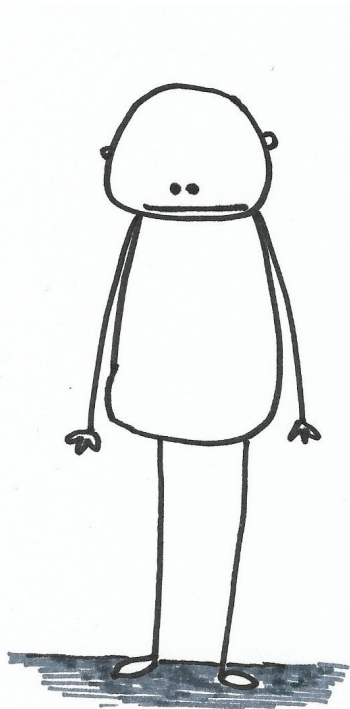
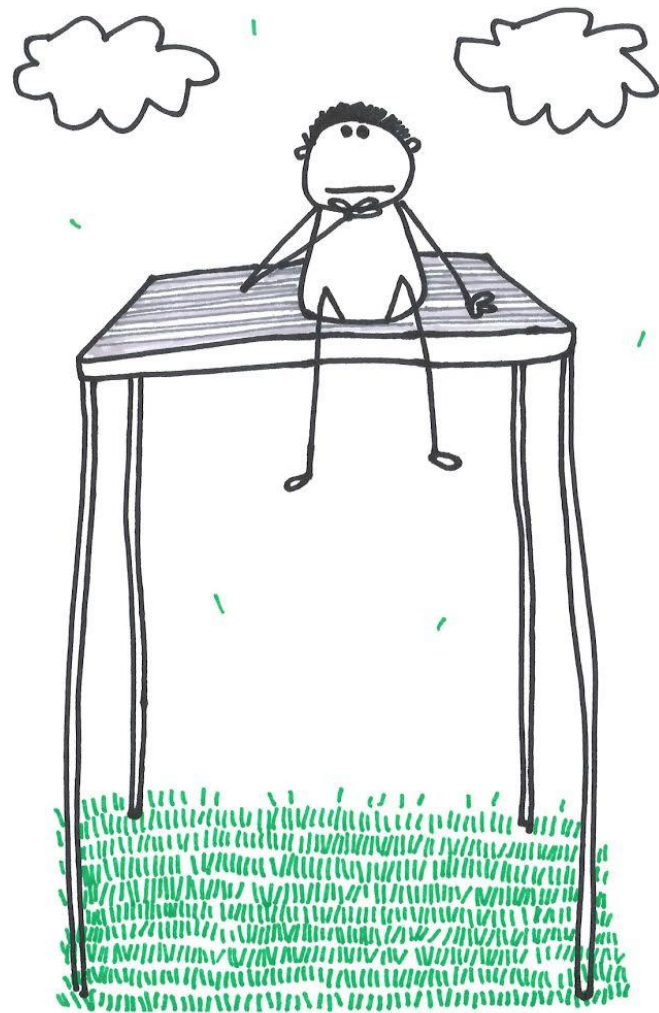
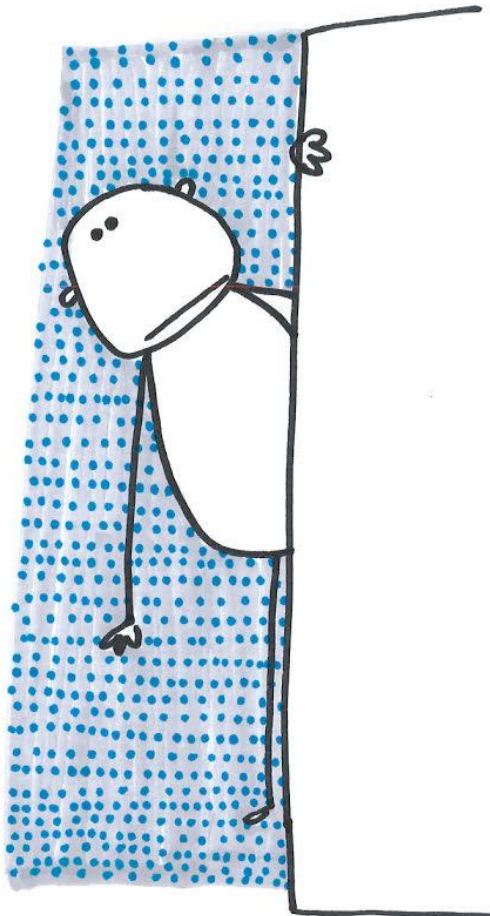


