

1 CPNTools interface

1.1 Introduction

This is a brief introduction to the interface elements and interaction techniques in CPNTools. After reading this, it should be possible to explore CPNTools further, trying out the interaction techniques on available net examples and tools. There are no detailed explanations of CP-nets herein, nor of the exact tools available in CPNTools; the latter can be found on the CPNTools help pages, located at http://wiki.daimi.au.dk:8000/cpn-tools-help/_home.wiki

1.2 Workspace

CPNTools runs in one big window, which can be maximized and resized just as a standard window in a window-based environment. It consists of an **index** on the left side, showing text items (index nodes) that represent the accessible workspace elements, and a large open area, the **workspace**, for tools and net modules. (See fig. 1).

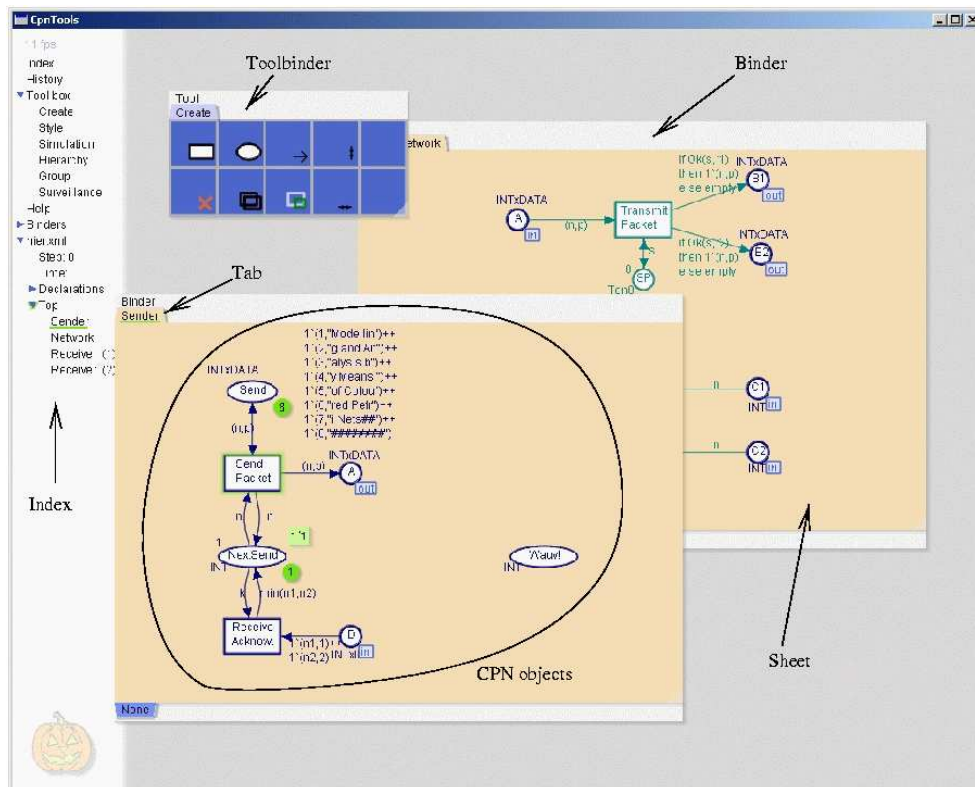


Figure 1: CPNTools workspace

A net module, or **page**, is placed in a **sheet** when opened (one page per sheet), and the sheets are organized in **binders**. **Tabs** on the sheets make it possible to flip between several pages in one binder. The sheets can be moved around and placed in different binders, and one sheet can be in several binders, providing several views, e.g. with different zoom factors, on the associated page (see fig 2). Binders can also be moved around and resized.

