

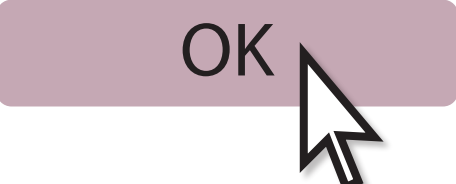
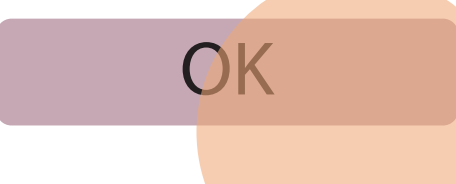
From the Lab to the World

Lessons from Extending a Pointing Technique for Real-World Use

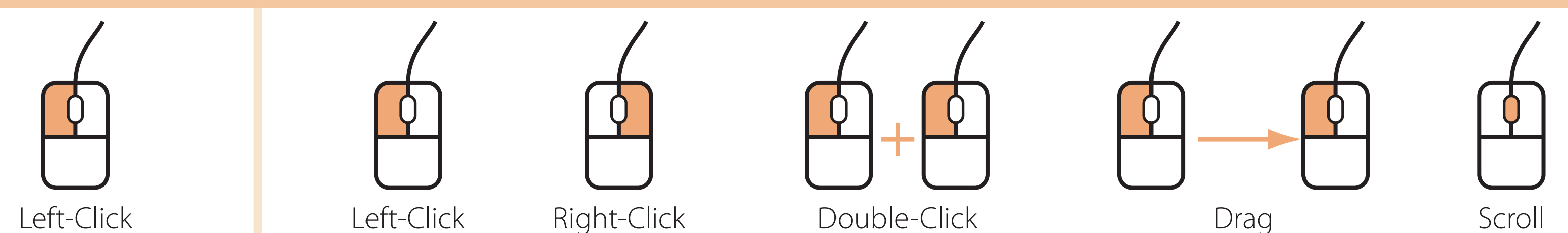
The quest to improve target acquisition has received significant attention in HCI over the years. While many pointing techniques offer speed and accuracy improvements in controlled lab experiments, they are rarely deployed outside of the laboratory or designed to support the full range of interaction necessary for real use. If we hope to create pointing techniques that will be widely adopted, we need to understand how those techniques function within the complexities of real applications and the context of real user priorities.

In moving pointing techniques from the lab to the field, two major challenges need to be addressed: (1) most often, lab evaluations only consider left clicks, rather than the full range of interaction (e.g., double clicks, dragging, scrolling); (2) many techniques are target aware, which means they need access to the location and size of targets on the screen. As a case study for understanding the challenges of deploying pointing techniques for real use, we present our extension of an existing pointing technique, the Pointing Magnifier, from a controlled lab setting.