Variations on Variations

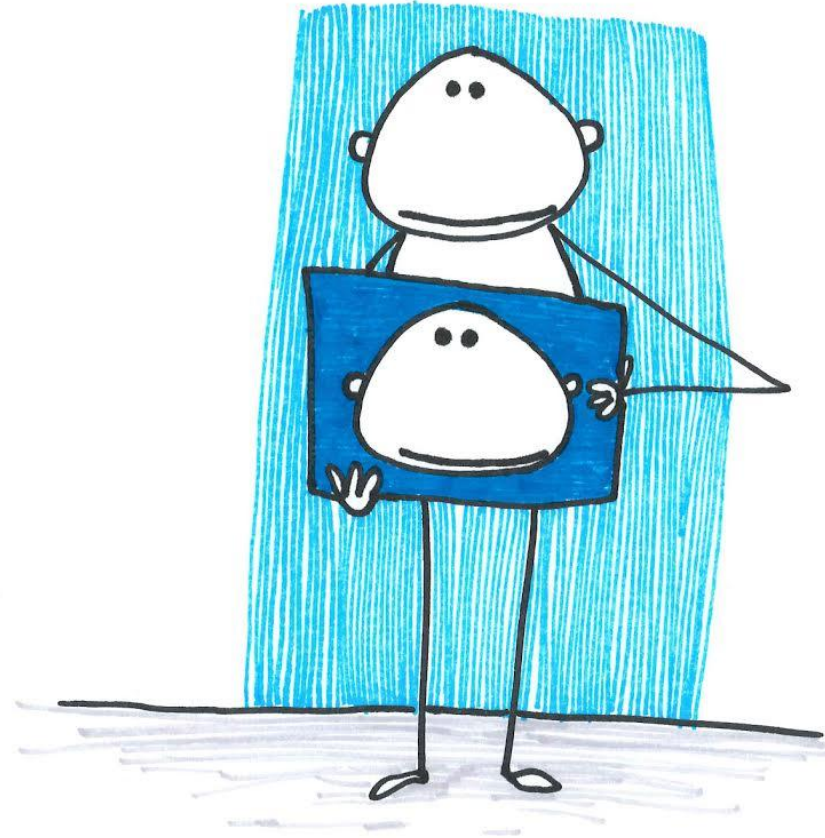




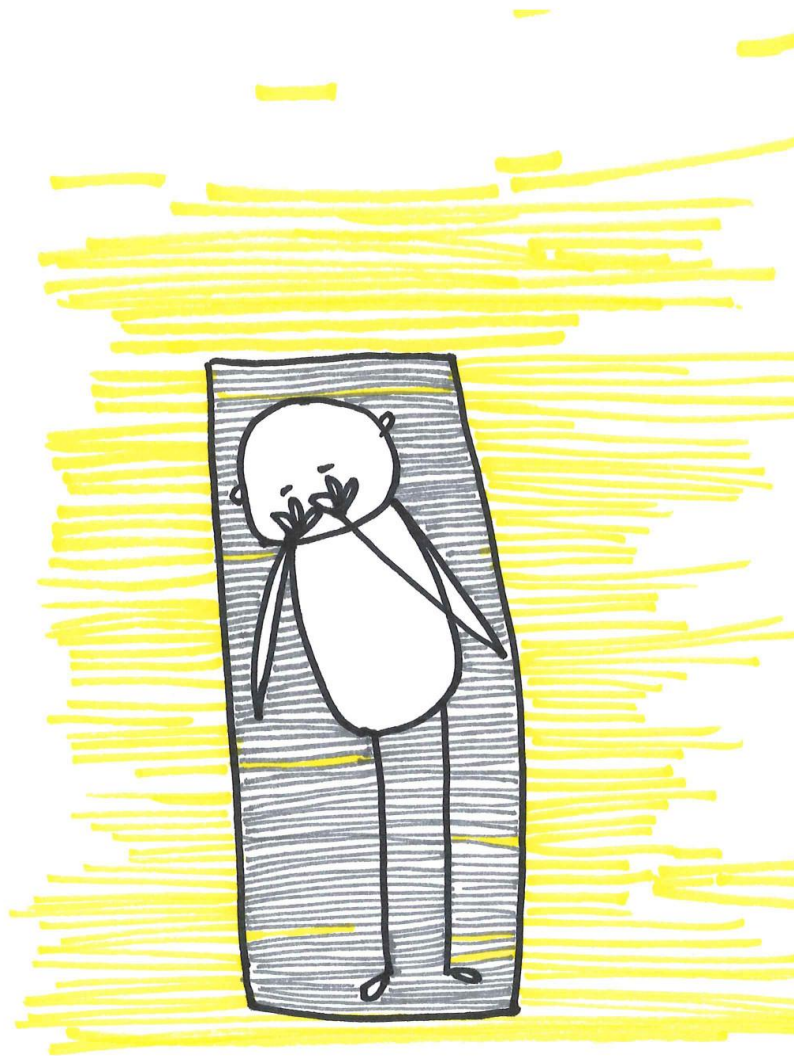




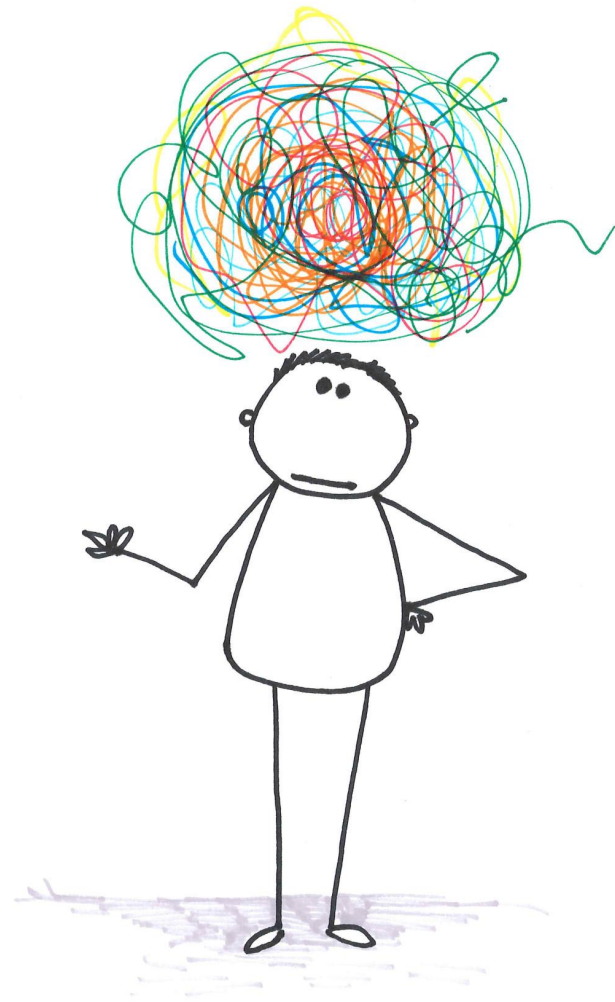








