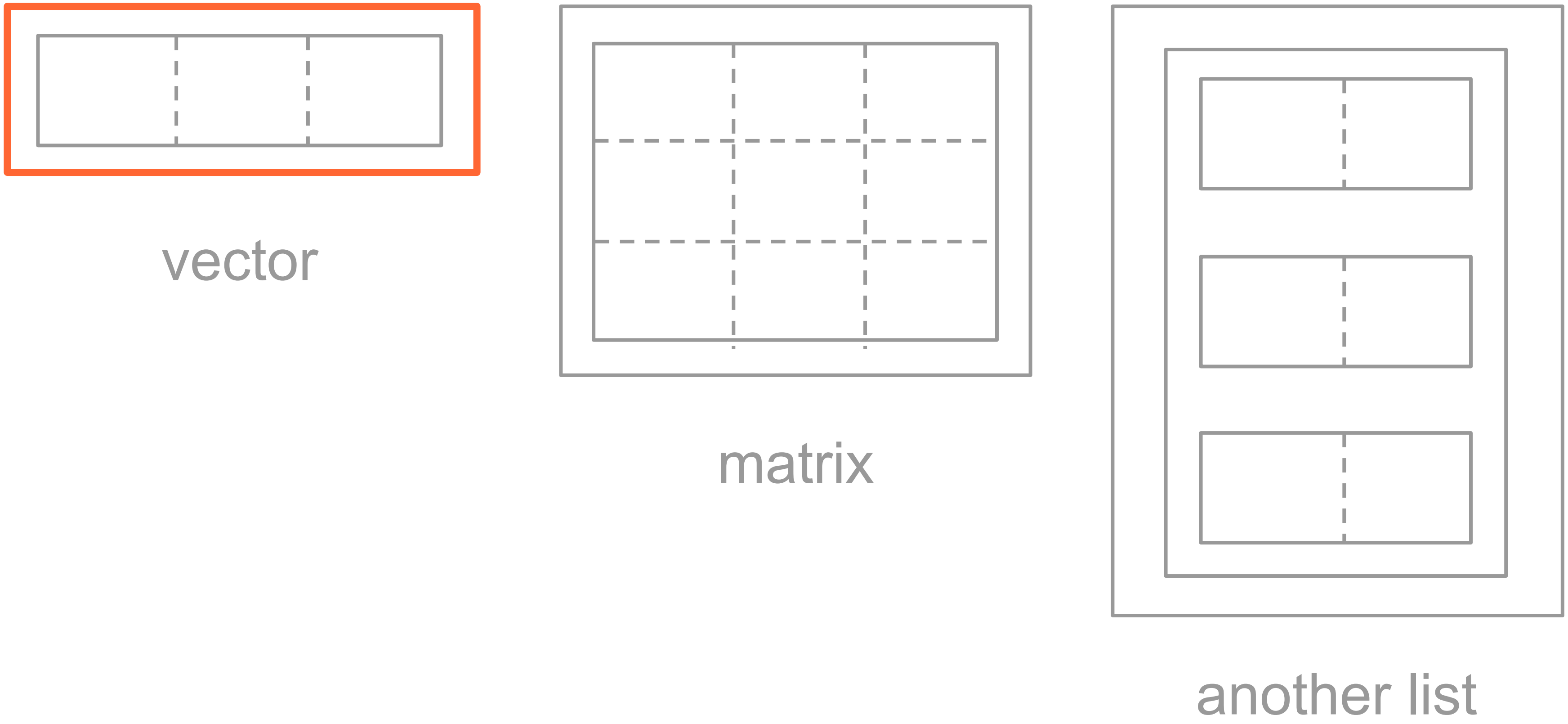
```
lst <- list(
  c(1, 2, 3),
  matrix(1:9, nrow = 3, ncol = 3),
  list(1:2, c(TRUE, FALSE), c("a", "b"))
)
```



access list element(s)

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

lst[1]

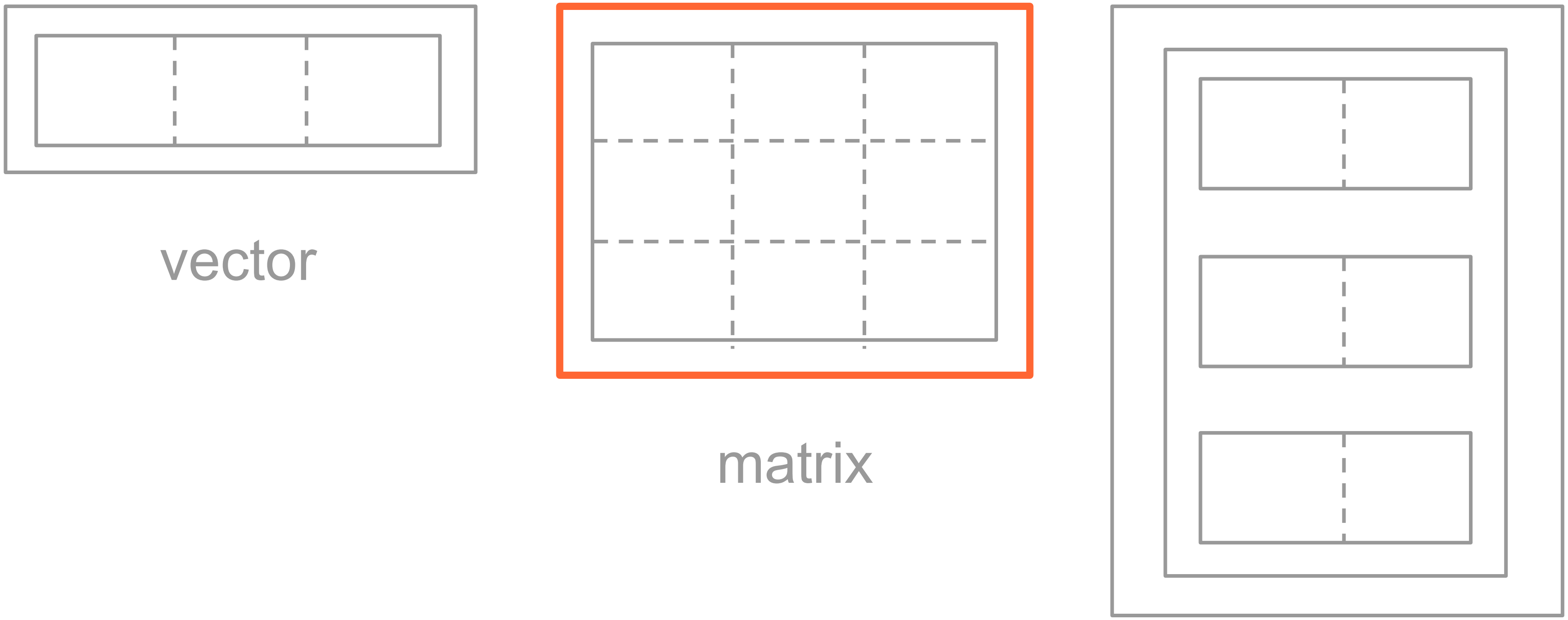


vector

matrix

another list

`lst[2]`

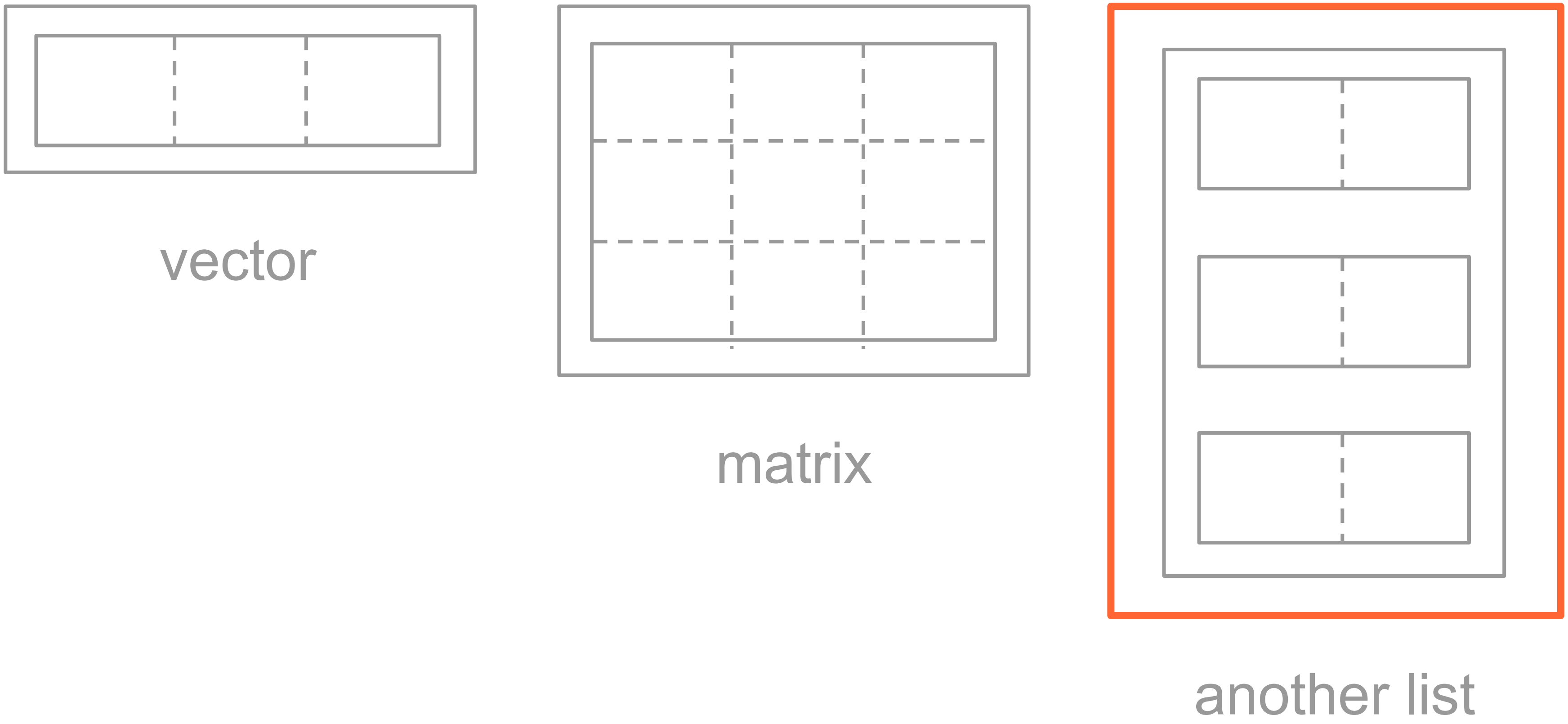


vector

matrix

another list

lst[3]



