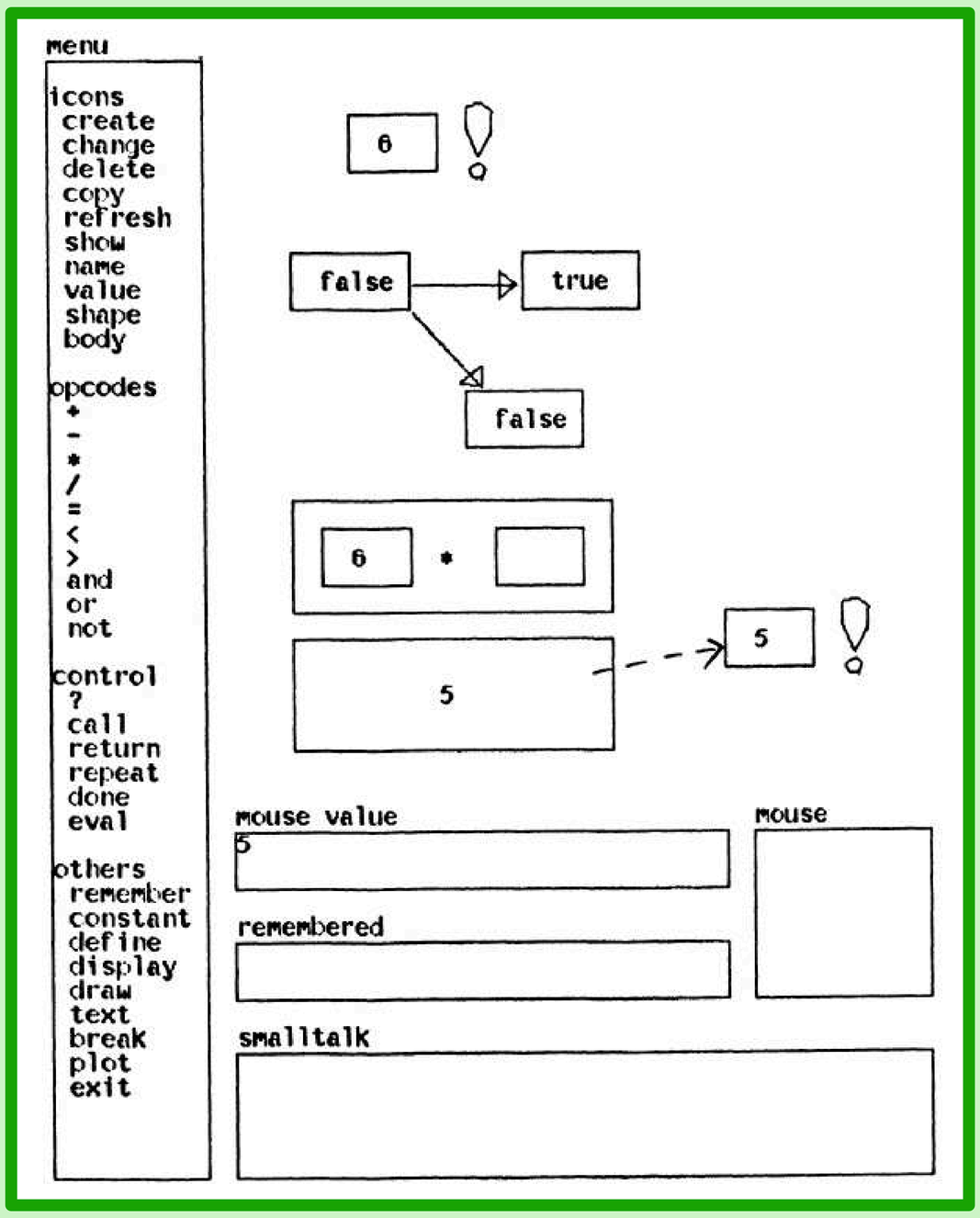
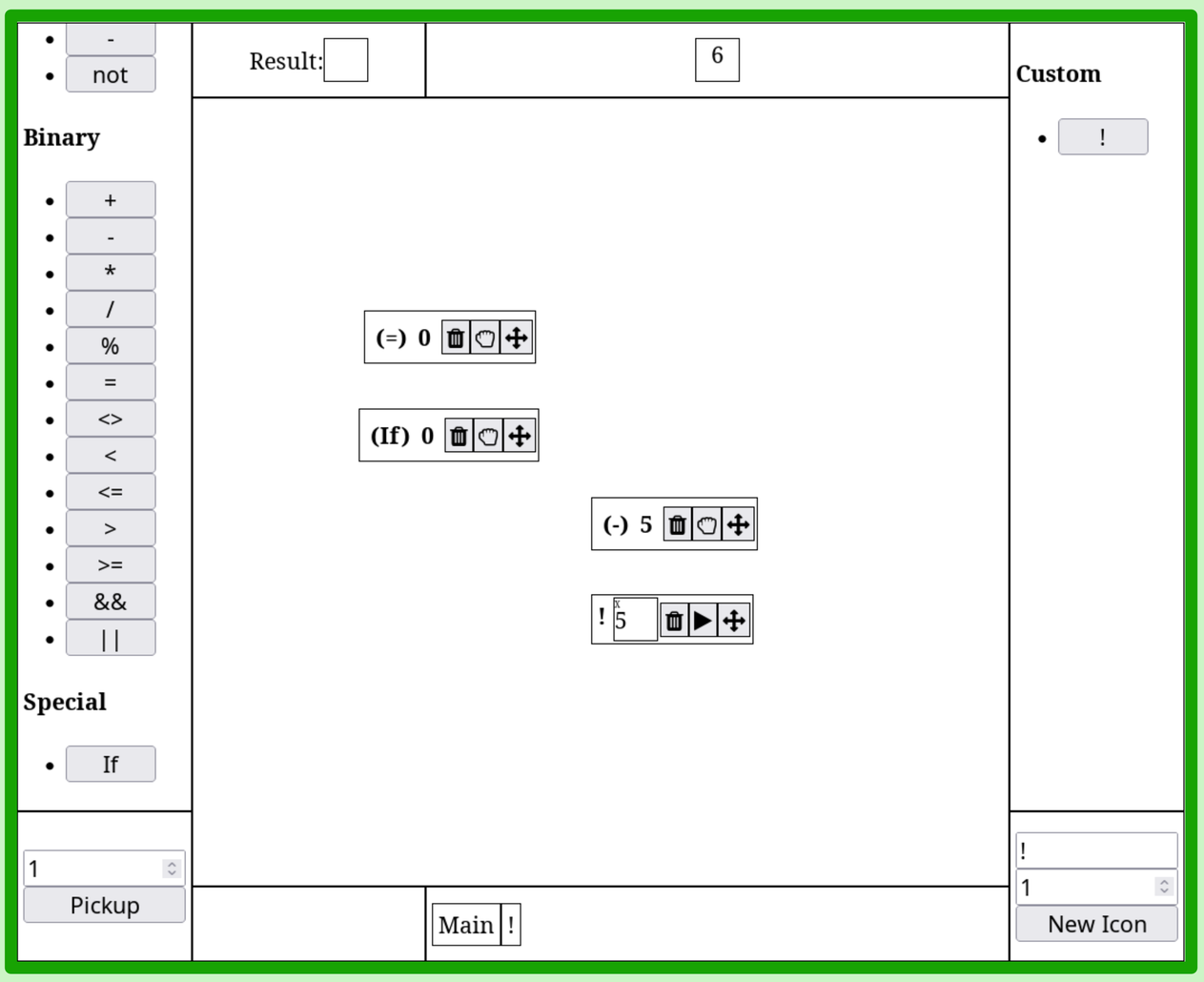
Reconstructing the Pygmalion programming environment

