Dealing with key events

INTRODUCTION

This has been a bit of a nightmare for years, as different browsers have had different ways of handling key events and key codes (read this if you are fond of JavaScript archeology:http://unixpapa.com/js/key.html). Fortunately it's much better today, and we are able to rely on methods that should work on any browser.

When you listen to keyboard related events (`keydown`, `keyup`or `keypressed`), the `event` parameter passed to the listener function will contain the code of the key that fired the event. Then it is possible to test what key has been pressed or released, like this:

```
window.addEventListener('keydown',function(event) {
    if (event.keyCode === 37) {
      //left arrow was pressed
    }
}, false);
```

At line 2, the value "37" is the key code that corresponds to the left arrow. It might be difficult to know the correspondences between real keyboard keys and codes, so here are handy pointers:

- Try key codes with this interactive example: http://www.asquare.net/javascript/tests/KeyCode.html
- And find a list of keyCodes (taken from: http://css-tricks.com/snippets/javascript/javascript-keycodes/) below:

Key	Code
backspace	8
tab	9
enter	13
shift	16
ctrl	17
alt	18
pause/break	19
caps lock	20
escape	27
(space)	32
page up	33
page down	34
end	35
home	36
left arrow	37
up arrow	38
right arrow	39
down arrow	40
insert	45
delete	46
0	48
1	49
2	50
3	51
4	52
5	53
6	54
7	55
8	56
9	57
a	65
b	66
c	67
d	68

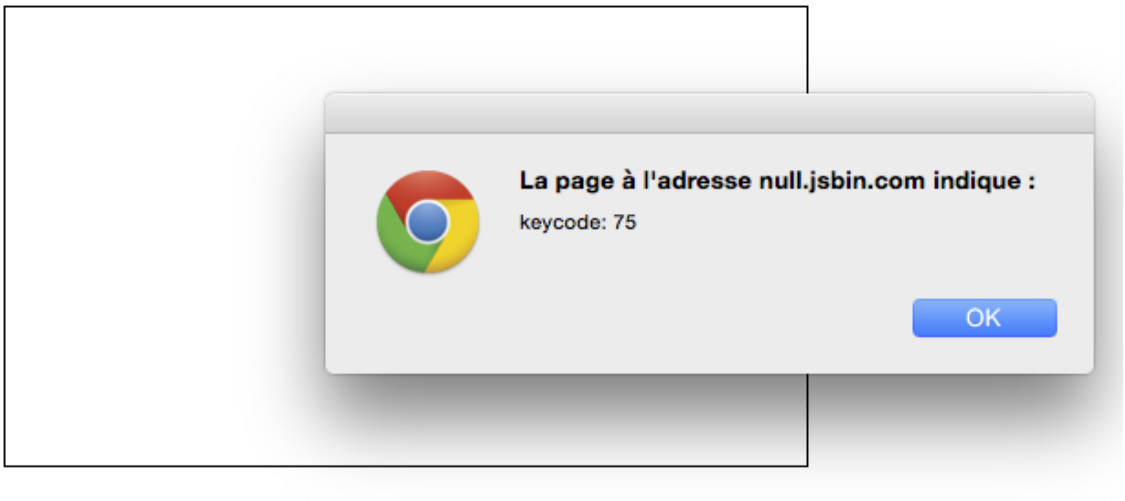
Key	Code
e	69
f	70
g	71
h	72
i	73
j	74
k	75
l	76
m	77
n	78
o	79
p	80
q	81
r	82
s	83
t	84
u	85
v	86
w	87
x	88
y	89
z	90
left window key	91
right window key	92
select key	93
numpad 0	96
numpad 1	97
numpad 2	98
numpad 3	99
numpad 4	100
numpad 5	101
numpad 6	102
numpad 7	103

Key	Code
numpad 8	104
numpad 9	105
multiply	106
add	107
subtract	109
decimal point	110
divide	111
f1	112
f2	113
f3	114
f4	115
f5	116
f6	117
f7	118
f8	119
f9	120
f10	121
f11	122
f12	123
num lock	144
scroll lock	145
semi-colon	186
equal sign	187
comma	188
dash	189
period	190
forward slash	191
grave accent	192
open bracket	219
back slash	220
close braket	221
single quote	222

EXAMPLE 1: ADDING A KEY LISTENER TO THE WINDOW OBJECT

A lot of people think that the canvas element is not able to get key events. Many examples on the Web handle key events on canvas by adding a listener to the window object directly, like this:

