The Brush Settings panel provides many options for adding dynamic (or changing) elements to preset brush tips. For example, you can set options that vary the size, color, and opacity of brush marks over the course of a stroke.

There are two primary components when adding dynamics elements to a brush:

- Jitter percentages specify the randomness of dynamic elements. At 0%, an element does not change over the course of a stroke; at 100%, an element has the maximum amount of randomness.

- Options in the Control pop-up menus specify how you want to control the variance of dynamic elements. You can choose not to control the variance of an element, to fade an element over the specified number of steps, or to vary an element based on pen pressure, pen tilt, position of the pen thumbwheel, or pen rotation.

**Note:** Pen controls are available only when you’re using a pressure-sensitive digitizing tablet such as the Wacom tablet, and supported pens (for rotation control and thumbwheel). A warning icon appears if you select a pen control but have not installed a tablet or are using a pen that is missing the control feature. Most of the following Brush Dynamics features will not apply to strokes created with a mouse.
SHAPE DYNAMICS

Shape dynamics determine the variance of brush marks in a stroke.

Brush stokes without shape dynamics (left) and with shape dynamics (right)

Size Jitter and Control
Specifies how the size of brush marks vary in a stroke. To specify the maximum percentage of jittering, type a number or use the slider to enter a value. To specify how you want to control the size variance of brush marks, choose an option from the Control pop-up menu:

- **Off**
  Specifies no control over the size variance of brush marks.

- **Fade**
  Fades the size of brush marks between the initial diameter and the minimum diameter in the specified number of steps. Each step is equal to one mark of the brush tip. The value can range from 1 to 9999. For example, entering 10 steps produces a fade in 10 increments.

- **Pen Pressure, Pen Tilt, Stylus Wheel**
  Varies the size of brush marks between the initial diameter and the minimum diameter based on the pen pressure, pen tilt, or position of the pen thumbwheel.

- **Minimum Diameter**
  Specifies the minimum percentage by which brush marks can scale when Size Jitter or Size Control is enabled. Type a number, or use the slider to enter a value that is a percentage of the brush tip diameter.

- **Tilt Scale**
  Specifies the scale factor applied to the height of the brush prior to rotation when Size Control is set to Pen Tilt. Type a number, or use the slider to enter a value that is a percentage of the brush diameter.

Angle Jitter and Control
Specifies how the angle of brush marks varies in a stroke. To specify the maximum percentage of jittering, enter a value that is a percentage of 360 degrees. To specify how you want to control the angle variance of brush marks, choose an option from the Control pop-up menu:
• **Off**  
  Specifies no control over the angle variance of brush marks.

• **Fade**  
  Fades the angle of brush marks between 0 and 360 degrees in the specified number of steps.

• **Pen Pressure, Pen Tilt, Stylus Wheel, Rotation**  
  Varies the angle of brush marks between 0 and 360 degrees based on the pen pressure, pen tilt, position of the pen thumbwheel, or rotation of the pen.

• **Initial Direction**  
  Bases the angle of brush marks on the initial direction of the brush stroke.

• **Direction**  
  Bases the angle of brush marks on the direction of the brush stroke.

**Roundness Jitter and Control**  
Specifies how the roundness of brush marks varies in a stroke. To specify the maximum percentage of jittering, enter a percentage indicating the ratio between the brush’s short and long axes. To specify how you want to control the roundness variance of brush marks, choose an option from the Control pop-up menu:

• **Off**  
  Specifies no control over the roundness variance of brush marks.

• **Fade**  
  Fades the roundness of brush marks between 100% and the Minimum Roundness value in the specified number of steps.

• **Pen Pressure, Pen Tilt, Stylus Wheel, Rotation**  
  Varies the roundness of brush marks between 100% and the Minimum Roundness value based on the pen pressure, pen tilt, position of the pen thumbwheel, or rotation of the pen.

• **Minimum Roundness**  
  Specifies the minimum roundness for brush marks when Roundness Jitter or Roundness Control is enabled. Enter a percentage indicating the ratio between the brush’s short and long axes.