vector

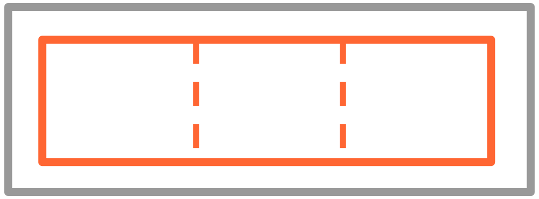
matrix

another list

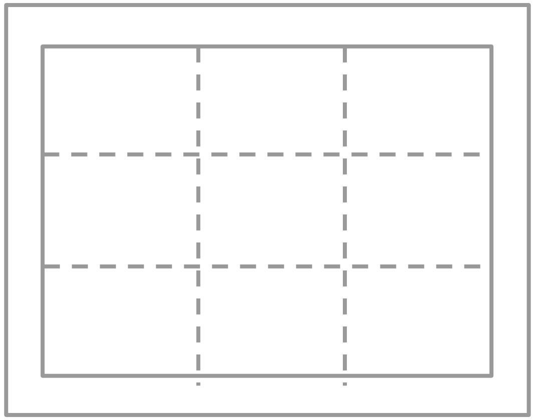
access object of list element

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

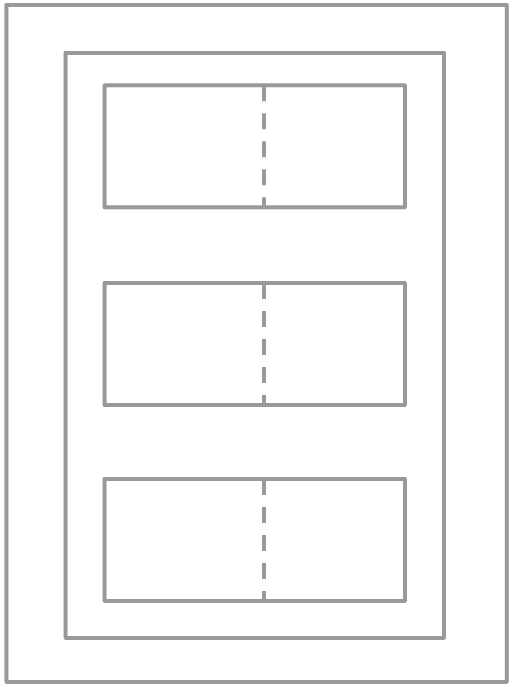
`lst[[1]]`



vector

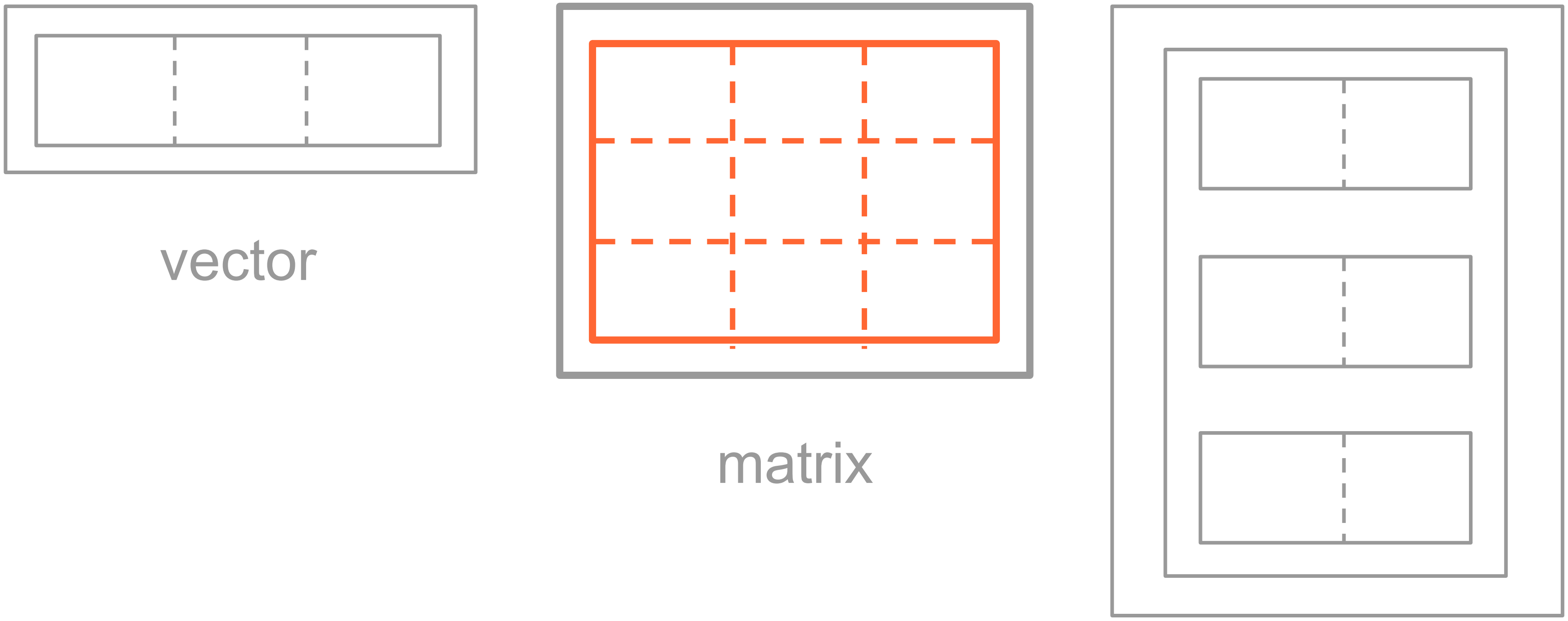


matrix



another list

`lst[[2]]`

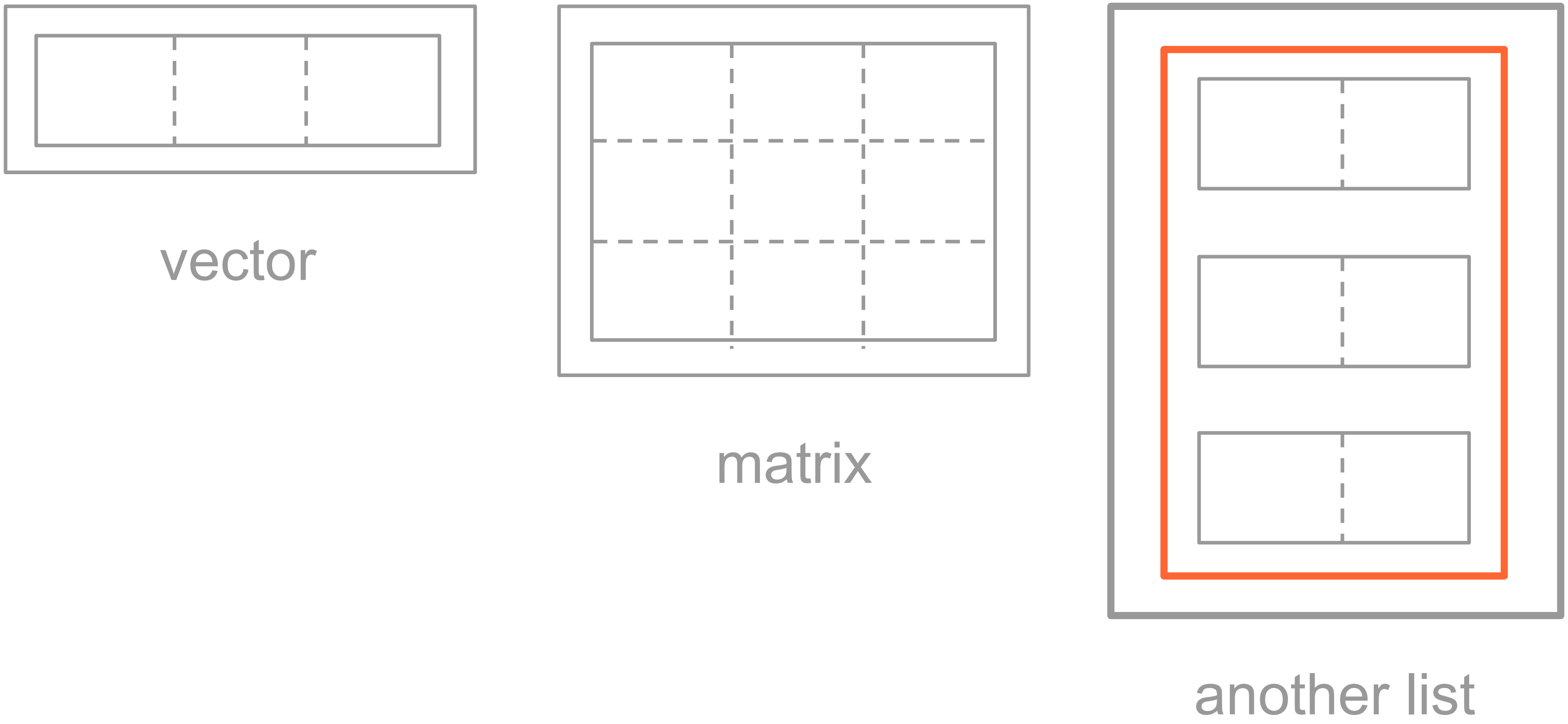


vector

matrix

another list

`lst[[3]]`



vector

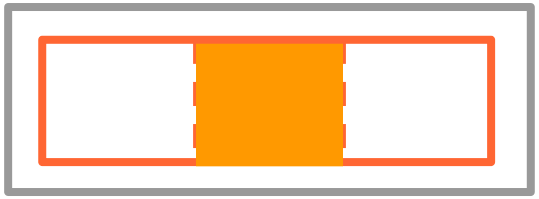
matrix

another list

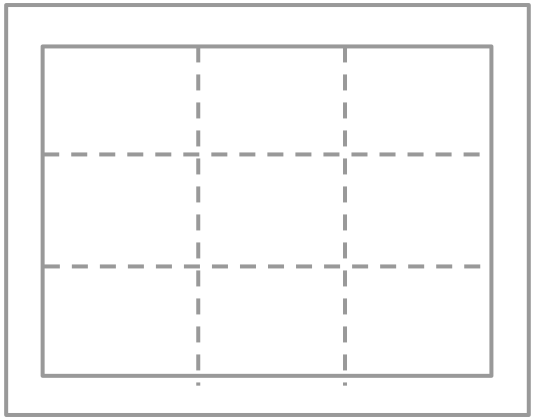
access object's elements,
of list element