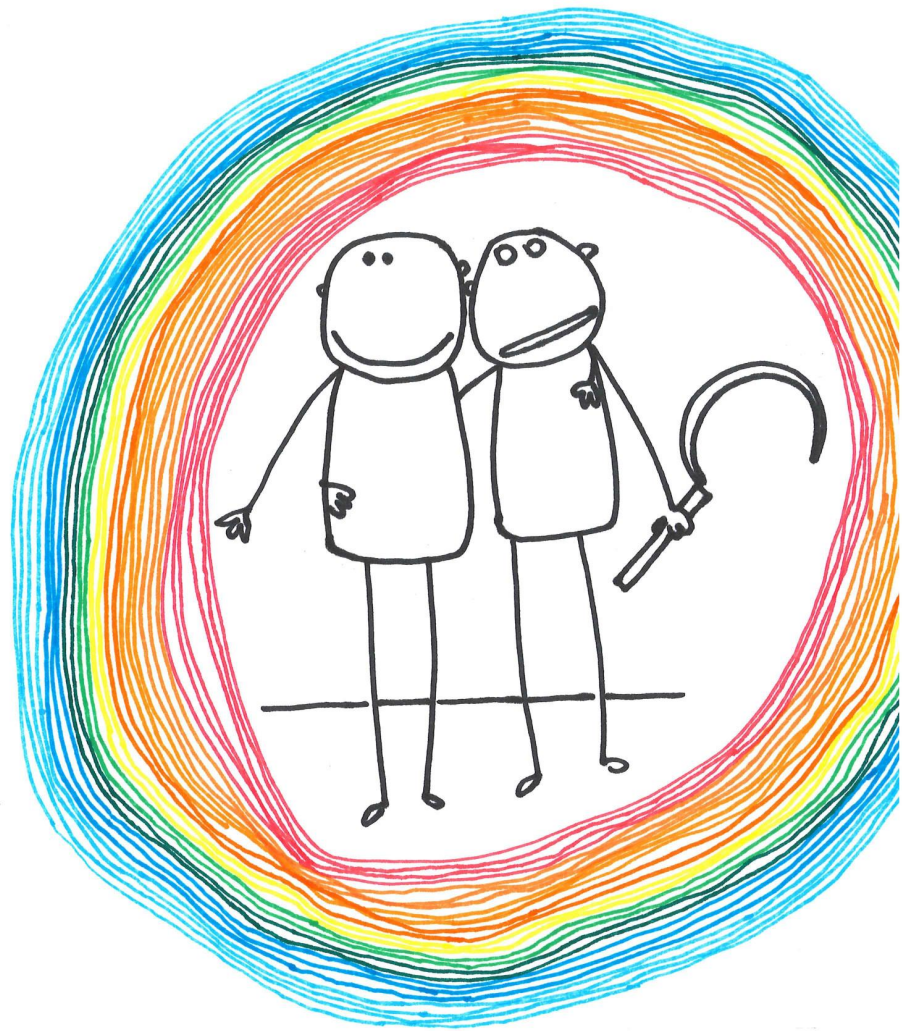












Variations

- FreeType
- HarfBuzz
- FontTools



FreeType

COMPLETE!



HarfBuzz

- `font-variation-settings`
- `hb-view --variations (DEMO!)`

Remaining:

- MVAR
- Named instances



FontTools

- GPOS merging
- varLib.interpolatable

Remaining:

- avar generation
- MVAR generation
- STAT generation
- Feature variations
- CFF2 generation