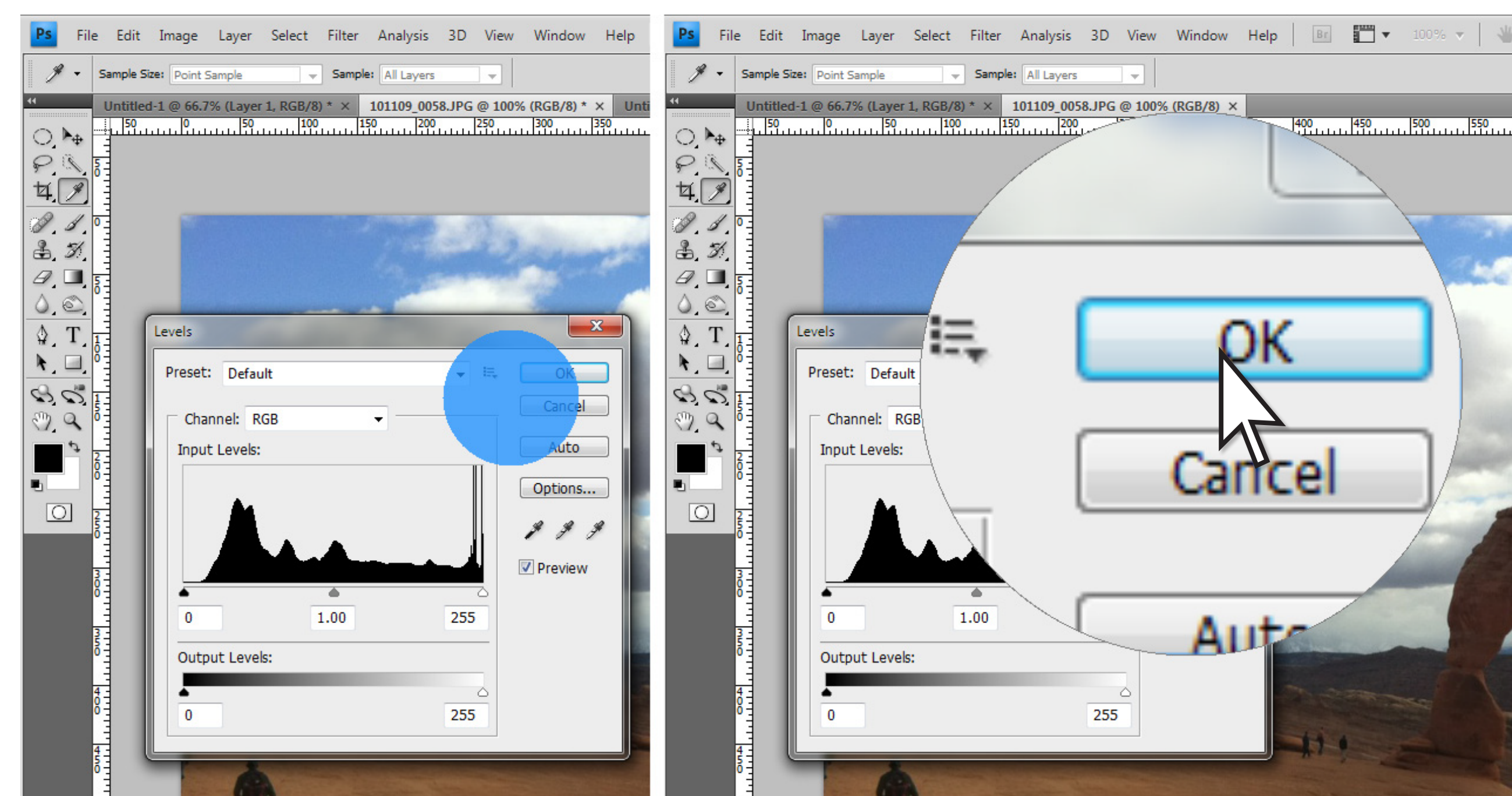
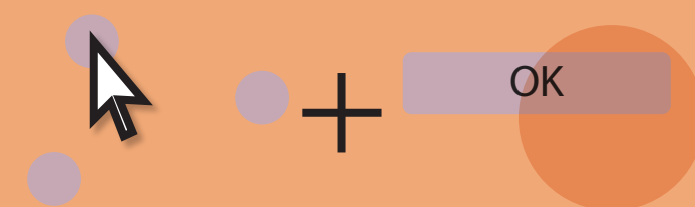
Classifying Lab Pointing Techniques

	Target-Agnostic	Target-Aware
Direct Pointing 	Angle Mouse [Wobbrock et al. 2009] PointAssist [Hourcade et al. 2010] Steady Clicks [Trewin et al. 2006]	Sticky Icons [Worden et al. 2006] Force Field [Ahlström et al. 2006] Object Pointing [Guiard et al. 2004]
Indirect Pointing 	Pointing Magnifier Fisheye View [Gutwin et al. 2002]	Bubble Cursor [Grossman et al. 2005] Area Cursor [Worden et al. 1997] Visual-Motor Magnifier [Findlater et al. 2010] Click-and-Cross Cursor [Findlater et al. 2010]

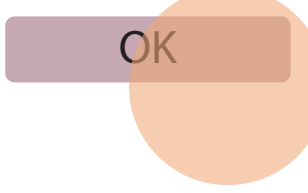
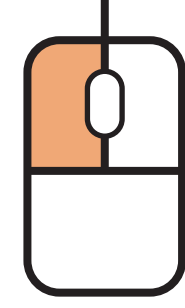
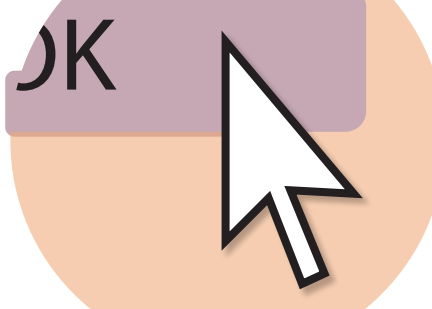
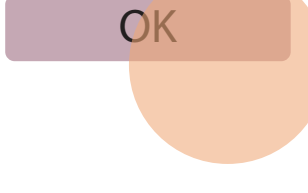
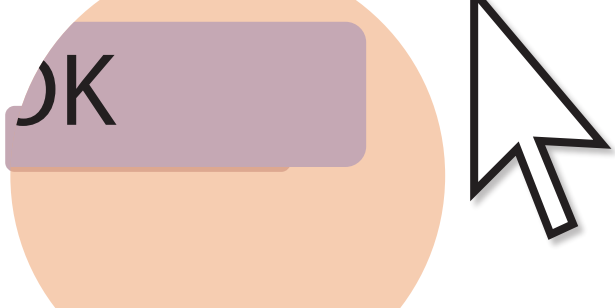
Lab vs. Real-World



