Another One-button Dynamic Mode for Dasher: 'Two-click mode'

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Abstract. The arithmetic-coding-based communication system, Dasher, can be driven by a single switch. In MacKay et al. (2004), we proposed two versions of one-button Dasher, 'static' and 'dynamic', aimed at a theoretical model of a user who can click with timing precision g, and who requires a recovery time D between clicks. While developing and testing those two versions we invented a third way of using one button, presented in MacKay and Ball (2006) and Mead et al. (2007) and included in Dasher 4 (released 2006) under the name 'one-button dynamic mode'. This note describes *another* design for a one-button version of Dasher, which is expected to be more user-friendly. I'll call this 'two-click mode' because the principal gesture made for each navigation action is a pair of clicks.

1 How to use one button in Dasher?

As in MacKay et al. (2004), MacKay and Ball (2006), and Mead et al. (2007), we assume that the user controls only the times of presses, not the times of releases.

The 'dynamic one-button mode' in Dasher version 4 can be likened to a bang-bang controller for a car. The car lurches either drunkenly to the top or to the bottom of the Dasher world, with the button presses being used to switch from the one sort of lurch to the other. Dynamic one-button mode has just one advantage over dynamic two-button mode – it uses only one button; and it has several disadvantages. First, whereas in two-button mode we recommend to users that they click as precisely as possible, identifying the exact moment when the desired target is alongside the fiducial, in one-button dynamic mode we have to give vaguer advice, along the lines of 'click when the target is close to the edge of the screen – but not too close, because clicking too late would be bad news, requiring an unzooming activity to get the target back on screen'. One-button mode is thus unable to exploit super-accurate presses.

The typical flow velocity of the Dasher canvas is bigger in one-button mode than in two-button mode (assuming the two modes are zooming at the same rate), because the point being zoomed in on is at the edge rather than the centre of the display.

Another weakness of the one-button mode is that it requires a special action – such as a long press, or a double-click or triple-click, or a press of a second button, to indicate that the user wants to get out of writing mode, for example to correct errors or to stop using Dasher.

The motivation for this note is to discuss other ways of using one button that fix these defects. Most important of all, we want to be able to instruct the user to click precisely, and to exploit the large information content of precisely timed clicks.

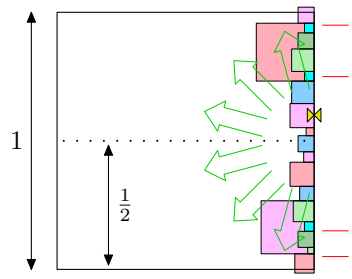

Fig. 1. Layout of two-click mode. Four vertical positions are marked by stationary fiducials shown in red. Normally the Dasher view zooms perpetually on the centre of the display (as shown by the green arrows). The user must identify, at least approximately, the location of the required destination, which is a point on the right hand side as illustrated by the triangular yellow markers. As long as this target was initially close to the centre line, subsequent zooming will take this target past two of the fiducials. For the situation shown by the triangular markers, the upper two fiducials will be passed. The user should click once for each of those passing events. On the second event, the view will be fairly rapidly shifted to restore the inferred location of the target to the exact centre of the display – and thus, hopefully put the true target approximately at the centre of the display. Zooming continues and the process repeats.

2 Two-click mode

The idea of two-click mode is to have the navigation of Dasher work just like two-button Dasher, and to distinguish between the two categories of navigation action (up and down) by using two types of double-click.

We could use two clicks closely spaced in time to indicate 'up' and two clicks spaced a little further apart to indicate 'down'.

To obtain high-precision temporal information from both clicks, we can place *four* fiducials on the screen. Then the instruction we give to the user is 'please click whenever your target point flows past a fiducial'. The display shifts whenever the second click occurs; the times of the two clicks allow the software to infer (a) which pair of fiducials have been passed; and (b) where the target is.

This approach to one-button navigation has some advantages.

(1) if the user clicks just once, then within a short time we can infer that something has gone wrong. A single click can thus be used as an instruction to Dasher to stop zooming and perhaps to start unzooming so that a navigational

correction can be made. A single click is a very easy action to make, and cannot easily be confused with other actions.

(2) in cases where the time between two clicks is not a good match for the separation between two fiducials, we can infer that the two clicks are not as accurate as normal, and take appropriate action. The fact that the user has not clicked accurately implies that their target is almost certainly going to appear, post-navigation-action, at a position further from the centre of the display than normal. We can therefore temporarily slow Dasher down in such cases.

(3) if the user consistently clicks super-precisely, we can infer the precision of their clicks and automatically increase the zooming speed of Dasher.

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