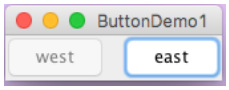
GUIS: Using anonymous functions to listen to events

When an event like pressing a button, or typing into a field, happen in a GUI (Graphical User Interface), a method must be called to process the event. One way to do this is "register" an anonymous function with the button or field.

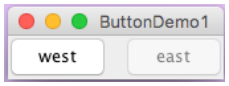
We explore doing this for the event of pressing a button.

The GUI, a `JFrame`, shown to the right has two buttons labeled East and West. Exactly one of them is enabled. When the enabled button is pressed, it becomes disabled and the other one becomes enabled. We show how this is done.



The two buttons are declared like this:

```
private JButton westButton= new JButton("west");
private JButton eastButton= new JButton("east");
```



To the right, we show a method that is to be called when the enabled button is pressed. It does three things: First, store true in local variable `b` if the east button is enabled and false otherwise. Second, complement the enabled property of the east button —if it was enabled it become disabled and vice versa. Third, change the enabled property of the west button accordingly.

```
/** Process a click of a button */
public void buttonClick(ActionEvent e) {
    boolean b= eastButton.isEnabled();
    eastButton.setEnabled(!b);
    westButton.setEnabled(b);
}
```

To have this method called when the east button is pressed, execute this call:

```
eastButton.addActionListener(e -> buttonClick(e));
```

The call registers the argument, the anonymous function, as a listener for the east button. So, when the east button is clicked, the anonymous function is called. What does it do? It calls procedure `buttonClick`, giving it as argument the parameter `e` of the anonymous function. Procedure `buttonClick` doesn't use the parameter, but it could, and we'll show its use in a later example.

Looking at procedure `buttonClick`, we can see that parameter `e` of the anonymous function has type `ActionEvent`.

Similarly, we register an anonymous function with the west button:

```
westButton.addActionListener(e -> buttonClick(e));
```

Using one anonymous function instead of two

The code shown above actually creates two anonymous functions, one for the east and one for the west button. If we want only one, we can store the anonymous function in a local variable and then use the variable twice:

```
ActionListener al= (ActionEvent e) -> buttonClick(e);
westButton.addActionListener(al);
eastButton.addActionListener(al);
```

You see that the type of the anonymous function is `ActionListener`. We did not have to put in the type of parameter `e`; it would have been inferred if we left it out.

Finally, note that we didn't really need function `buttonClick`, for we could have written the assignment to `al` as shown below. The anonymous function does all the work without calling `buttonClick`. We advise against this when the body of an anonymous function becomes complicated. Certainly don't do this until you know more about anonymous functions.

```
ActionListener al= e -> {
   boolean b= eastButton.isEnabled();
   eastButton.setEnabled(!b);
   westButton.setEnabled(b);

};
```