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

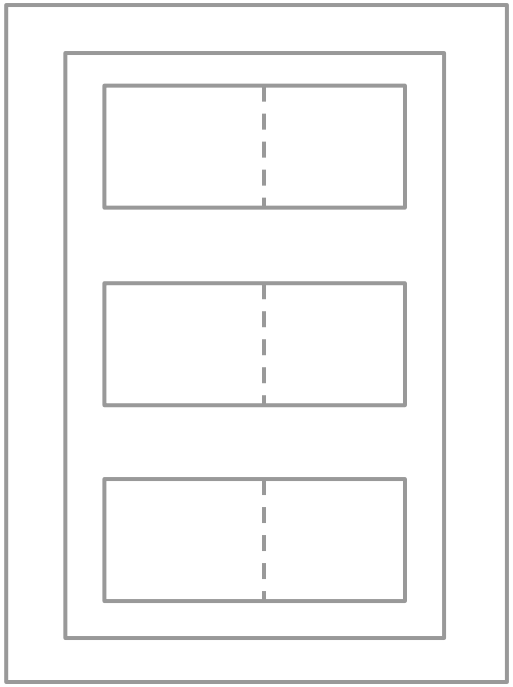
```
lst[[1]][2]
```



vector

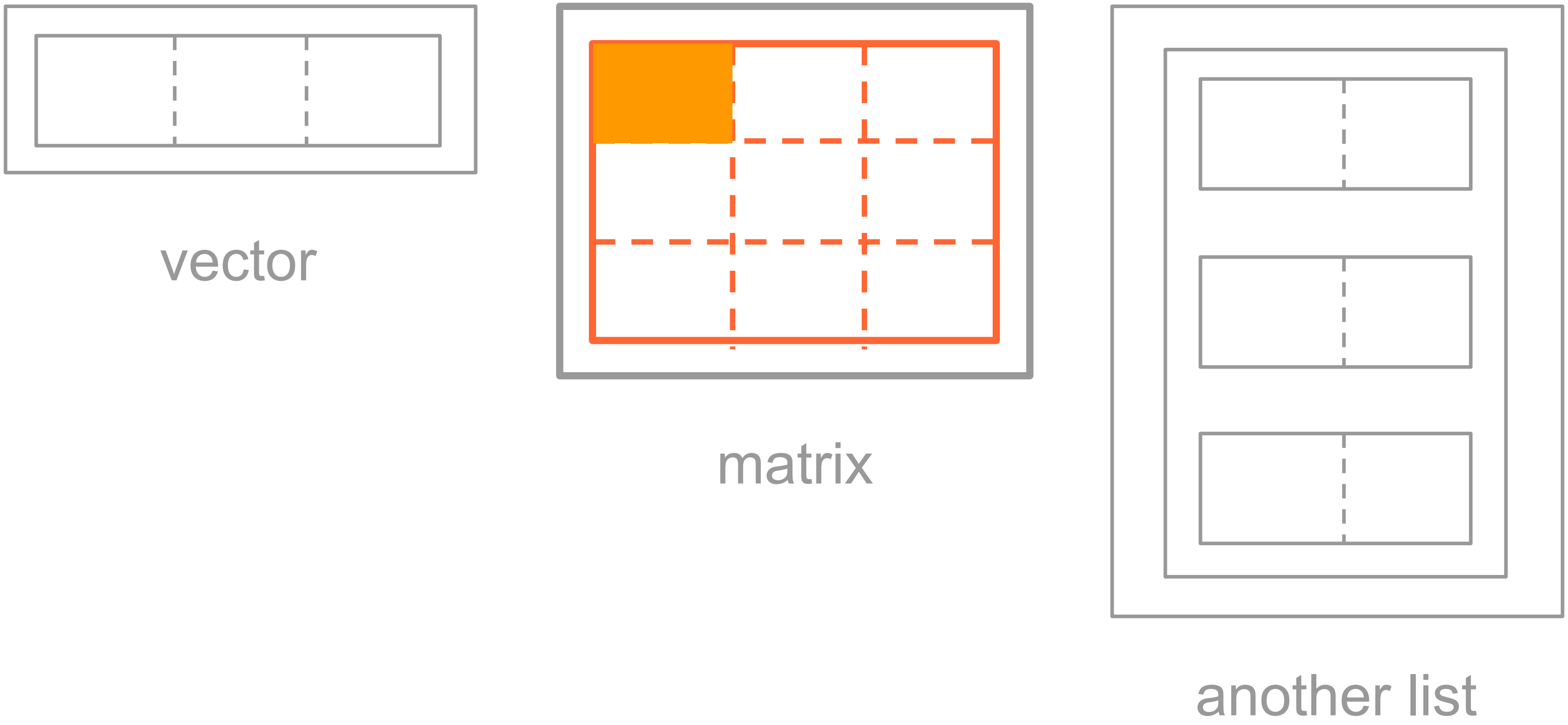


matrix

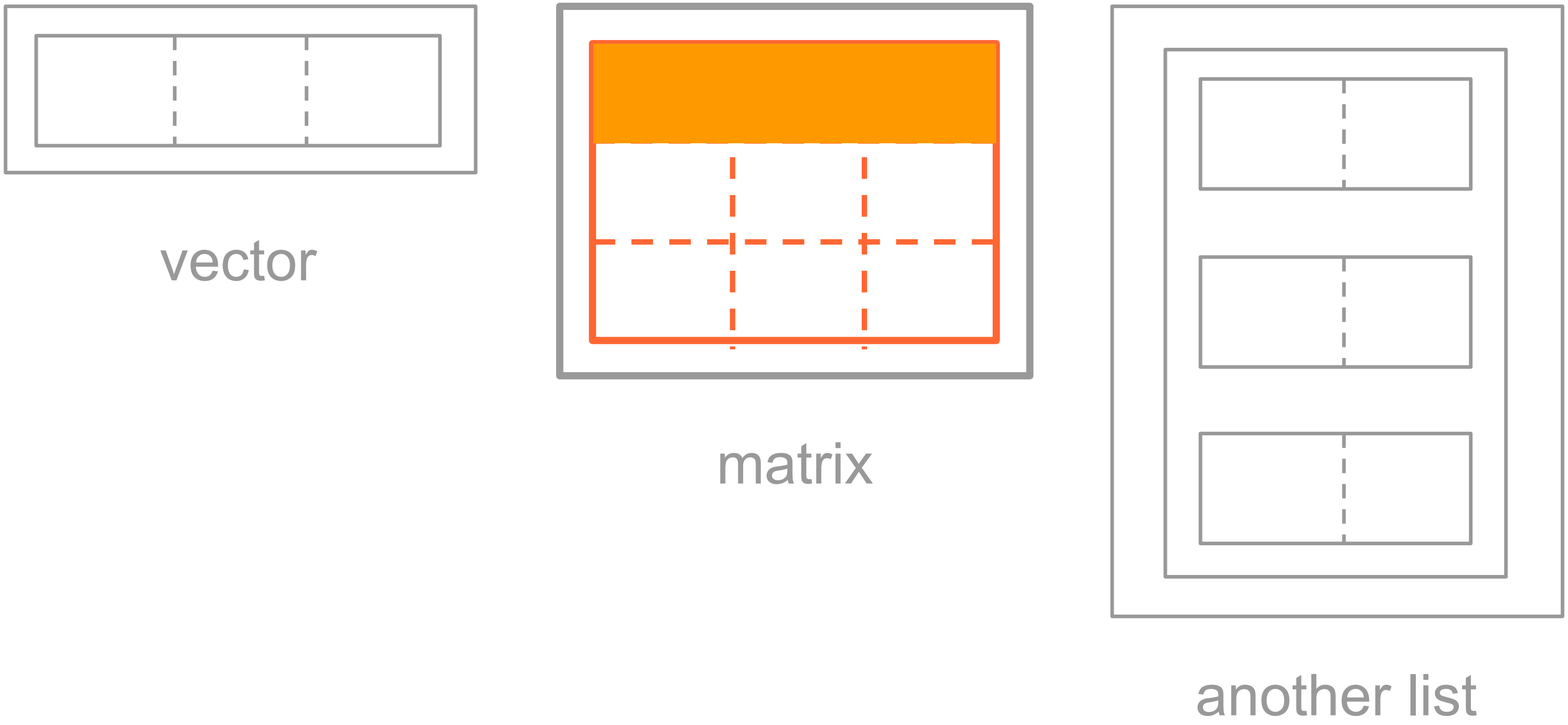


another list

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



