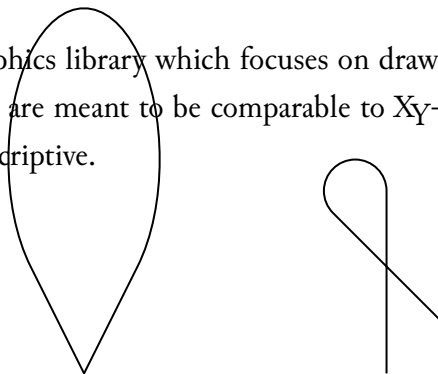


# Stylo: the diagram toolkit for SAT<sub>Y</sub>SF<sub>I</sub>

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Stylo is a satisfactory graphics library which focuses on drawing geometrical diagrams in its entirety. Rendered diagrams are meant to be comparable to X<sub>Y</sub>-pic package of L<sup>A</sup>T<sub>E</sub>X, but the code looks readable and descriptive.



## 1. Getting started

To use Stylo in your document, at first you need to @require: stylo/stylo. TBW

```
+diagram {
  \stylo((0cm, 2cm, 2cm))(
    open Path in
    let s = (0cm, -1cm) in
    let n = (0cm, 1cm) in
    [
      start-from s
      |> arc-thru-to n (3cm, 0cm)
      |> arc-thru-to s (2cm, 0cm)
      |> arc-thru-to n (1cm, 0cm)
      |> arc-thru-to s (0.5cm, 0cm)
      |> arc-thru-to n (0cm, 0cm)
      |> arc-thru-to s (-0.5cm, 0cm)
      |> arc-thru-to n (-1cm, 0cm)
      |> arc-thru-to s (-2cm, 0cm)
      |> arc-thru-to n (-3cm, 0cm)
```

```
|> solid;  
]  
);  
}
```

## 2. Concepts and datatypes

TBW (some amazing art)

TBW

### 2.1. Geometricals

Concepts described under this section are purely geometrical and are essentially not tied to actual style when rendered.

#### 2.1.1. Points

TBW (illustration of the Big Dipper?)

A point is one of the most primitive object in the world of graphics.

#### 2.1.2. Paths

TBW

A path—that's all about diagrams. Stylo uses its own implementation of path instead of SATYSFY's built-in one, in order to achieve a series of manipulation around paths in depth. Constructed paths are translated into built-in representations at the time of rendering.

#### 2.1.3. Positions

TBW

A position is a waypoint on a path. Some operations require some positions on a path to be specified by scalar values. Usually, in the term of specifying these positions, paths are always treated as if the starting point and ending point are connected to each other, regardless of being closed or not. That is:

- When specified values are negative, interpreted backwardly from the ending point of the path.
- When the absolutes of specified values exceed the total length of the path, interpreted cyclically through the path.

Positions can be specified in scale or length. That is:

- When in scale, interpreted assuming 0.0 and 1.0 are the starting point and the ending point of the path respectively.
- When in length, interpreted assuming 0cm is the starting point of the path.

Stylo's internal representations of lengths are all in centimeters, thereby returned lengths of measurement functions are all in centimeters.

#### 2.1.4. Angles

TBW (some angels?)

Angles can be specified in radians or degrees. Stylo's internal representations of angles are all in radians, thereby returned angles of measurement functions are all in radians.

### 2.2. Decoratives

In this section, style-related concepts and predefined decoratives are shown in series.

- TBW

#### 2.2.1. Pins

TBW

Pins are used to indicate specific points in the diagram.

A pin is actually a small footage with its origin point placed at a given point. Thereby any types of complex paths can be used as pins, including labels.

Pins are oftenly used as arrowheads but also can be used as a pseudo-arrowshaft by splitting a path into multiple subpaths.

### 2.2.2. Wires

TBW

Wires can indicate lines and curves in the diagram. Oftenly wires are used as arrowshafts.

### 2.2.3. Labels

TBW

TBW

## 2.3. Footages

A footage is a ready-to-render object containing a decorated path or a label, but still accepts some configurations of contextual options.

Internally, a footage is just a function which takes a context and returns a graphics.

## 3. Constructs and Commands

In the world of Stylo, the noun “construct” refers to commands that takes some paths and returns some paths modifying them. There's a set of commands for drawing, measuring and decorating paths.

### 3.1. Constructing paths

Paths can be constructed from scratch. Unlike SATySFt's path implementation, Stylo has no concept of “pre-path”. Constructs always return complete paths closed or not. When constructing paths by hand, basically manipulated paths are open, so if you want to close them you need to connect the starting point and the ending point manually and pass them into `finish`.