Online example: http://jsbin.com/voviva/2/edit



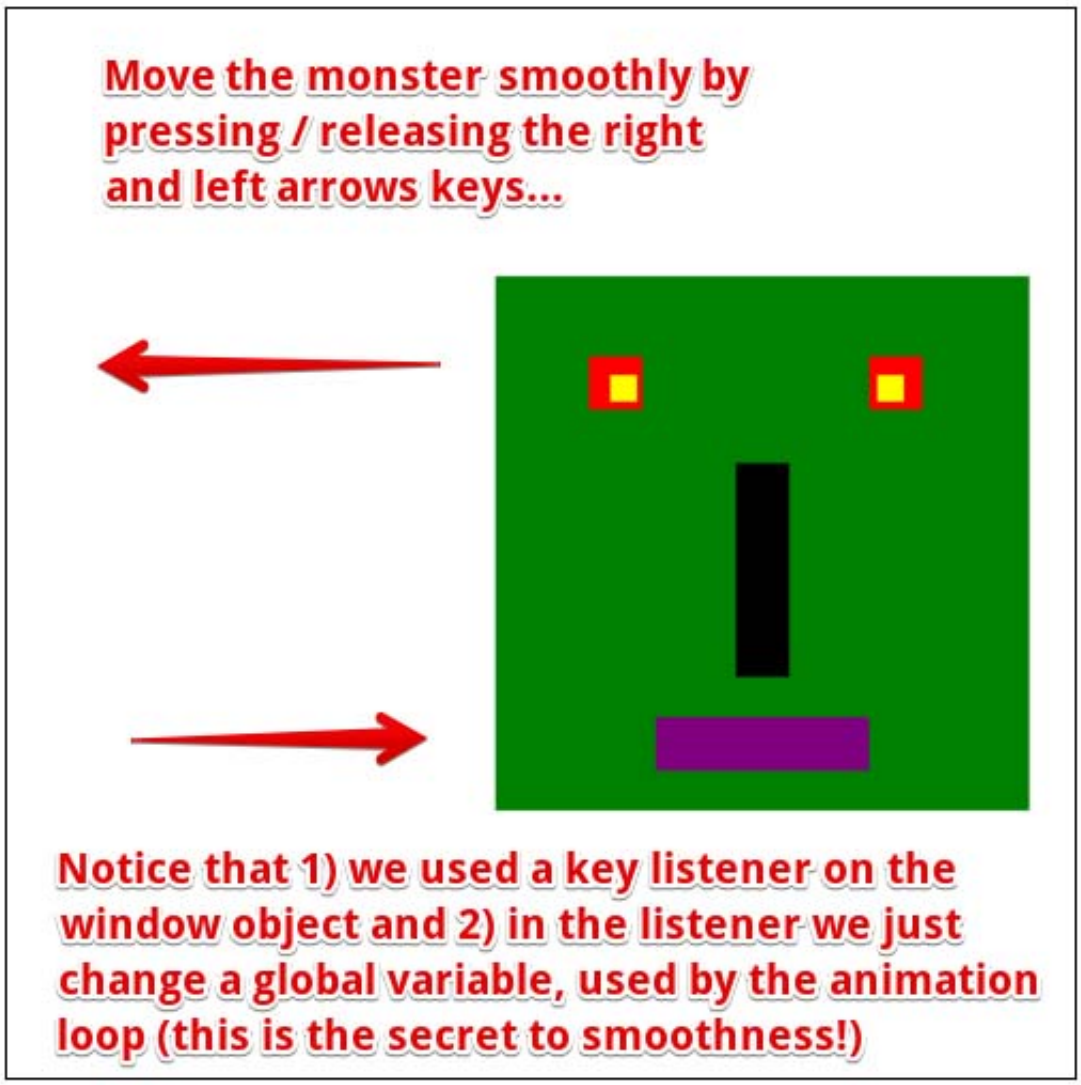
Extract from source code:

```
<canvas id="myCanvas" width="350"height="200">
</canvas>

<script>
function init() {
    // This will work when you press a key, anywhere on the
document
    window.addEventListener('keydown',handleKeydown, false);
 }


function handleKeydown(e){
    alert('keycode: '+e.keyCode);
    return false;
 };
</script>
```

Indeed this solution works well if you write a game, and want to detect events wherever the mouse cursor is, and without worrying about what HTML element has the focus, etc...

Move the monster with the keyboard

Online example at JS Bin



Extract from source code:

```
<script>
 var canvas, ctx;
 var monsterX=100, monsterY=100,monsterAngle=0;
 var incrementX = 0;
 function init() {
```

```
    // This function is called after the page is loaded

    // 1 - Get the canvas
    canvas =document.getElementById('myCanvas');

    // 2 - Get the context
    ctx=canvas.getContext('2d');

    // 3 add key listeners to the window element
    window.addEventListener('keydown',handleKeydown, false);
    window.addEventListener('keyup',handleKeyup, false);
    // 4 - start the animation
    requestId =requestAnimationFrame(animationLoop);
}
function handleKeydown(evt) {
    if (evt.keyCode === 37) {
        //left key
        incrementX = -1;
    } else if (evt.keyCode === 39) {
        // right key
        incrementX = 1;
    }
}
function handleKeyup(evt) {
    incrementX = 0;
}
function animationLoop() {
    // 1 - Clear
    ctx.clearRect(0, 0, canvas.width,canvas.height);

    // 2 Draw

drawMonster(monsterX, monsterY,monsterAngle, 'green', 'yellow');

    // 3 Move
    monsterX += incrementX;

    // call again mainloop after 16.6 ms (60 frames/s)
    requestId =requestAnimationFrame(animationLoop);
}
```

```
</script>
```

EXAMPLE 2: WHAT IF I WANT TO LISTEN TO KEY EVENTS ONLY IN MY CANVAS?