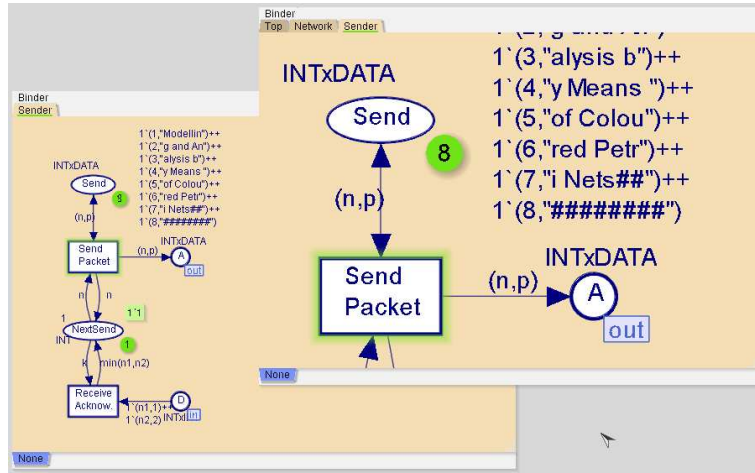


Figure 2: Multiple views

The workspace contains two cursors, one for the right hand and one for the left. (Fig. 3)

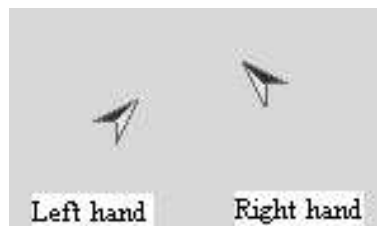


Figure 3: Standard cursors

Left-handed users can switch devices (using the trackball in the right hand and the mouse in the left hand), and it is possible to plug in extra input devices to work collaboratively with other users on the same machine. Each new input device will have its own cursor.

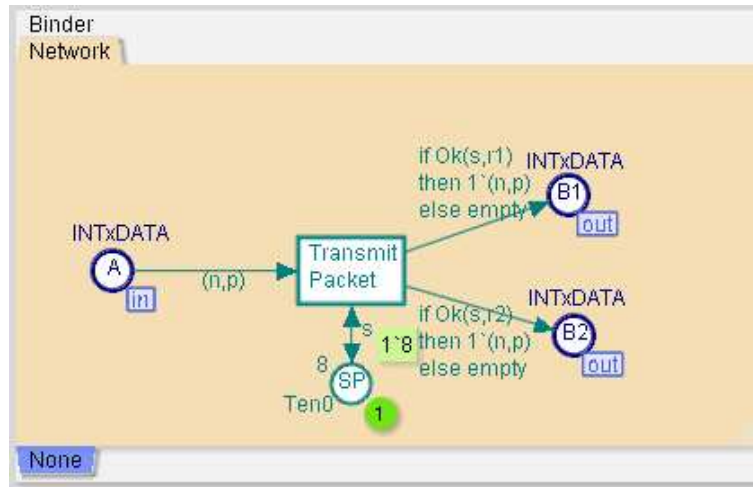


Figure 4: CP-net objects

1.3 CP-net objects

The pages contain the objects in the net, i.e. places, transitions, arcs, inscriptions, etc.

1.4 Interaction techniques

1.4.1 Palettes

Tool palettes consist of a collection of **tool cells**, each containing an icon that indicates the tool in the cell. Tools are located in **tool binders**.

Tool palettes are on sheets, and they can be placed together in binders (fig 5). This way, users can collect tools that they need to switch between for a certain task.

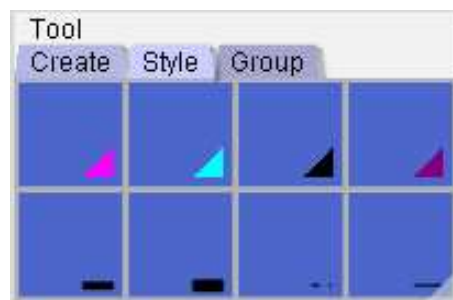


Figure 5: Tools in a binder

Toolbinders only contain tool-sheets, and cpnbinders only contain page-sheets; thus, it is not possible to put toolglasses and net pages together in a binder.

Tools are selected from palettes by clicking on a cell with the left mouse button. The tool is now "in the hand" and clicking with the left mouse button on an appropriate object will apply the tool. The cursor changes to indicate which tool is currently in the hand (see fig. 6).