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

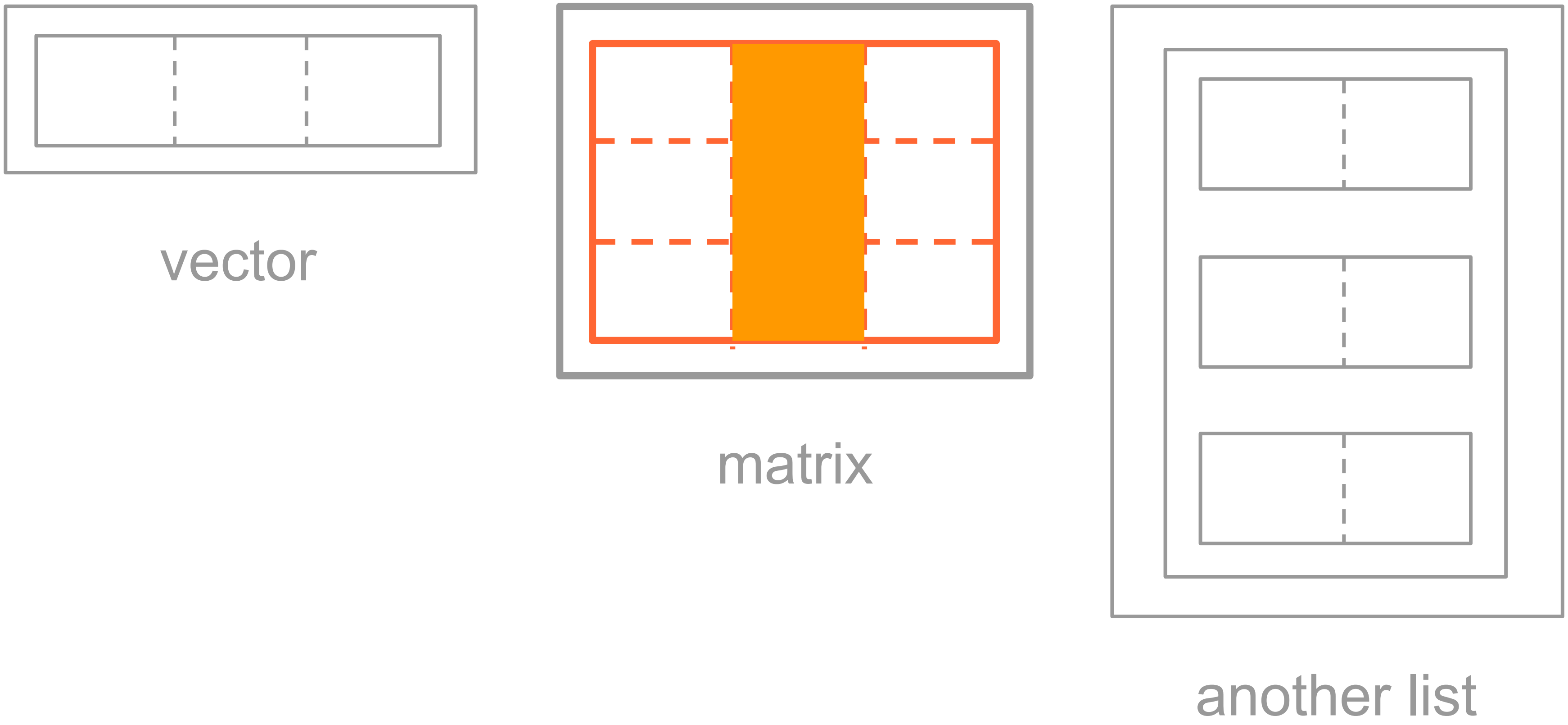


vector

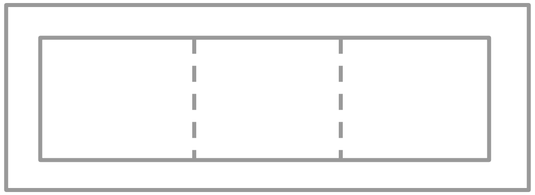
matrix

another list

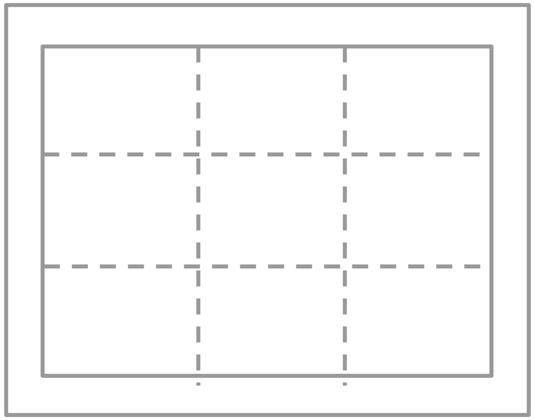
`lst[[2]][ ,2]`



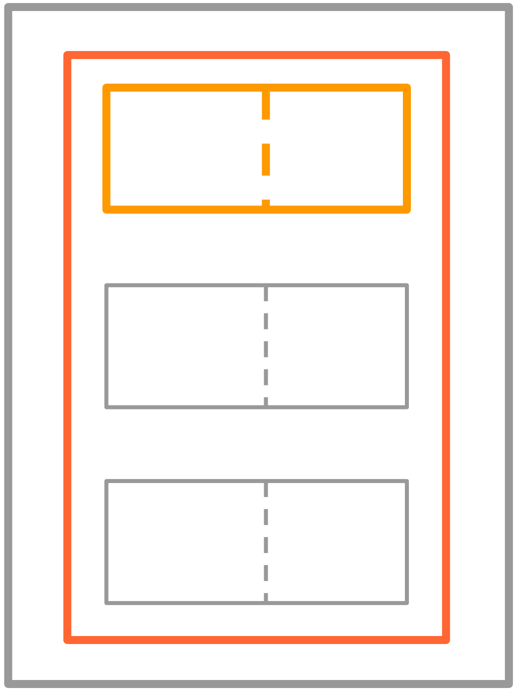
`lst[[3]][1]`



vector



matrix