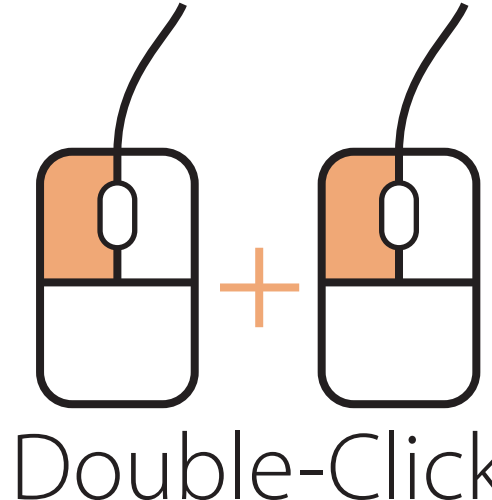
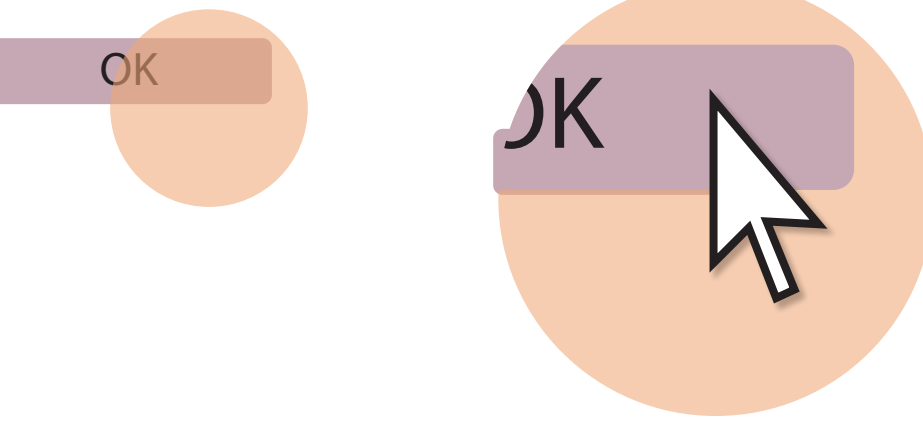
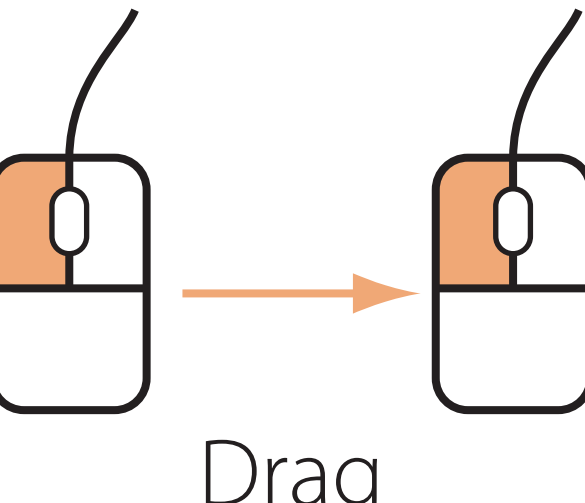
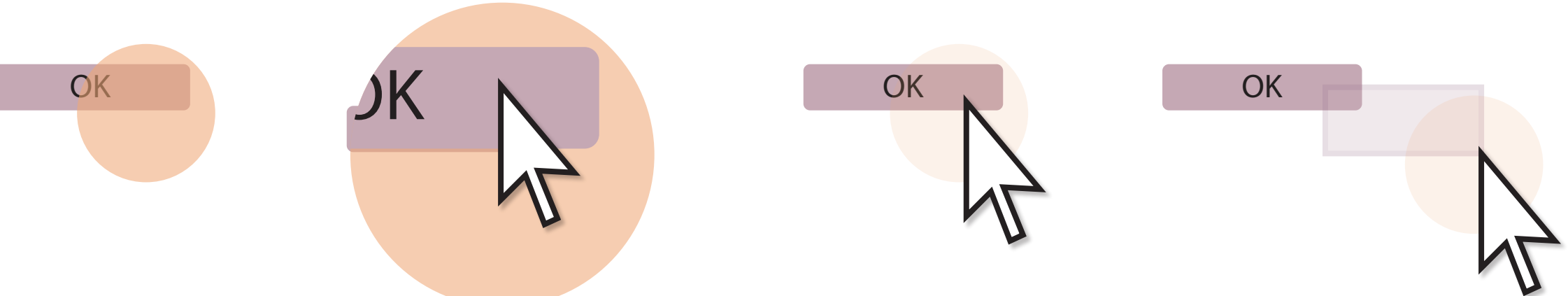
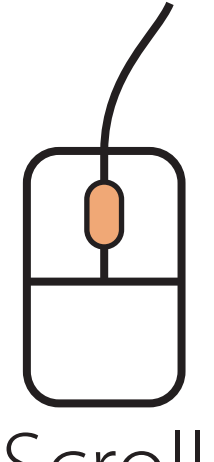
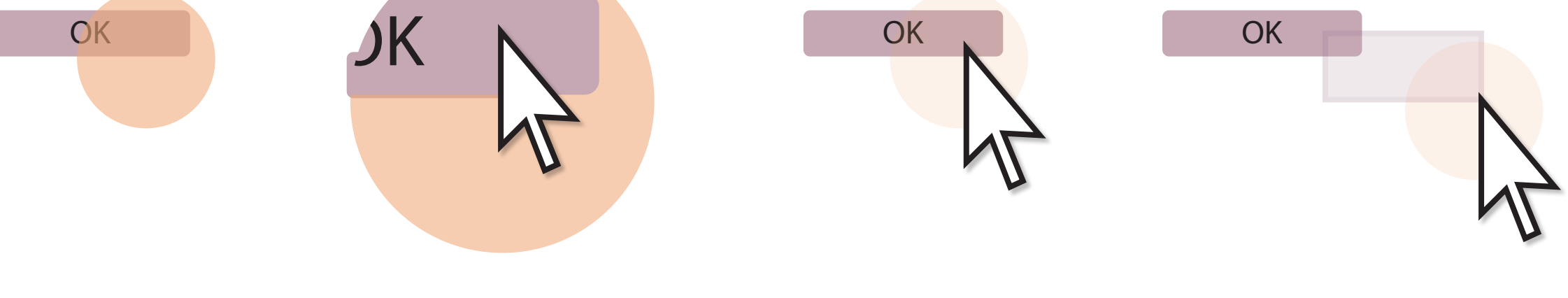
Pointing Magnifier