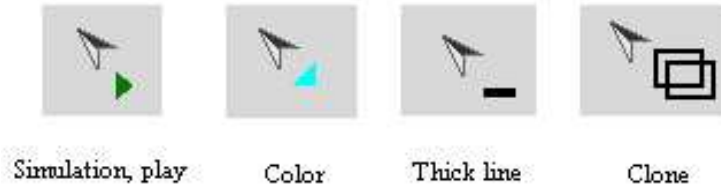


Figure 6: Examples of cursors

While a tool is in the hand, it is still possible to move objects around; this is done with a so-called **long click**, where the mouse is pressed and held over an object, until the cursor changes to indicate that the move tool is now active (see figure 7). When the move operation is finished, the user releases the mouse, and the tool that was in the hand before the move is back (indicated by a switch back to the associated tool cursor).

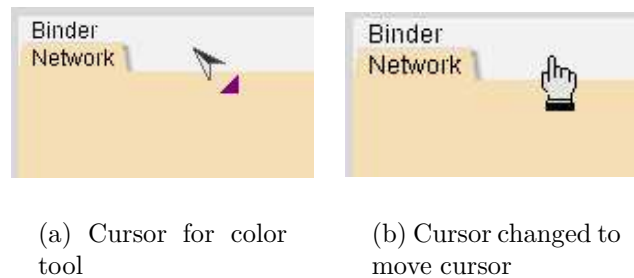


Figure 7: Moving a binder with a tool in the hand

Icons Icons in the marking menus and palettes show which action is associated with the tool. An icon is either a graphical object or a text item. Marking menus currently use text items.

An example of a graphical icon: the Transition tool has a small version of a transition as its icon, and the Change Color tool has a small colored triangle.

The graphical icons change if the associated action does, e.g. if the Transition tool changes to make red transitions of a particular width and breadth, the icon turns into a red transition of the right proportions. (Fig 8).

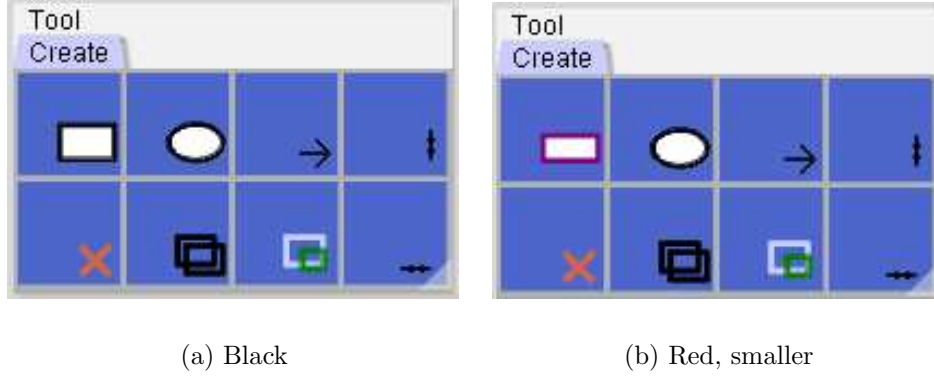


Figure 8: Changing icons for transition tool

Icons in palettes highlight when they are active, i.e. when a tool is picked from a palette into the hand, the corresponding tool cell has a darker background to indicate that it is active. (See fig. 9).

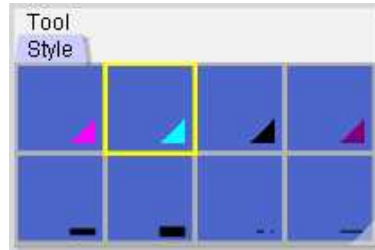


Figure 9: A highlighted cell

1.4.2 Toolglasses

Toolglasses are semi-transparent, floating palettes (fig. 10).

With toolglasses, users specify a tool and a target in one action by clicking through a cell onto an object. One hand moves the toolglass around, and the other hand clicks through with the left button. Clicking the right button on the device that holds the toolglass drops the toolglass as a fixed palette.

Both hands can pick up a toolglass. The most common practice is to work with the toolglass in the non-dominant (typically left) hand.



Figure 10: A toolglass

1.4.3 Marking menus

The marking menus are nearly opaque, circular, context-sensitive menus. The marking menus appear when the right mouse button is pressed and held down for a short while. It appears with the center at the mouse coordinates. Moving the mouse cursor over the entries make the entries highlight to show which entry is chosen. (See fig. 11). Releasing the mouse button on top of an entry will perform the corresponding action.