• **Brush Projection**  
  Specifies that as you paint with a stylus, changes to tilt and rotation alter the tip shape.

**COLOR DYNAMICS**  
Color dynamics determine how the color of paint changes over the course of a stroke.
Brush strokes without color dynamics (left) and with color dynamics (right)

- **Apply per tip**
  Specifies changing color for each distinct tip stamp in a stroke.
  
  If unchecked, dynamic changes occur once at the beginning of each stroke. You can vary color between strokes, rather than within each individual stroke.

- **Foreground/Background Jitter and Control**
  Specifies how paint varies between the foreground color and background color.
  
  To specify a percentage by which the color of the paint can vary, type a number, or use the slider to enter a value. To specify how you want to control the color variance of brush marks, choose an option from the Control pop-up menu:

  - **Off**
    Specifies no control over the color variance of brush marks.

  - **Fade**
    Varies the color of paint between the foreground color and the background color in the specified number of steps.

  - **Pen Pressure, Pen Tilt, Stylus Wheel, Rotation**
    Varies the color of paint between the foreground color and the background color based on the pen pressure, pen tilt, position of the pen thumbwheel, or rotation of the pen.

  - **Hue Jitter**
    Specifies a percentage by which the hue of the paint can vary in a stroke. Type a number, or use the slider to enter a value. A lower value changes the hue while maintaining a close proximity to the hue of the foreground color. A higher value increases the difference between hues.

  - **Saturation Jitter**
    Specifies a percentage by which the saturation of the paint can vary in a stroke. Type a number, or use the slider to enter a value. A lower value changes the saturation while maintaining a close proximity to the saturation of the foreground color. A higher value increases the difference between saturation levels.
• **Brightness Jitter**
  Specifies a percentage by which the brightness of the paint can vary in a stroke. Type a number, or use the slider to enter a value. A lower value changes the brightness while maintaining a close proximity to the brightness of the foreground color. A higher value increases the difference between brightness levels.

• **Purity**
  Increases or decreases the saturation of the color. Type a number, or use the slider to enter a percentage between –100 and 100. At –100%, the color is fully desaturated; at 100%, the color is fully saturated.

**SCATTERING DYNAMICS**
Brush scattering determines the number and placement of marks in a stroke.

![Brush strokes without scattering (left) and with scattering (right)](image)

**Scatter and Control**
Specifies how brush marks are distributed in a stroke. When Both Axes is selected, brush marks are distributed in a radial direction. When Both Axes is deselected, brush marks are distributed perpendicular to the stroke path.

To specify the maximum percentage of scattering, enter a value. To specify how you want to control the scattering variance of brush marks, choose an option from the Control pop-up menu:

• **Off**
  Specifies no control over the scattering variance of brush marks.

• **Fade**
  Fades the scattering of brush marks from maximum scattering to no scattering in the specified number of steps.

• **Pen Pressure, Pen Tilt, Stylus Wheel, Rotation**
  Varies the scattering of brush marks based on the pen pressure, pen tilt, position of the pen thumbwheel, or rotation of the pen.
• **Count**
  Specifies the number of brush marks applied at each spacing interval.
  
  **Note:** If you increase the count without increasing the spacing or scattering values, painting performance may decrease.

**Count Jitter and Control**
Specifies how the number of brush marks varies for each spacing interval. To specify the maximum percentage of brush marks applied at each spacing interval, enter a value. To specify how you want to control the count variance of brush marks, choose an option from the Control pop-up menu:

- **Off**
  Specifies no control over the count variance of brush marks.

- **Fade**
  Fades the number of brush marks from the Count value to 1 in the specified number of steps.

- **Pen Pressure, Pen Tilt, Stylus Wheel, Rotation**
  Varies the number of brush marks based on the pen pressure, pen tilt, position of the pen thumbwheel, or rotation of the pen.