If you add a key listener to a canvas element, the problem is that it will get events only when it has the focus. And by default, it will never have the focus!

The `tabindex` attribute of the canvas element makes it focusable. Without it, it will never get the focus!

The trick is to declare the canvas like this:

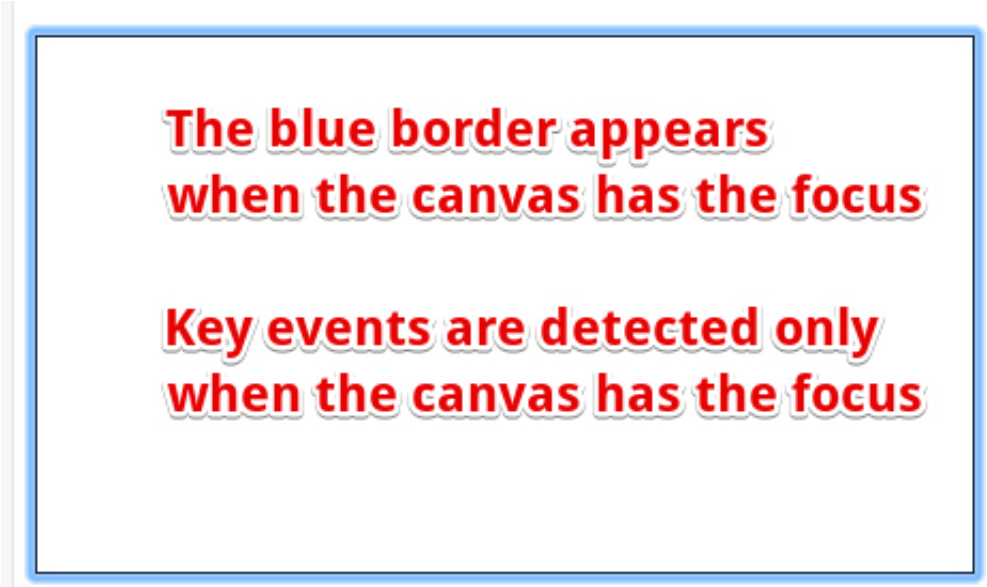
```
<canvas id="myCanvas" width="350"tabindex="1" height="200">
</canvas>
```

And we force the canvas to get the focus with:

```
canvas=document.getElementById('myCanvas');
...
canvas.focus();
```

Now, if we try an example with the above canvas declaration, we show when an HTML element has the focus: a border is added to it, as shown here: http://jsbin.com/cohide/2/edit.

Note that the line that forces the focus to the canvas is commented by default. Try to click on the canvas, then press a key, then click out of the canvas, then press a key: this time nothing happens!



Extract from the code:

```
var canvas;
function init() {
    canvas=document.getElementById('myCanvas');

    // This will work only if the canvas has the focus
    canvas.addEventListener('keydown',handleKeydown, false);
    // We can set the focus on the canvas like this:
    //canvas.focus();
    // ... but it will stop working if we click somewhere
else
    // in the document
}


function handleKeydown(e){
    alert('keycode: '+e.keyCode);
    return false;
};
```

Line 10 is useful to initially set the focus on the canvas, but this trick will not work if we click somewhere else in the HTML page.