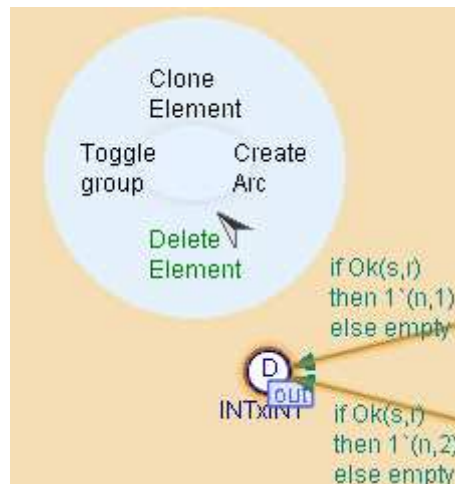


Figure 11: CPNTools marking menu

When the user has learned the position of the individual entries, it is no longer necessary to pop up the menu, and a quick gesture can now perform the desired action. The user presses down the right mouse button and with a quick gesture moves the mouse in the direction of the menu entry (see fig. 12).

The starting point of a gesture is the focus point for the following action. When the user wants to e.g. create an object, the object appears where the gesture starts.

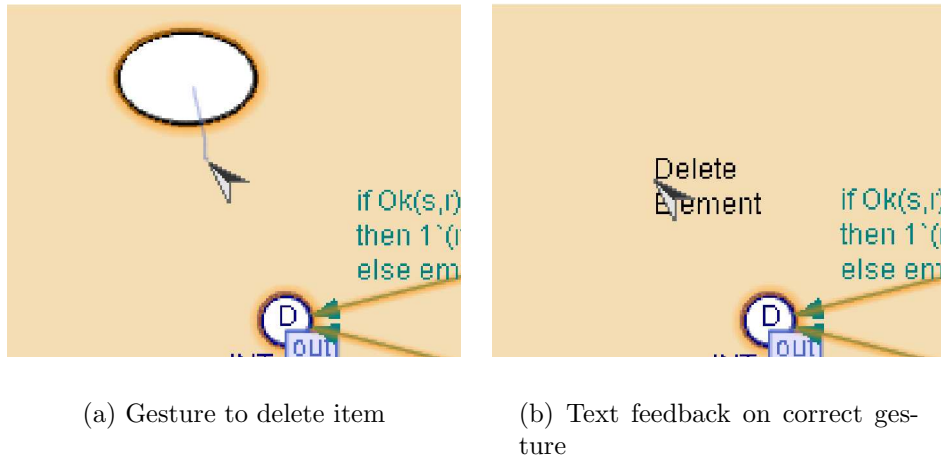


Figure 12: Gesture interaction

1.4.4 Two-handed manipulation

The two hands can interact with objects in a number of different ways, working simultaneously either on their own or together. Two buttons on each hand have separate functions, determining the interactions of the hands. The following describes the three ways the hands can work; separately, asymmetrically, and symmetrically.

Separate hand interaction The two hands can work separately, performing similar interactions such as moving objects and picking up tools (toolglasses in the non-dominant hand, individual tools in the dominant hand).

In the following, I will use "right" and "left" for dominant and non-dominant; the operations are reversible for left-handed users. Possible separate hand operations are:

Move objects By pressing the **left** button on the mouse or trackball and dragging, users can move objects around. The cursor changes to the move cursor (see fig. 13) to indicate when the object can be moved.



Figure 13: The move cursor

Objects that can be moved are: **Pages** (by dragging the page tab), **binders** (by dragging the lightgrey title area), **tool palettes** (by dragging the tab on the palette), **CP-net objects** (by dragging the object).

Pan By pressing and dragging with the **left** button on the mouse or trackball in the background of a page (i.e. the light brown area), users can pan the page. The pan cursor (see fig. 14) indicates when the page can be panned.

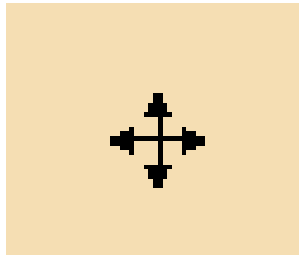


Figure 14: The pan cursor

Switch between pages and tools By clicking on a tab (either a page or a tool tab), users can bring a page or tool palette to front.

