Forms of the Assignment Operator in R

In the *R Programming* assignment on lexical scoping, students are introduced to the `<<-` syntax for assigning values to R objects. The sample code for this assignment often confuses people, because it is not clear how this syntax works.

`<<-` is one of three forms of the assignment operator. The following syntax from the `makeVector()` function for the lexical scoping assignment in *R Programming* assigns the object m the value of mean:

```
#
# assign value of mean to m in parent scope
#
setmean <- function(mean) m <<- mean
```

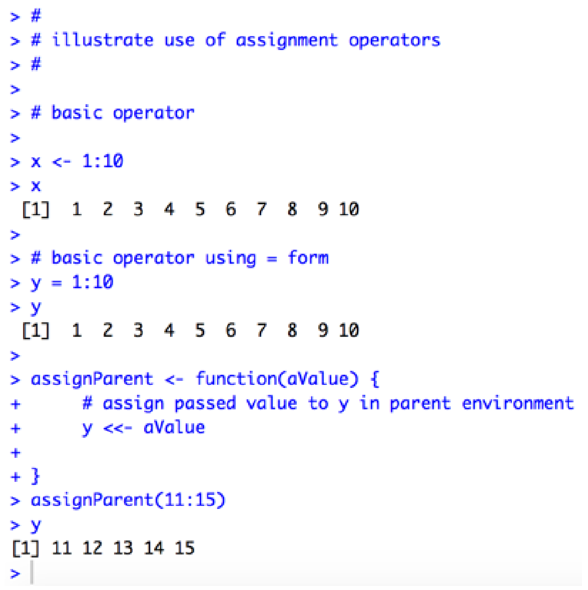
The double left arrow `<<` indicates that the assignment should be made to the parent environment, as opposed to the current scope within the `setmean()` function.

To make the scoping more obvious, one could rewrite the code this way.

```
setmean <- function(mean) {
    m <<- mean
}
```

The other forms of the assignment operator are `<-` and `=`. All of these are documented in the Assignment Operators R Documentation.

For example:



```
> #
> # illustrate use of assignment operators
> #
>
> # basic operator
>
> x <- 1:10
> x
 [1]  1  2  3  4  5  6  7  8  9 10
>
> # basic operator using = form
> y = 1:10
> y
 [1]  1  2  3  4  5  6  7  8  9 10
>
> assignParent <- function(aValue) {
+      # assign passed value to y in parent environment
+      y <<- aValue
+
+ }
> assignParent(11:15)
> y
[1] 11 12 13 14 15
>
```

As one can see from the user of the `assignParent()` function, the value assigned to within the function is accessible after the function ends because we used the `<<-` version of the assignment operator.

One subtlety of the assignment operator is that it can be used bidirectionally.

```
# leftward form
x <- 15
```

is the same as

```
# rightward form
15 -> x
```

Note that the `=` form of the assignment operator is leftward form only, and that it has other restrictions on its use: `=` is only allowed at the top level (e.g., in the complete expression typed at the command prompt), or within a subexpression within a braced list of expressions.

Therefore, most people who work in R prefer `<-` over `=`.

Appendix

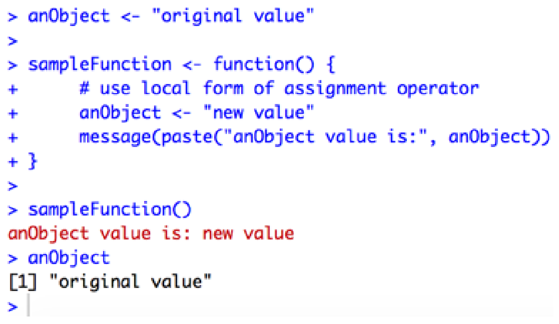
This section contains questions and answers about topics related to the assignment operator.

Question: why must I use `<<-` to assign a value to an object in a parent environment?

Answer: The `<-` form of the assignment operator will create a new object that is local to a function rather than traversing the environment tree to find whether there is an object of the same name in a parent scope. Therefore, one must use `<<-` to assign a value to an object in a parent scope.

We'll illustrate the point with the following code. Notice how `anObject` in the parent environment retains its original value after `sampleFunction()` is executed.

```
 anObject <- "original value"
 sampleFunction <- function() {
      # use local form of assignment operator
      anObject <- "new value"
      message(paste("anObject value is:", anObject))
 }
 sampleFunction()
 anObject
```



```
> anObject <- "original value"
>
> sampleFunction <- function() {
+      # use local form of assignment operator
+      anObject <- "new value"
+      message(paste("anObject value is:", anObject))
+ }
>
> sampleFunction()
anObject value is: new value
> anObject
[1] "original value"
>
```