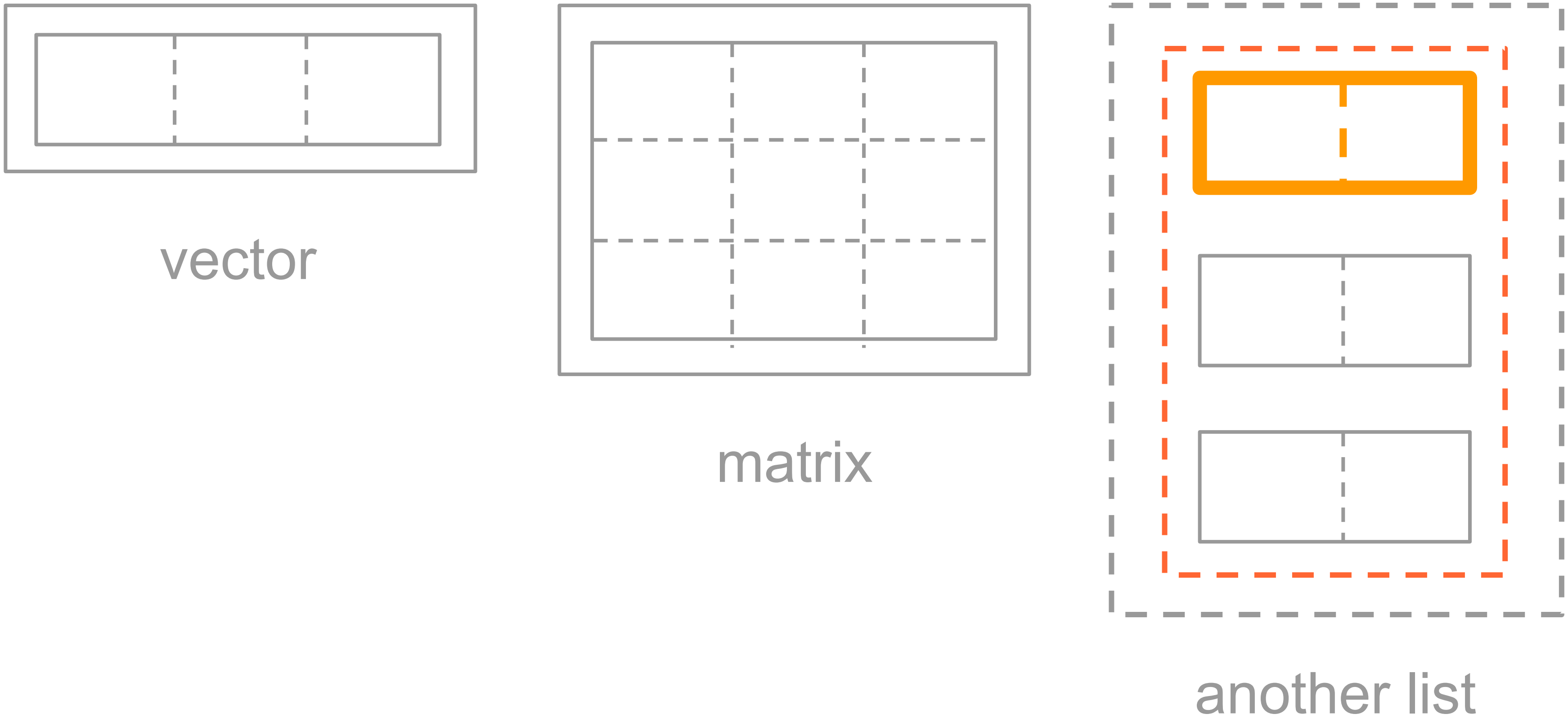


another list

access object’s elements,
of list element

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

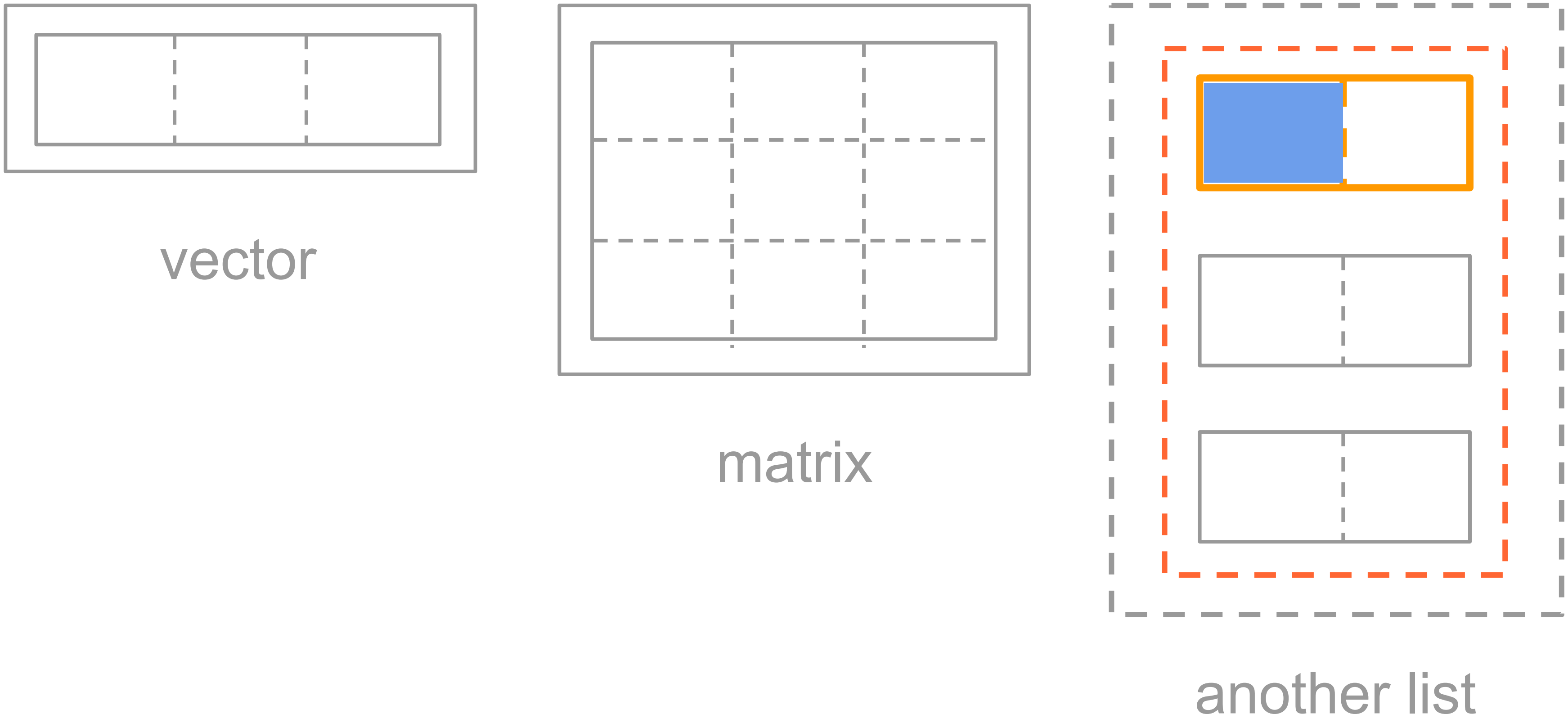
lst[[3]][[1]]



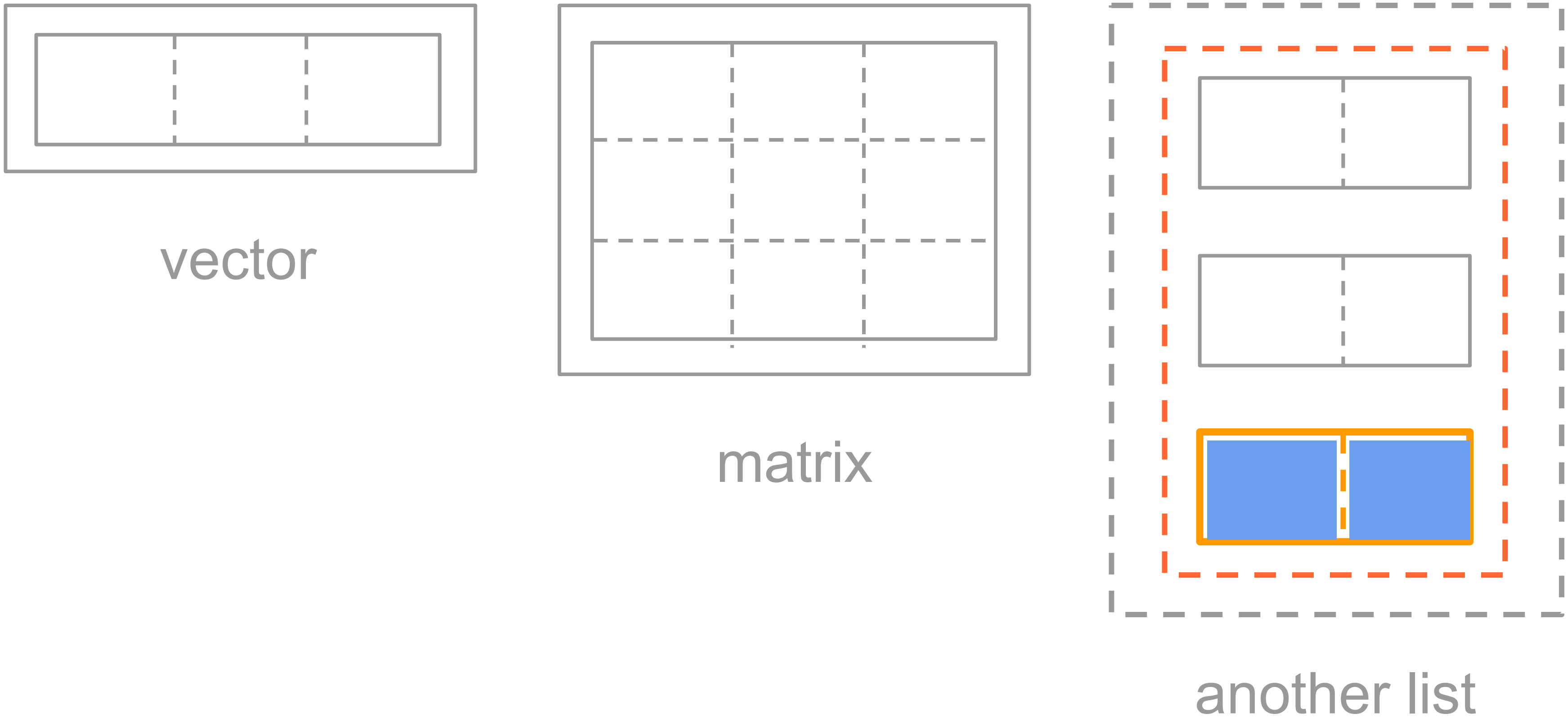
access element of object's elements, of list element