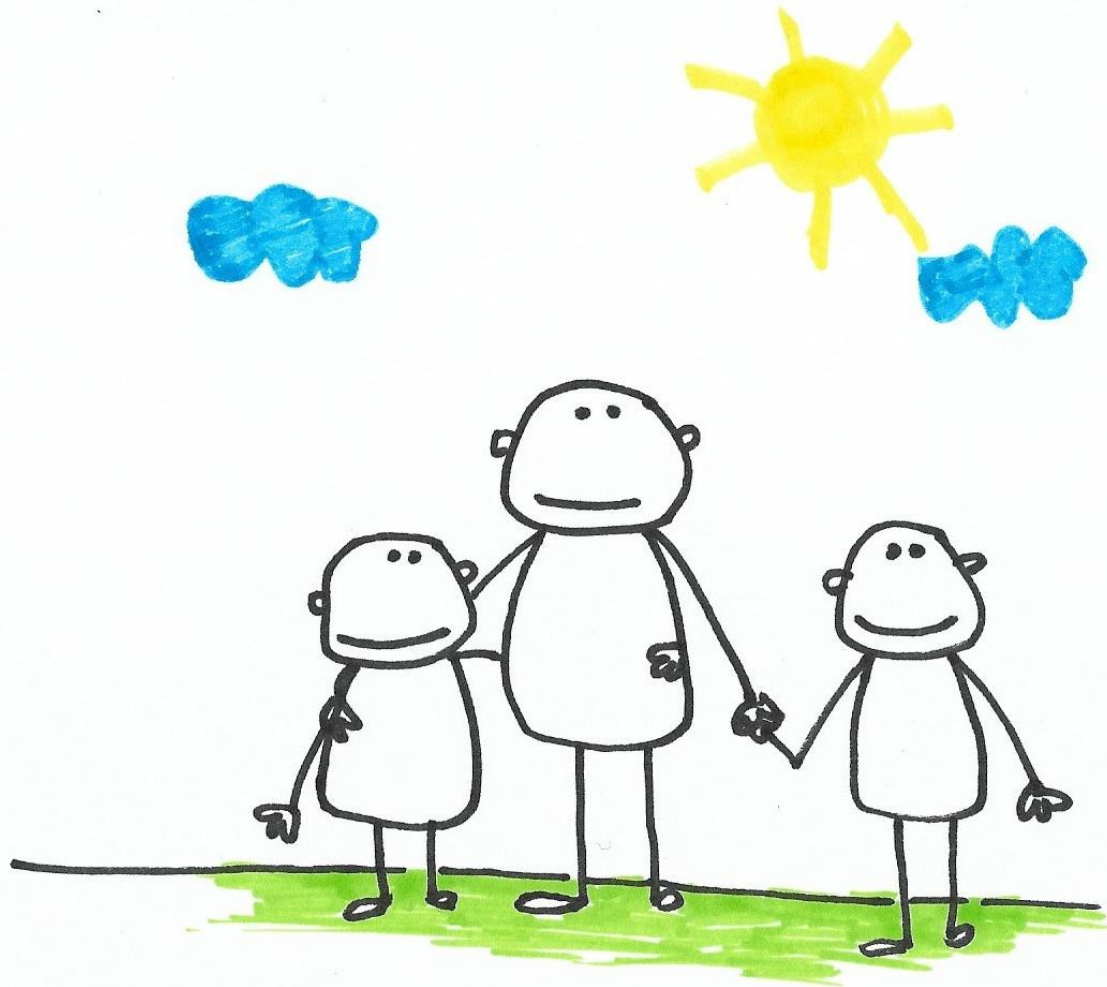


FontTools

- GPOS merging
- varLib.interpolatable

Remaining:

- avar generation
- MVAR generation
- STAT generation
- Feature variations
- CFF2 generation



GPOS merging

- Merge exception subtables
- Combine exception subtables
- Merge class-based subtables
- Classify differing class groups
- Recombine split subtables

Remaining:

- Unwrap Extension subtables



fvar / avar generation

```
<axes>
```

```
  <axisname="weight" tag="wght">
```

```
    labelname="Weight"
```

```
    minimum="100"
```

```
    default="400"
```

```
    maximum="1000"/>
```

```
  <labelname xml:lang="en">Weight</labelname>
```

```
  <labelname xml:lang="fa-IR">وزن</labelname>
```

```
  <map input="100" output="26"/>
```

```
  <map input="400" output="90"/>
```

```
  <map input="700" output="151"/>
```

```
  <map input="1000" output="190"/>
```

```
</axis>
```

```
<axes>
```