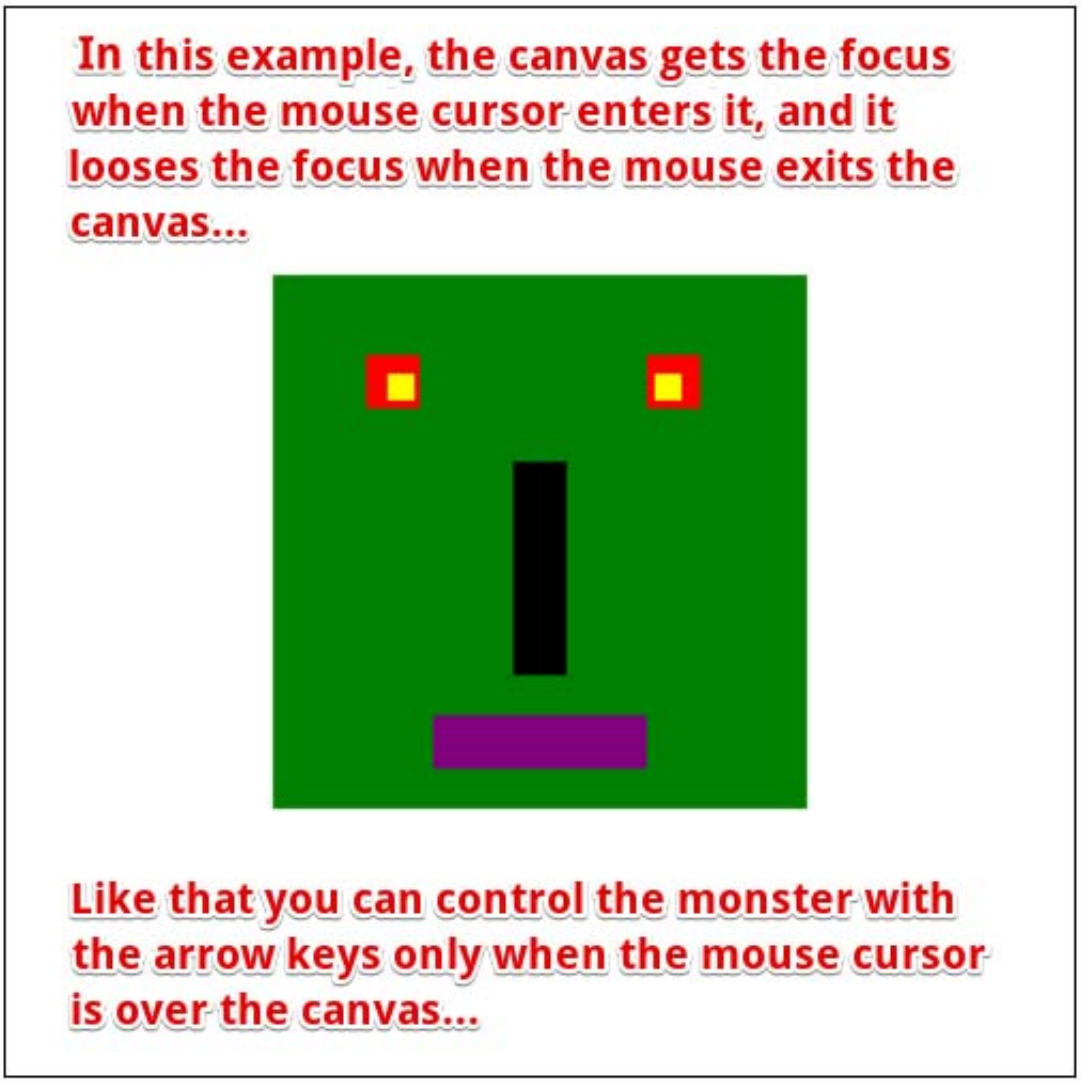
EXAMPLE 3: A BETTER WAY: SET THE FOCUS WHEN THE MOUSE CURSOR ENTERS THE CANVAS

A better way to manage key events on a canvas is to set the focus when the mouse is over the canvas, and to un-focus it otherwise.

Here is a modified version of the "move monster example" seen earlier. This time, you move the monster with the left and right arrow only when the mouse cursor is over the canvas. We added two mouse event listeners on the canvas: one for the`mouseenter` event and the other for the `mouseout` event.

When the mouse enters the canvas we call `canvas.focus()` to set the focus to the canvas, and when the mouse cursor goes out of the canvas, we call `canvas.blur()` to unset the focus.

Online example at JS Bin



Extract from the code:

```
    function init() {
      // This function is called after the page is loaded
      // 1 - Get the canvas
      canvas =document.getElementById('myCanvas');
      // 2 - Get the context
      ctx=canvas.getContext('2d');
      // 3 - Add key listeners to the window element
      canvas.addEventListener('keydown',handleKeydown, false);
      canvas.addEventListener('keyup',handleKeyup, false);
12.   canvas.addEventListener('mouseenter',setFocus, false);
      canvas.addEventListener('mouseout',unsetFocus, false);
      // 4 - Start the animation
```

```
    requestId =requestAnimationFrame(animationLoop);
}
function setFocus(evt) {
    canvas.focus();
};
22.
function unsetFocus(evt) {
    canvas.blur();
    incrementX = 0; // stop the monster if the mouse exists the canvas
};
```

The third parameter (false) of lines 12 and 13 means "we do not want to propagate the event to the ancestors of the canvas in the DOM."

KNOWLEDGE CHECK 4.3.2 (NOT GRADED)

Suppose we have defined a key event listener to a canvas: should this canvas have the focus in order to fire key events?

- ○ Yes
- ○ No