#### 3.1.1. Terminative constructs

**start-from** : point → stylo-path

Starts a path from a given point.

**start-with-tangent** : point → point → stylo-path

Starts a path from a second given point, with the pre-start tangent from a first given point. The tangent can be referred by the next construct such as `arc-to-with-`

tangents. This phantom tangent does not affect to the second or further next constructs in any way, including the path closing.

**finish** : stylo-path  $\rightarrow$  stylo-path

Closes a path if the last point is meeting to the starting point, otherwise leaves it open.

**restart** : stylo-path  $\rightarrow$  stylo-path

Opens a path if closed. Usually you don't need to use this construct because most constructs implicitly reopen when applied to a closed path.

**restart-at** : position  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path

Restarts the path from a given position. The path portion after the position is discarded.

### 3.1.2. Lines and curves

You can draw each segment of a path step by step using these constructs.

**line-to** : point  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path

Draws a straight line to a given point.

**bezier-to** : (point  $\times$  point  $\times$  point)  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path

Draws a Bézier curve to the last given point with the first two given control points.

### 3.1.3. Arcs

Stylo has a powerful set of constructs for drawing arcs in different ways. These constructs generates one or more segments onto the path.

**arc-by-around** : point  $\rightarrow$  angle  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path

Draws an arc around a given point, with a given angle.

**arc-by-aside** : length  $\rightarrow$  angle  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path

Draws an arc around a given point which is a given length away from the current point orthogonally to the current tangent, with a given angle. Positive length means the left direction.

**arc-to-with-tangents** : point  $\rightarrow$  point  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path

Draws an arc, surrounded by zero or supplemental line for each side if needed to smoothly tangent the arc to the current tangent and the forwarding tangent specified by a first given point. Thereby the next segment shall be smoothly connected as long as it starts for the identical direction of the forwarding tangent. See the example below:

`arc-to-with-tangents-counter` : point  $\rightarrow$  point  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path

Same as `arc-to-with-tangents`, except that it draws the counter arc against what `arc-to-with-tangents` draws thereby tangented like a pair of needles. Not implemented yet.

### 3.1.4. Tracing another path

Not implemented yet.

## 3.2. Predefined shapes

TBW

### 3.2.1. Arrows

TBW

An arrow is constructed from a wire and one or two pin(s). TBW

## 3.3. Splicing paths

Splicing constructed paths is one of the main ways to produce complex paths.

### 3.3.1. Splitting

Paths can be splitted into subpaths at an arbitrary position.

`split-at` : position  $\rightarrow$  stylo-path  $\rightarrow$  (stylo-path  $\times$  stylo-path)

Splits a path in two at a given position.

`split-into` : int  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path list

Splits a path into a given number of subpaths. Passing a zero returns an empty list.

`split-incr` : position  $\rightarrow$  stylo-path  $\rightarrow$  stylo-path list

Splits a path in increments of a given position. The incremental position can be negative. When positive, the fractioned subpath comes in last, and vice versa. Passing a

zero always results in an infinite loop. Unusually, when the incremental position longer than the length of the path, no split is performed and it returns just the original path wrapped in a list.

### 3.3.2. Trimming

Paths can be trimmed at an arbitrary endpositions. 切り落としの始端位置から終端位置への向きがパスを逆行する場合、切り出されるパスの向きもそれに従う。Not implemented yet.

**trim-within** : (position × position) → stylo-path → stylo-path

Trims a path at given endpositions.

## 3.4. Measuring

Stylo provides a set of features that supports measuring distances, lengths, areas and angles amongst geometrical objects.

### 3.4.1. Distances

TBW

### 3.4.2. Lengths

TBW

**length-of** : stylo-path → length

Measures the total length of a given path. The returned length is an approximate value within the set tolerance, especially when the path has some curves.

### 3.4.3. Areas

TBW

### 3.4.4. Angles

TBW

## 3.5. Compositing paths

Not implemented yet.

### 3.5.1. Boolean operations

Not implemented yet.

## 3.6. Transforming paths

Stylo supports affine transformations of paths and footages. Not implemented yet.

## 4. Syntax sugars

Stylo provides some syntax sugars for specific use cases.

### 4.1. Grid layout

An equivalent feature to X<sub>Y</sub>-matrix of X<sub>Y</sub>-pic. Not implemented yet.