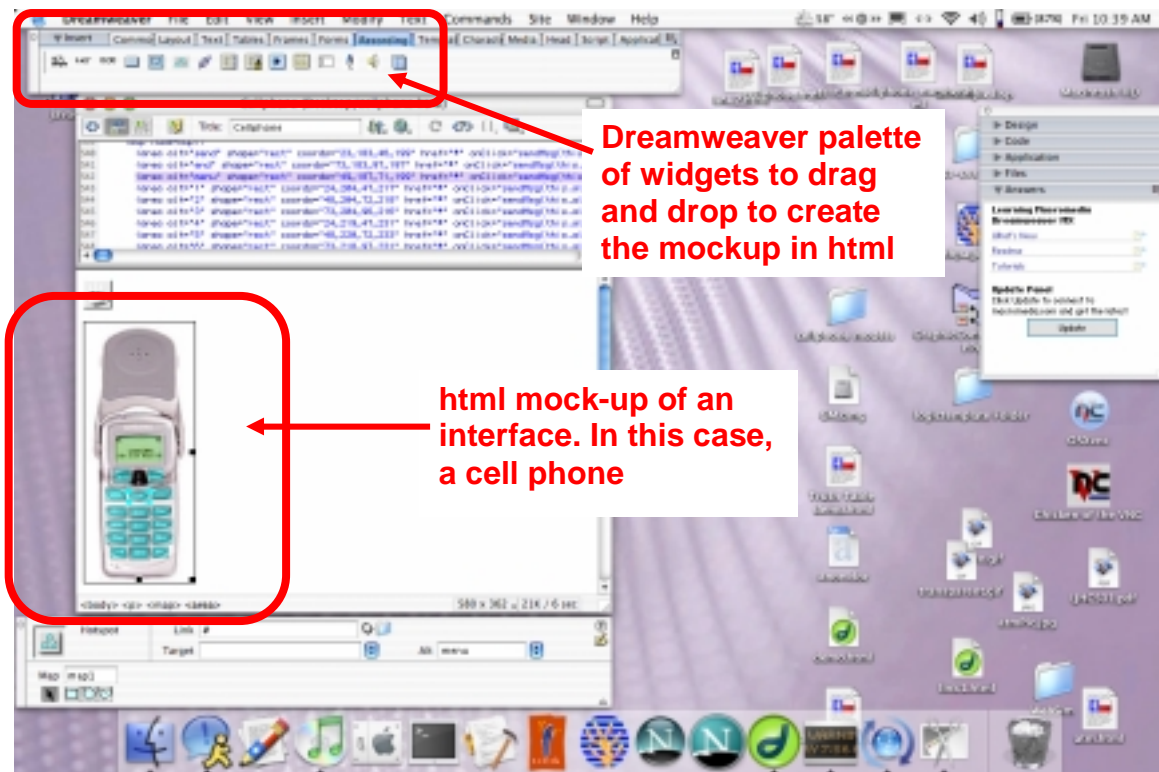New tools for modeling for HCI evaluation.
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One of the applications of cognitive modeling is for evaluating human-computer interfaces. For instance, the Keystroke-Level Model (Card, Moran & Newell, 1980) has been used to evaluate skilled performance on many interfaces in the past two decades (see John & Kieras, 1996 for 11 examples of use in industry). Despite its proven usefulness for many HCI situations, modeling has proven too difficult to be adopted as a routine procedure for UI designers. This work attempts to bring modeling into the work context and skill-set of UI designers.

Our approach is to make modeling an activity of WYSIWYG drag-and-drop and task demonstration, without a line of code or model having to be typed in by a UI designer. We will demonstrate a suite of tools that include new capabilities and integrate some tools from other researchers to produce this non-coding mock-up of interfaces and modeling.

The first step in the process is to create a html storyboard mock-up of the interface to be evaluated using Dreamweaver, and extensible WYSIWYG tool for website design. We have extended Dreamweaver with a new palette of widgets from which to construct the mock-up storyboard. The widgets are capable of talking outside of the Netscape 7.0 browser to allow task demonstration and interaction with ACT-RPM. (see Fig below)


Dreamweaver palette of widgets to drag and drop to create the mockup in html

html mock-up of an interface. In this case, a cell phone

The nest step is to open the BehaviorRecorder, a tool produced by Ken Koedinger's group to allow rapid construction of cognitive tutors. Opening the html page in Netscape connects Netscape to the BehaviorRecorder. The UI designer then demonstrates the task to be evaluated in Netscape and the BehaviorRecorder produces a state-transition trace of the demonstration. (see Figure below)

