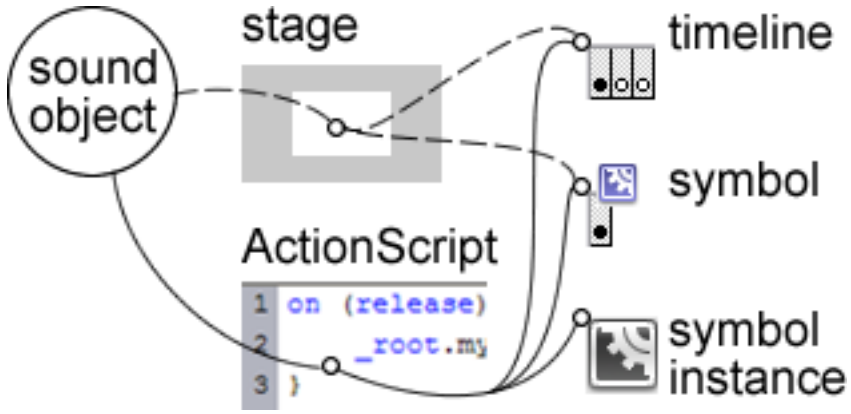
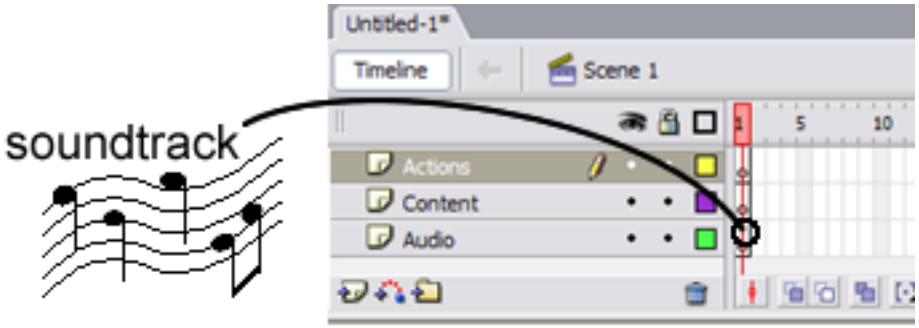
1. Point of confusion

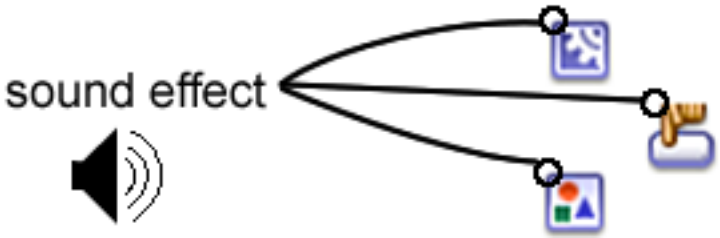
Currently in Adobe Flash, sound is manipulated either with ActionScript or in part through the Graphical User Interface (GUI). ActionScript treats sound as a programming object and allows for precise control. Using the GUI, the developer has fewer options. In addition, the model for sound through the GUI is confusing for those developers who depend on this implementation option. This is because at present, a sound cannot be added to a symbol instance through the GUI.



2. Inside the user's mind

We have noticed that users mentally categorize sounds into *soundtracks* and *sound effects*. We formed this insight after talking with a novice Flash user and monitoring the online Flash Support Forums. Soundtracks are associated with items in the Timeline. Sound effects are associated with objects such as movie, button and graphic instances.



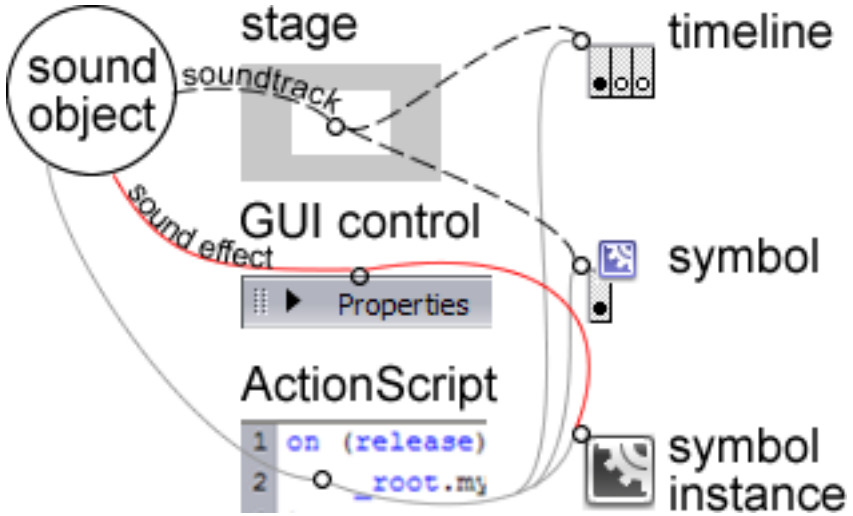


"I have created button symbols and (as stated in tutorials... etc) added an audio file (just a click) to the down state of the button. But it does not play. Is there another way to put an audio file in a button?"