The Pointing Magnifier being activated over a dialog in Photoshop. The Pointing Magnifier appears as a blue area cursor (left). Once activated, the Pointing Magnifier locks in place and magnifies the contents of the screen under the area cursor (right).

-  While moving around the screen, the Pointing Magnifier appears as an area cursor.
-  Magnifying the area of the screen under the cursor is done by clicking any button on the mouse.
-  Selection in the magnified visual and motor space is done using a standard mouse pointer. Selections are translated to the corresponding non-magnified point on the screen.
-  As soon as a mouse button is pressed down in the the magnified visual and motor space, the Pointing Magnifier returns to an area cursor and the click is passed through to the underlying application.
-  To cancel out of the magnified state, the user can click anywhere outside of the magnified area.

Addressing Real-World Challenges

-   Double-Click
When the Pointing Magnifier returns from a magnified state, it allows mouse input to pass through to underlying applications for the length of the Windows double click interval.. While clicks are allowed through, the area cursor appears lighter than normal and the pointer is still visible.
-  Drag
 As long as the mouse is down, mouse input passes through to underlying applications. While clicks are allowed through, the area cursor appears lighter than normal and the cursor is still visible.
-  Scroll
 Scroll wheel events are passed through the Pointing Magnifier unobstructed. Since there is no actual button press, scrolling will not activate the Pointing Magnifier.