As you demo the task in the html mock-up, the BehaviorRecorder traces the demo.
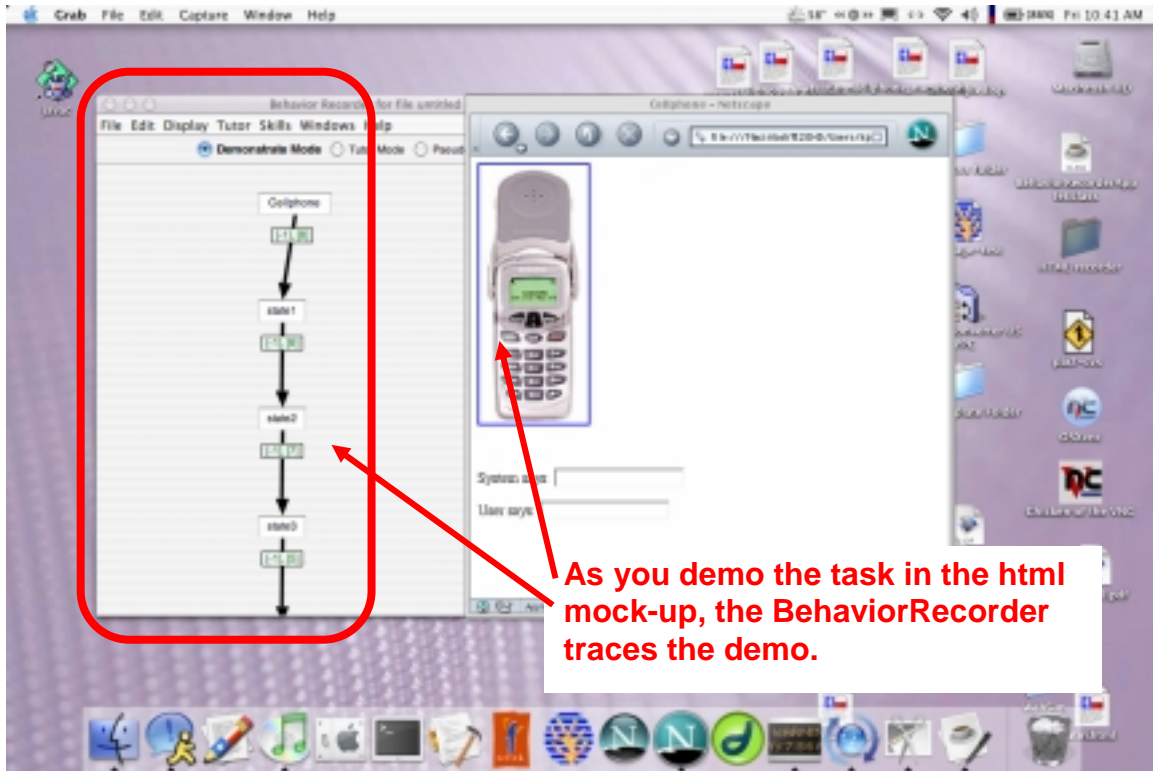
The third step is to use the Export… item in the File menu of the BehaviorRecorder to export the demonstration into ACT-Simple. ACT-Simple is a KLM-like language created by Dario Salvucci and Frank Lee (Chi 2003) that compiles into ACT-RPM productions.

Finally, you load the resulting ACT-Simple code and the ACT-Simple to ACT-RPM compiler into ACT-R. When you run the model, ACT-RPM interacts with the html website in Netscape. That is, the widgets come in through ACT-RPM's perceptual module, and ACT-RPM's hand can be seen mousing and typing into the html mock-up. Predictions of skilled performance time are produced. (see Figure below)
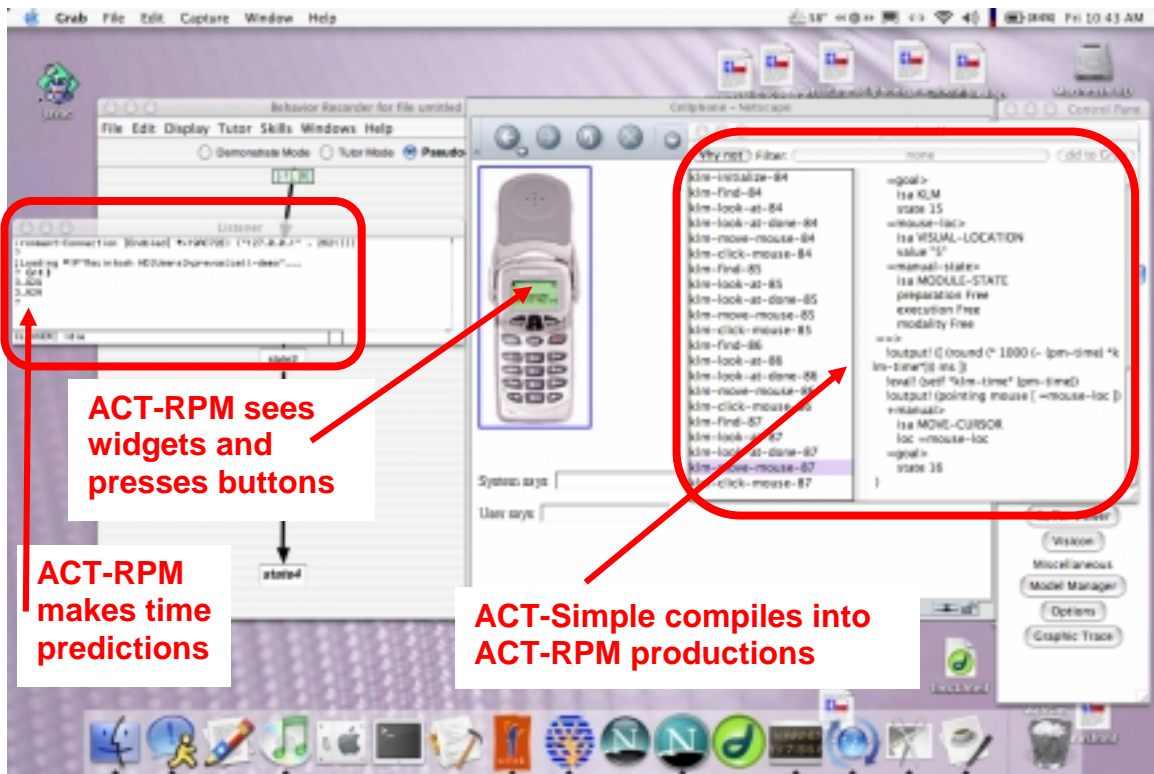
Thus, the html mock-up of the interface to be evaluated was created solely through drag-and-drop and the model was created solely through demonstration. Thus no code was typed in to make the mock-up and no model code was typed in to make the model. We believe that this simplicity puts modeling into the realm of possibility for UI designers.