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

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

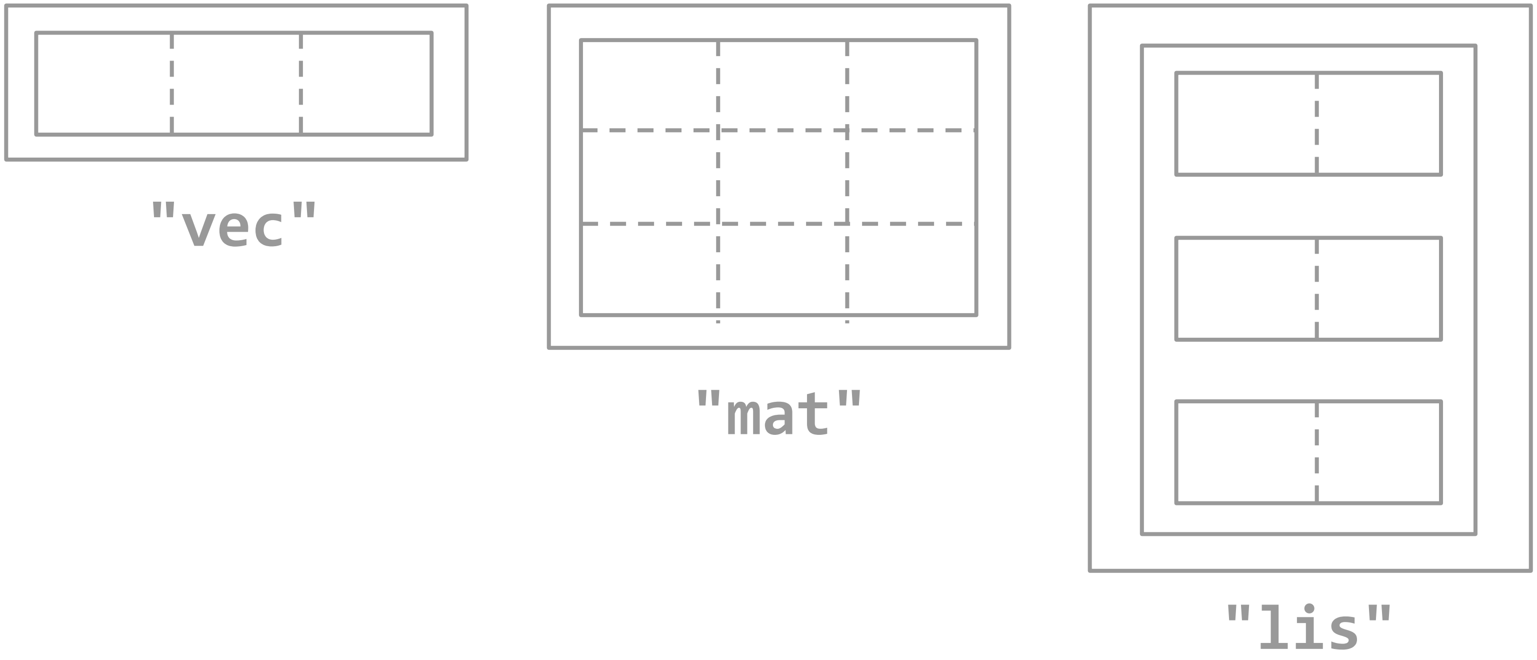


```
lst[[3]][[3]][c(1,2)]
```



Dollar Notation

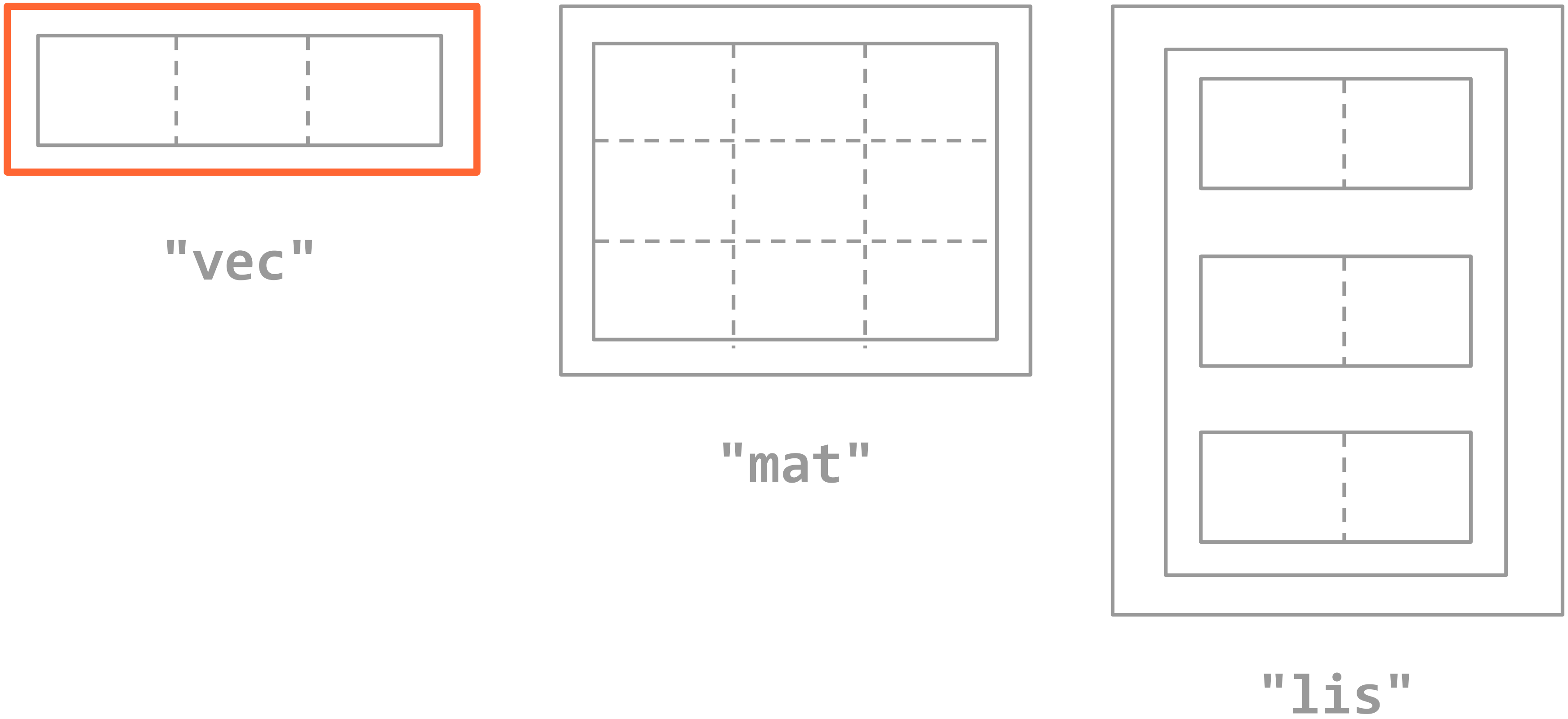
```
lst <- list(
  vec = c(1, 2, 3),
  mat = matrix(1:9, nrow = 3, ncol = 3),
  lis = list(1:2, c(TRUE, FALSE), c("a", "b"))
)
```



access list named element(s)

`list$name`

`lst$vec`

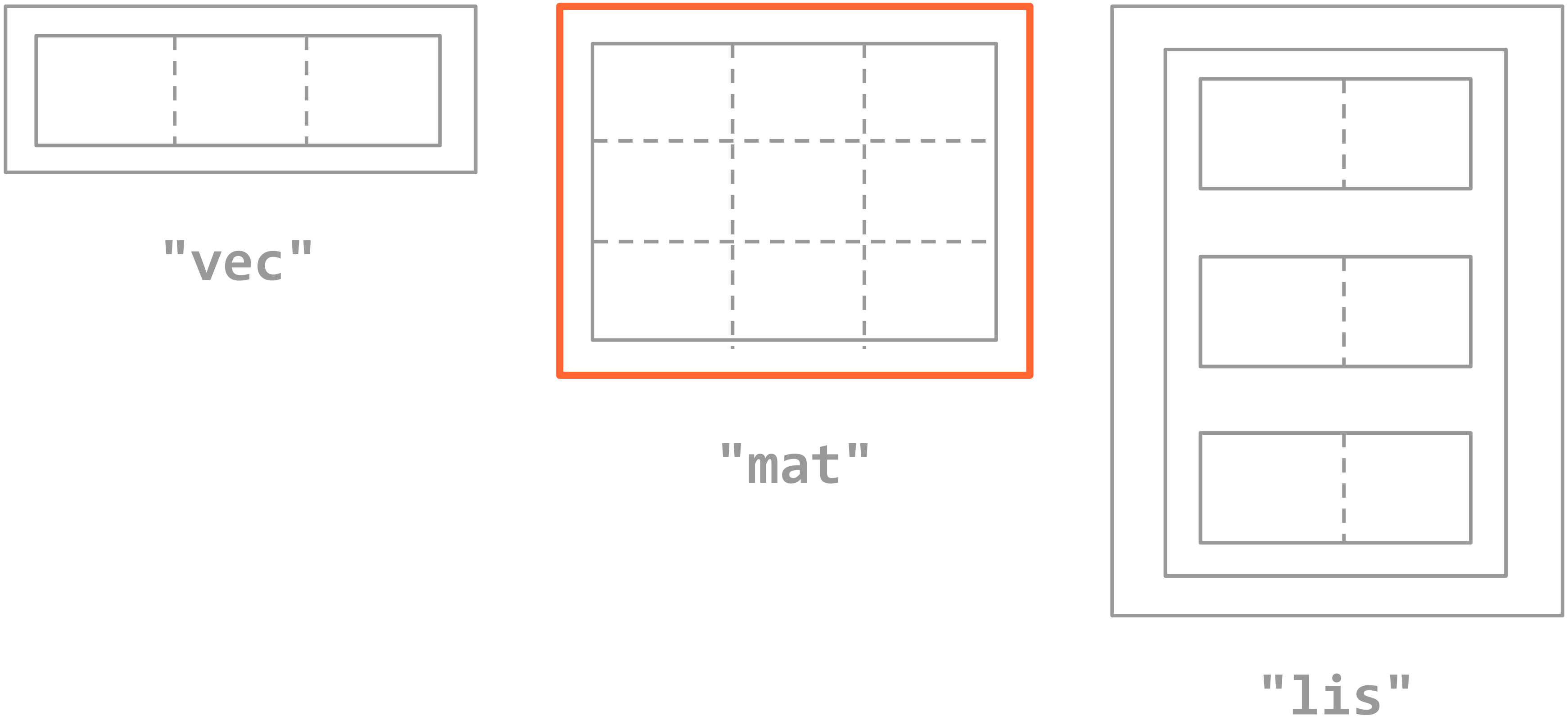


"vec"