Pygmalion is a visual programming system that was lost to time. It utilized the ideas of **programming by demonstration** and **iconic programming** with ambitions to provide an error-free programming experience. Nowadays, you can't easily run Pygmalion, as the only existing copy is a scan of the source code in Smalltalk-72.



The goal of this reconstruction was to create an application which allows users to experience the style of interaction presented by Pygmalion. We chose the factorial example from the original thesis as our baseline.



A single step of the definition of a factorial in the original system.

Part of the definition of a factorial in the finished reconstruction.

Difficulties

There were several difficulties that we encountered when creating our reconstruction:

- Lack of proper documentation
- Smalltalk-72 source code
- Conditional icons

Iterative Methodology

To create the reconstruction, we applied an iterative methodology. We first created a design that was based on our initial understanding of the system. We then used the insight gained from this implementation to plan and create our second design.

First design

Based on the idea of using user actions to build an expression. When evaluated with the same input, it produces the same output as the users actions.

```
type IOP = IconOperationParameter
type IconOperation =
  | Unary of string * IOP
  | Binary of string * IOP * IOP
  | If of IOP
  | CustomOp of string * IOP list
type IconOperationParameter =
  | Trap
  | Constant of int
  | OperationParameter of int
  | LocalIconReference of IconID
type CustomOperation =
  { ParameterCount : int
    SavedIcons : IconTable
    EntryPoint : IconID option}
```

Second design

Based on the idea of storing user actions directly and replaying them during evaluation.

```
type SimpleExecutionAction =
    | EvaluateSimpleIcon of IconPrism
    | PickupNewIcon of IconOperation
    | PickupIcon of IconPrism
    | PickupNumber of UnderlyingNumberDataType
    | PickupParameter of parameterIndex : int
    | PickupIconResult of IconPrism
    | PlacePickup of MovableObjectTarget
    | CancelPickup
    | RemoveIcon of remover : (Icons -> Icons)
    | RemoveIconParameter of IconPrism * int
```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