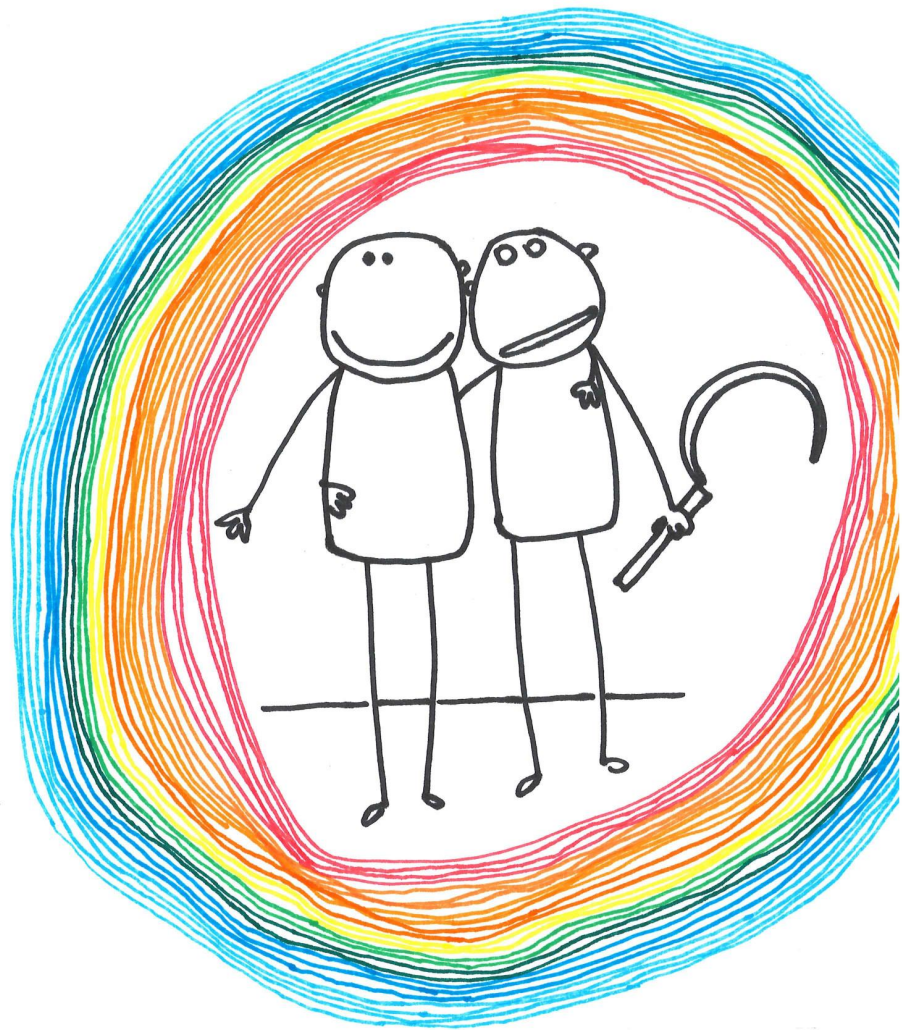
MVAR generation

Soon!



STAT generation

STAT generation



STAT generation

Source?



Feature Variations

Remaining:

- Designsapce rules

```
<rules>
```

```
  <rule name="named.rule.1">
```

```
    <condition maximum="250" minimum="750" name="weight" />
```

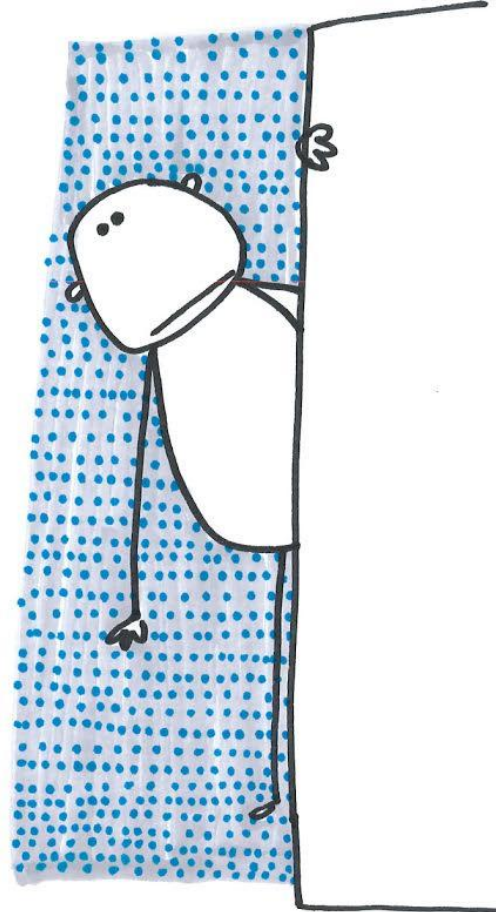
```
    <condition maximum="1000" minimum="500" name="width" />
```

```
    <sub name="dollar" byname="dollar.alt"/>
```

```
  </rule>
```

```
</rules>
```