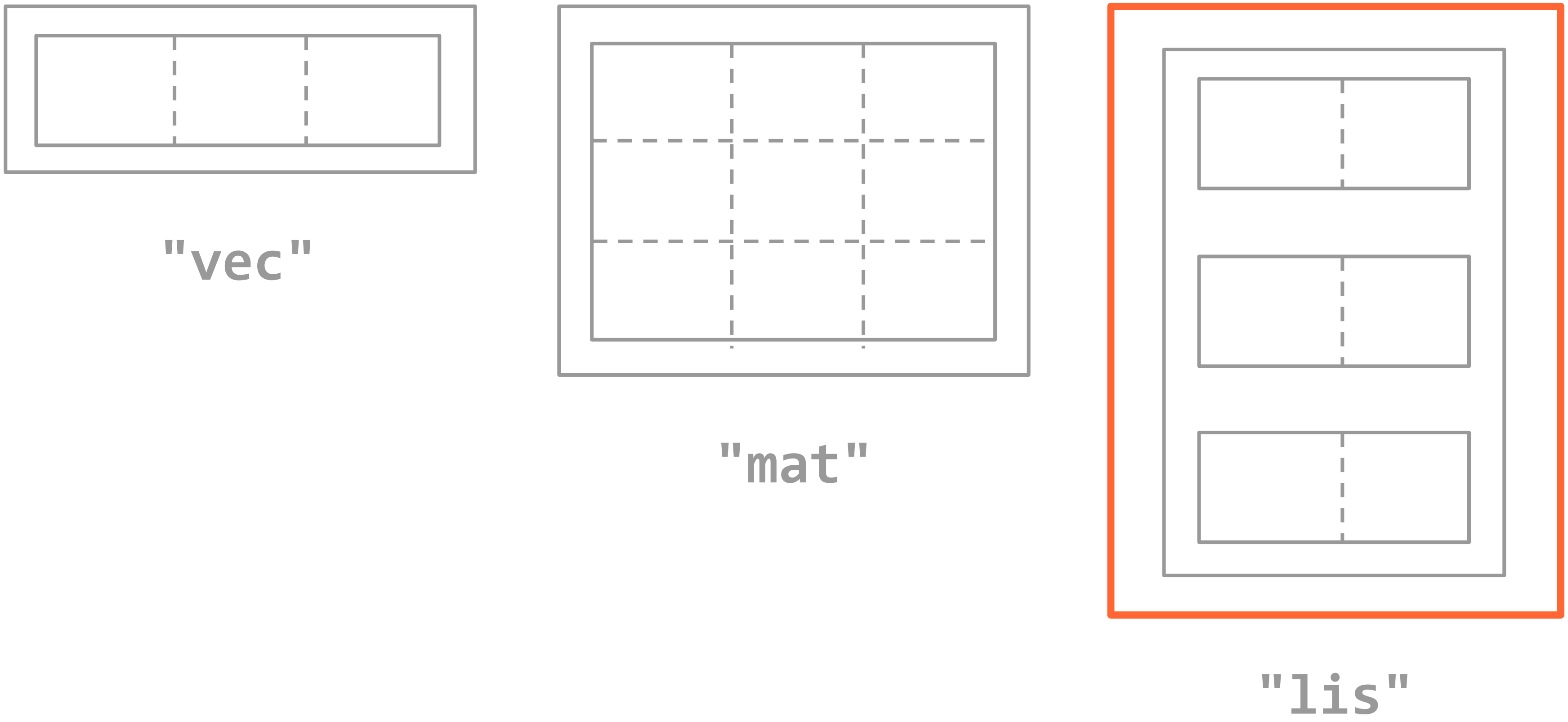
"mat"

"lis"

