

# Widget multiplexers for side-by-side display and control of information-processing scenarios

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## Abstract

Widget multiplexers are elements that can be included within an application's graphical user interface to provide explicit support for comparing different scenarios. They have been developed as part of the *subjunctive interfaces* research theme (Lunzer 1999; Lunzer & Hornbæk 2003).

## 1 Helping users to compare scenarios

In information-processing activities, users often need to experiment with a number of different scenarios – i.e., to specify alternative values for some set of inputs, and to compare the various corresponding results. For example, the user of a travel-enquiry application might specify various dates and itineraries, and compare the offered journeys in terms of cost and timing.

Some styles of interface can only display a single scenario at a time. Comparison can be supported to some extent with mechanisms for moving rapidly between different scenarios – such as sophisticated undo/redo facilities, or controls for dynamically adjusting parameters – but the user must still make the effort to remember (or perhaps to write down) details from the scenarios that are not currently on view. One way to avoid this memory burden is to let the user define a batch of scenarios, whose results are then all presented in a summary table; but having to switch between defining such a batch and viewing its results disrupts the user's flow of work.

Our goal is to support the integrated, side-by-side display and control of many scenarios. We reject the possible but naïve approach of rendering multiple copies of the application's entire display, because this wastes space by replicating even elements that are identical in all scenarios, and also forces the user to perform a visual search to find out where the scenarios differ.

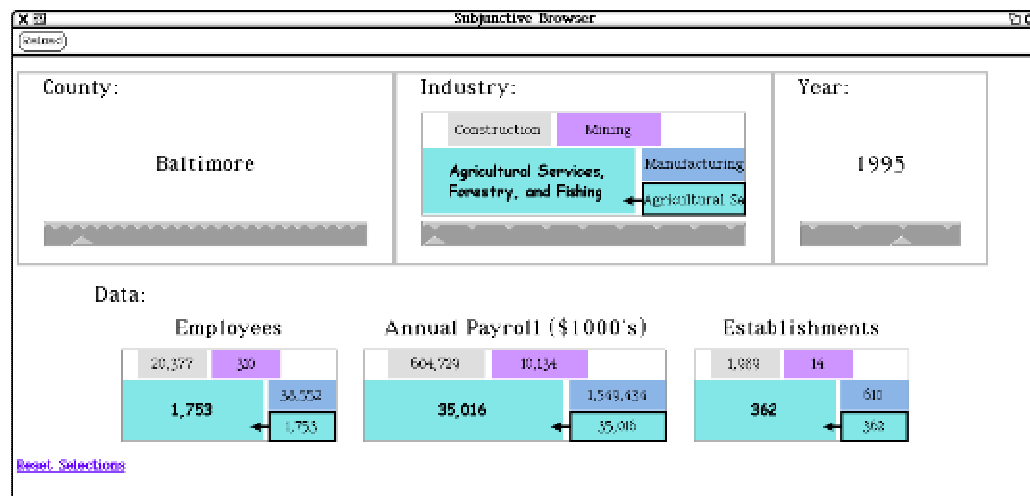
## 2 Widget multiplexers

A widget multiplexer takes over the display and control of a region of an application's display – typically, a single interaction widget. When that display region has different contents in different scenarios set up by the user, the multiplexer shows the various contents side by side.

**Correlated display:** Each multiplexer does the same job for its own region, with all multiplexers using the same geometrical layout for the scenarios' different values. The overall impression is as if several independent copies of the application are merged into a single display. The correlated layout helps the user to locate the various elements of each individual scenario – for example, to see which setting in a departure-date widget relates to which value in a field showing the cost.

**Coordinated control:** Through interaction with the multiplexers, the user can select which scenarios will be affected by subsequent input actions. For example, with this facility a user can choose that several itineraries pick up each change to the input parameters, such as trip duration or the class of air travel. This multiplies the rate at which scenarios can be examined and compared.

Creating interfaces to handle scenarios side by side raises many new challenges in both interaction design and its underlying support. We are now prototyping and evaluating solutions for exploratory activities in simulation, scheduling/planning, and information access.



**Figure 1.** An interface for exploring census data. Three sliders in the upper half of this window let the user choose from among twenty-three counties, nine industry areas and four years. For each combination of these choices, three statistics are displayed. In the situation shown here the user has established four separate scenarios, all specifying Baltimore county in 1995 but each with a different industry; therefore the industry display and the three statistics displays each appear as a widget multiplexer containing four distinct values. All multiplexers use the same arrangement of views, laying out the four scenarios' values around a larger 'working view' that mirrors the value for the currently selected scenario (here the one at bottom right). The overall display simultaneously supports the task of reading off values for a single scenario (e.g., seeing that in Construction there were 20,377 employees in 1,989 establishments) and the task of making comparisons between scenarios.

## References

Lunzer, A. (1999). Choice and Comparison Where the User Wants Them: Subjunctive Interfaces for Computer-Supported Exploration. Proceedings of the IFIP TC. 13 International Conference on Human-Computer Interaction (INTERACT '99), 474-482.

Lunzer, A., & Hornbæk, K. (2003). Side-By-Side Display and Control of Multiple Scenarios: Subjunctive Interfaces for Exploring Multi-Attribute Data. Submitted for review.