Expanding/collapsing index triangles By clicking on the small triangles in the index (and on declaration sheets), users can open and close the index entries. The triangles flash briefly in green when they expand/collapse.

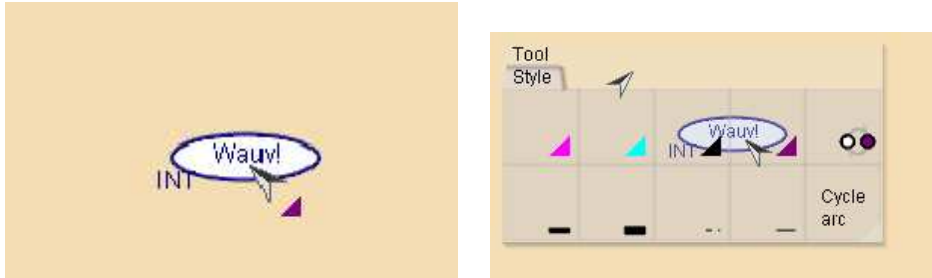
Drag from index By pressing and dragging on a text item in the index, users can drag the item out to open a page, a tool palette, or a declaration. Not all text items can be dragged from the index.

Pick up a tool By clicking with the **left** button of the mouse on a tool in a tool palette, users can pick up tools in the hand. Note that this only works when the tool palette is in palette mode, i.e. it is not possible to pick tools up from a toolglass. A yellow frame around the tool cell indicates that the tool is selected (see fig. 9). Clicking again on the selected tool will drop the tool, and the hand is now empty. When there is a tool in the hand, the cursor shows which tool it is (see fig. 6).

While a tool is in the hand, it is still possible to move objects, pan, bring pages to front, etc. This is then done with a "long click", i.e. by pressing and holding down the mouse button until the cursor changes to indicate that e.g. an object can be moved. When the operation is done, the cursor returns to the tool cursor, and

Apply a tool When a tool is in the hand, it can be applied by clicking on an appropriate object with the **left** mouse button. If there is no tool in the

hand, a toolglass tool can be applied by clicking through the cell with the **left** mouse button onto an appropriate object. Fig. 15 shows how to change colors on an object with a tool in the hand and with a toolglass.



(a) Tool in hand: Click on place

(b) Toolglass: Click through on place

Figure 15: Coloring a place

Pick up toolglass Clicking with the **right** trackball button on a tool binder picks the binder up as a toolglass, i.e. a semi-transparent palette that sticks to the trackball. The right hand apply tools in the toolglass to objects underneath as described above.

Drop toolglass If the palette is in toolglass mode, a click with the **right** trackball button drops it on the background (as a palette), and it no longer sticks to the trackball.

Move toolglass While the toolglass sticks to one of the input devices, it can be moved around by moving the device, thus keeping tools close to where the user works.

Asymmetrical two-handed interaction The two hands can perform tasks together, working in two different ways. These tasks are:

Apply tool from toolglass While the trackball moves the toolglass around, the mouse clicks through the cells to apply the tools, as described above.

Symmetrical two-handed interaction The two hands can work together, symmetrically, on the same task:

Zoom To zoom in on a page, position the trackball cursor somewhere on the page background (i.e. the light brown area), and press the **left** trackball button. Now position the mouse cursor somewhere on the same page background,

and press the **left** mouse button. Moving the cursors closer and farther from each other ("stretching" and "shrinking") will zoom in and out on the page. There is no cursor feedback on the zoom; only the left cursor changes during this interaction.

Resize binder To resize a binder, position the trackball cursor somewhere on the binder's title area (i.e. the light grey bar in the top of the binder), and press the **left** trackball button. Now position the mouse cursor somewhere in the binder, e.g. on the background of the page in the binder, and press the **left** mouse button. Moving the cursors closer and farther from each other will resize the binder. There is no cursor feedback on this; only the left cursor changes during this interaction.

The interactions for zoom and resize are the same, the only difference is where to position the trackball cursor.