lst$mat



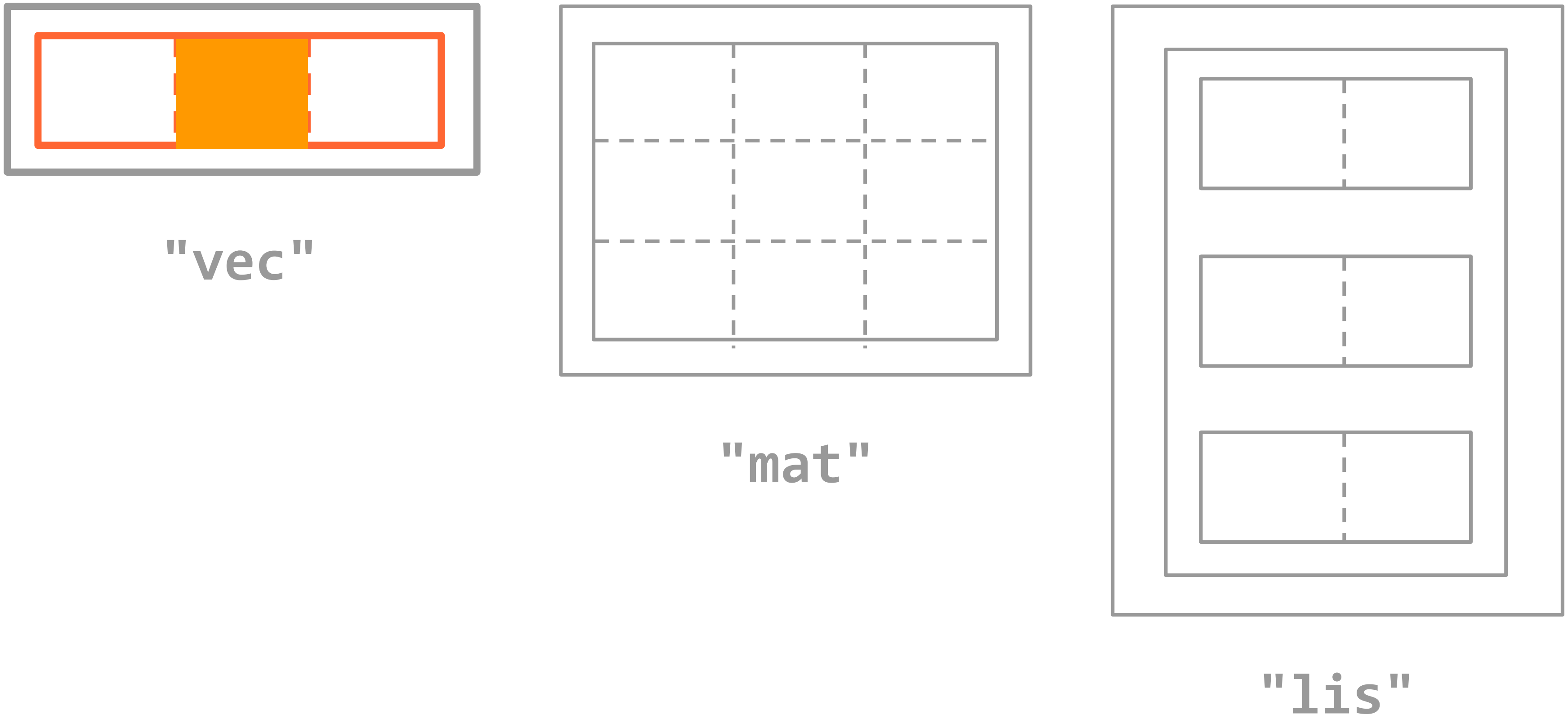
lst$lis



access list named element(s)

```
list$name[ind]
```

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

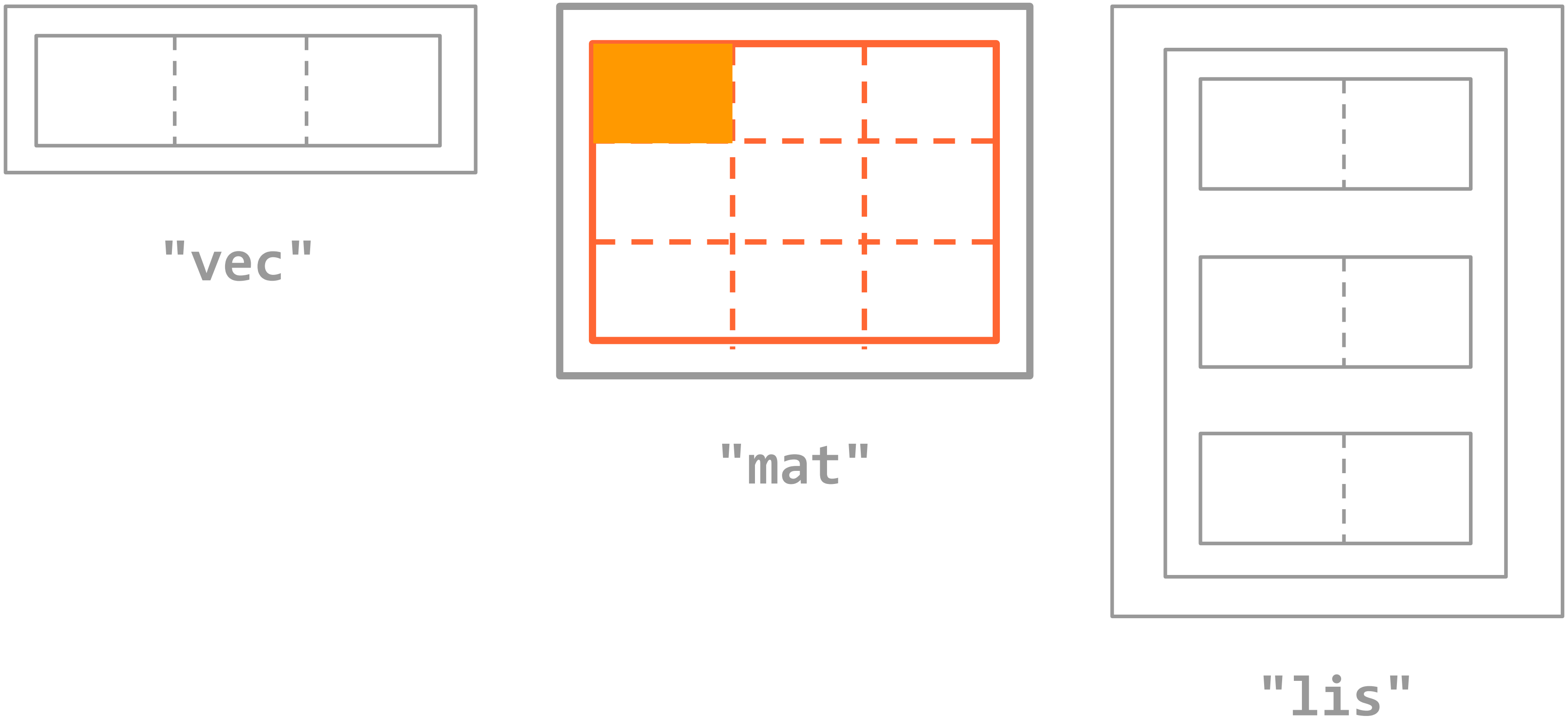


"vec"

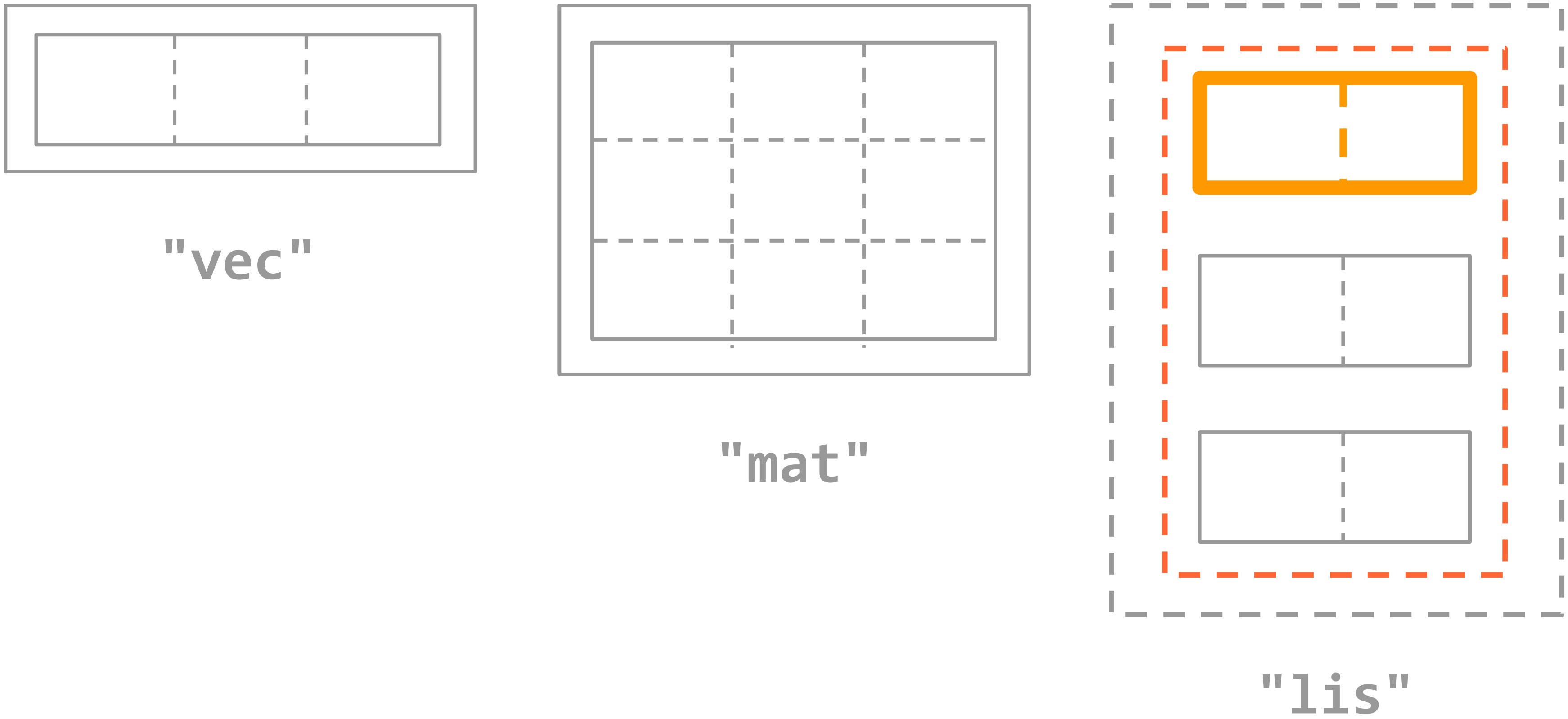
"mat"

"lis"

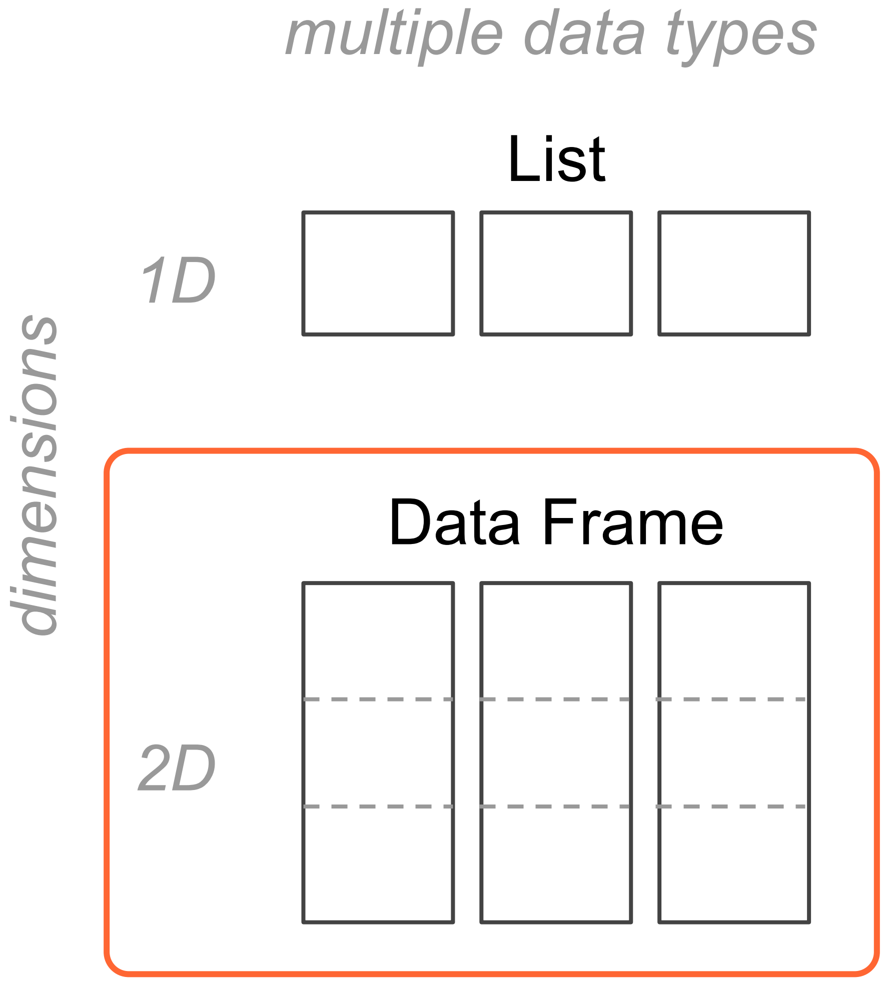
```
lst$mat[1,1]
```



lst$lis[[1]]



Special list: Data Frames



multiple data types

dimensions

1D

List

2D

Data Frame

We’ll talk about data frames later