-excerpt from Flash User Forums; http://www.macromedia.com/cfusion/webforums/forum/index.cfm?forumid=15

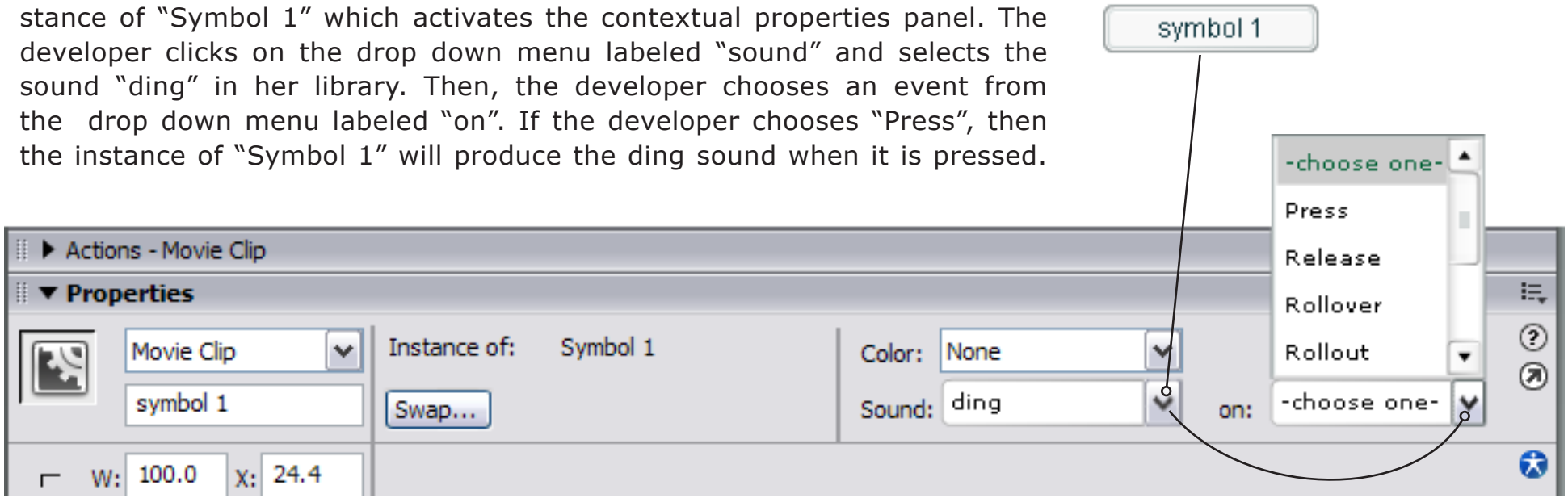
3. Proposed Flash Model

The soundtrack model already exists within Flash. A developer can add a sound to the stage or the timeline through the GUI. We support a model for sound effects through two feature additions. The first is in the properties panel where developers will find a drop down menu for sound. Upon choosing a sound, a contextual drop down menu appears that allows for selection of trigger events. The second implementation is the addition of an "Add Sound Effects" option in the right click menu of an instance. We refined the interface shown here through a round of paper prototype tests with intermediate Flash users.



4. Interface Elements mock-up and behaviour

To add a sound effect to a symbol instance, the developer selects the instance of "Symbol 1" which activates the contextual properties panel. The developer clicks on the drop down menu labeled "sound" and selects the sound "ding" in her library. Then, the developer chooses an event from the drop down menu labeled "on". If the developer chooses "Press", then the instance of "Symbol 1" will produce the ding sound when it is pressed.



Alternatively, the developer may use the right click menu to add a sound effect to a symbol instance. Right-clicking the symbol instance brings up the menu. Just above "Timeline Effects" is the options "Add Sound Effects". Clicking this option causes the "Add Sound Effects" dialog to pop up. The dialog works like the properties panel method. The developer selects a sound from the "sound" drop down menu, then she selects a triggering event. The increased real estate of the dialog allows Mouse Events and Keyboard Events to be listed separately. Once selected, the developer clicks "OK" and the sound effect is associated with the symbol instance.