**PAINT TRANSFER DYNAMICS**
Paint transfer brush options determine how paint changes over the course of a stroke.

Brush strokes without paint dynamics (left) and with paint dynamics (right)

**Opacity Jitter and Control**
Specifies how the opacity of paint varies in a brush stroke, up to (but not exceeding) the opacity value specified in the options bar. To specify a percentage by which the opacity of the paint can vary, type a number or use the slider to enter a value. To specify how you want to control the opacity variance of brush marks, choose an option from the Control pop-up menu:

- **Off**
  Specifies no control over the opacity variance of brush marks.
• **Fade**
  Fades the opacity of paint from the opacity value in the options bar to 0, in the specified number of steps.

• **Pen Pressure, Pen Tilt, Stylus Wheel**
  Varies the opacity of paint based on the pen pressure, pen tilt, or the position of the pen thumbwheel.

**Flow Jitter and Control**
Specifies how the flow of paint varies in a brush stroke, up to (but not exceeding) the flow value specified in the options bar.

To specify a percentage by which the flow of the paint can vary, type a number or use the slider to enter a value. To specify how you want to control the flow variance of brush marks, choose an option from the Control pop-up menu:

• **Off**
  Specifies no control over the flow variance of brush marks.

• **Fade**
  Fades the flow of paint from the flow value in the options bar to 0 in the specified number of steps.

• **Pen Pressure, Pen Tilt, Stylus Wheel**
  Varies the flow of paint based on the pen pressure, pen tilt, or position of the pen thumbwheel.

**SMOOTHING BRUSH STROKES**
It can be difficult to create nice, smooth brush stroke, particularly while using a mouse. Photoshop does not automatically smooth out the natural unevenness due to hand-shake or other factors, it simply lays down the pixels based on the path you make with your cursor. Photoshop’s **Smoothing** scale, available in the Options Bar whenever a brush tool is active, can help to automatically smooth lines as you draw.

The **Smoothing** settings are available in the Options Bar.

Click the dropdown arrow to activate the slider used to increase or decrease smoothing.
A low smoothing percentage may result in a jagged stroke. Increasing the smoothing percentage will result in a much cleaner stroke. Note that a Smoothing value needs to be set before the stroke is created.

To accomplish the smoothing effect Photoshop performs complex mathematical equations as the stroke is drawn. This may result in a lag between the location of the brush tip and the completion of the drawn stroke. The Brush Leash feature displays a thin magenta line between the lagging stroke and the cursor.

The Brush Leash feature displays a line between the brush tip and the lagging stroke.

The Brush Leash feature can be turned on or off by going to Edit > Preferences > Cursors.
The Show Brush Leash While Smoothing option in the Preferences menu.

**Brush Smoothing Options**
The Smoothing Options menu can be selected by clicking on the gear icon next to the Smoothing percentage.

Click the gear icon to access the Smoothing Options menu.

**Select from the following Smoothing Modes:**
Pulled String Mode
Displays a magenta circle, indicating the location of the brush tip, at the initial click.

A magenta circle indicates the brush tip location.

The stroke will be drawn, with a magenta line indicating the lag, as the cursor is dragged outside of the circle. The size of the circle is determined by the Smoothing Percentage. The higher the percentage, the bigger the circle.

Note: Selecting the Pulled String Mode disables the other modes.

Stroke Catch-up Mode
Adjusts the length of the line following the cursor as the stroke is drawn. Drawing slowly shortens the line, drawing quickly lengthens the line.

Catch-up on Stroke End Mode
The line will always be close to your cursor. When the cursor is removed the line jumps to the point where the pen was taken away. Some people prefer this mode as too much of a lag can be distracting.

Adjust for Zoom Mode
Adjusts the displayed smoothing effect relative to the image zoom factor. For instance, decreasing the zoom factor, while keeping the same smoothing value, will make the smoothing effect more noticeable. The magenta line display is also automatically adjusted based on the zoom level.

Selecting the Stroke Catch-up and Adjust for Zoom modes offers the most precision when drawing a line.

Adjusting Brush Hardness can affect stroke smoothing. The illustration below shows two lines,
one with a hard edge and one with a soft edge.

A hard-edged line (top) and a soft-edged line (bottom).

With smoothing set to 40% for both brushes, the soft round brush appears smoother.