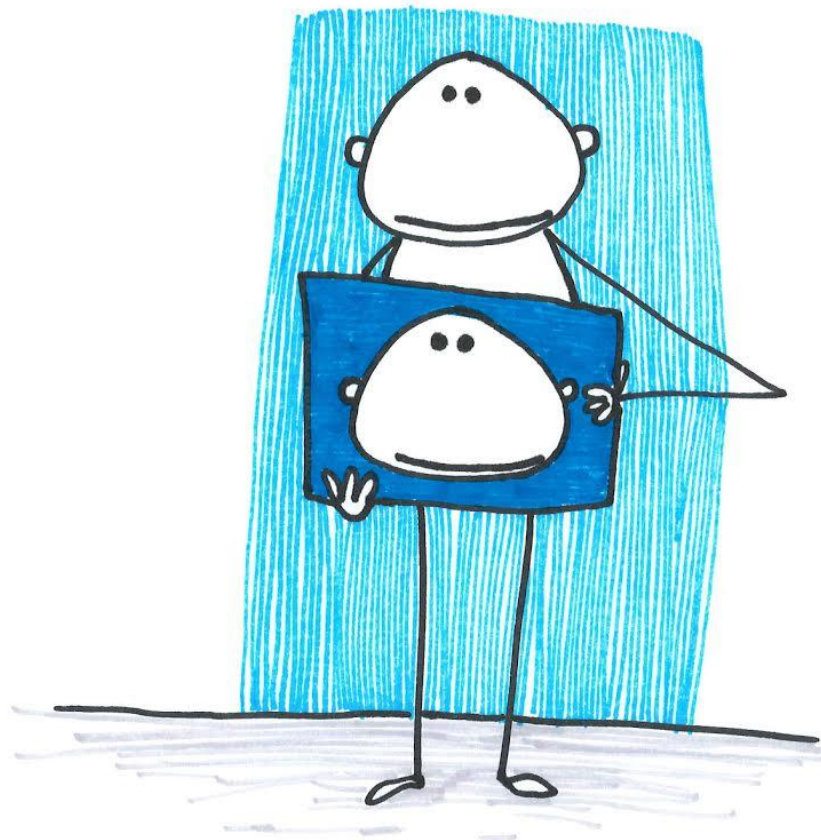
- What else?



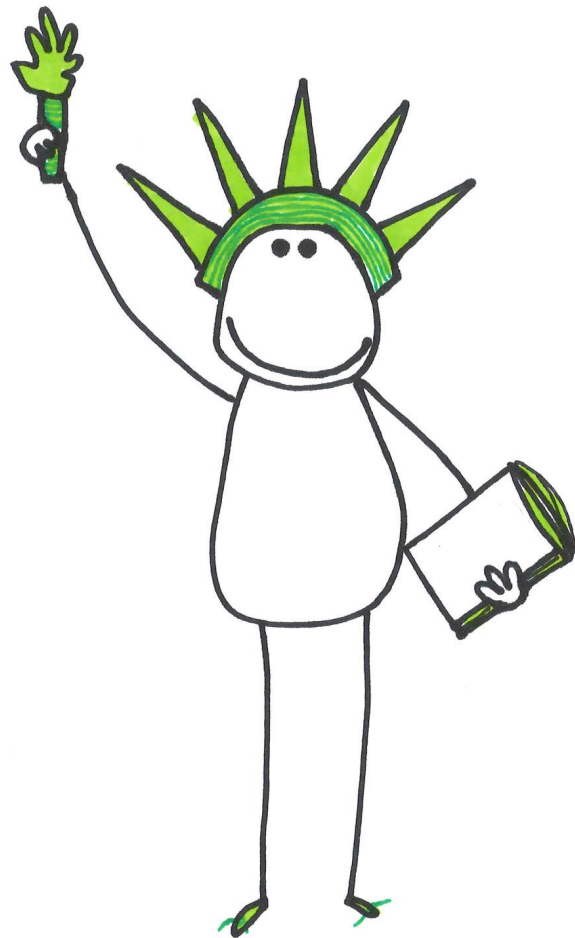
CFF2 generation

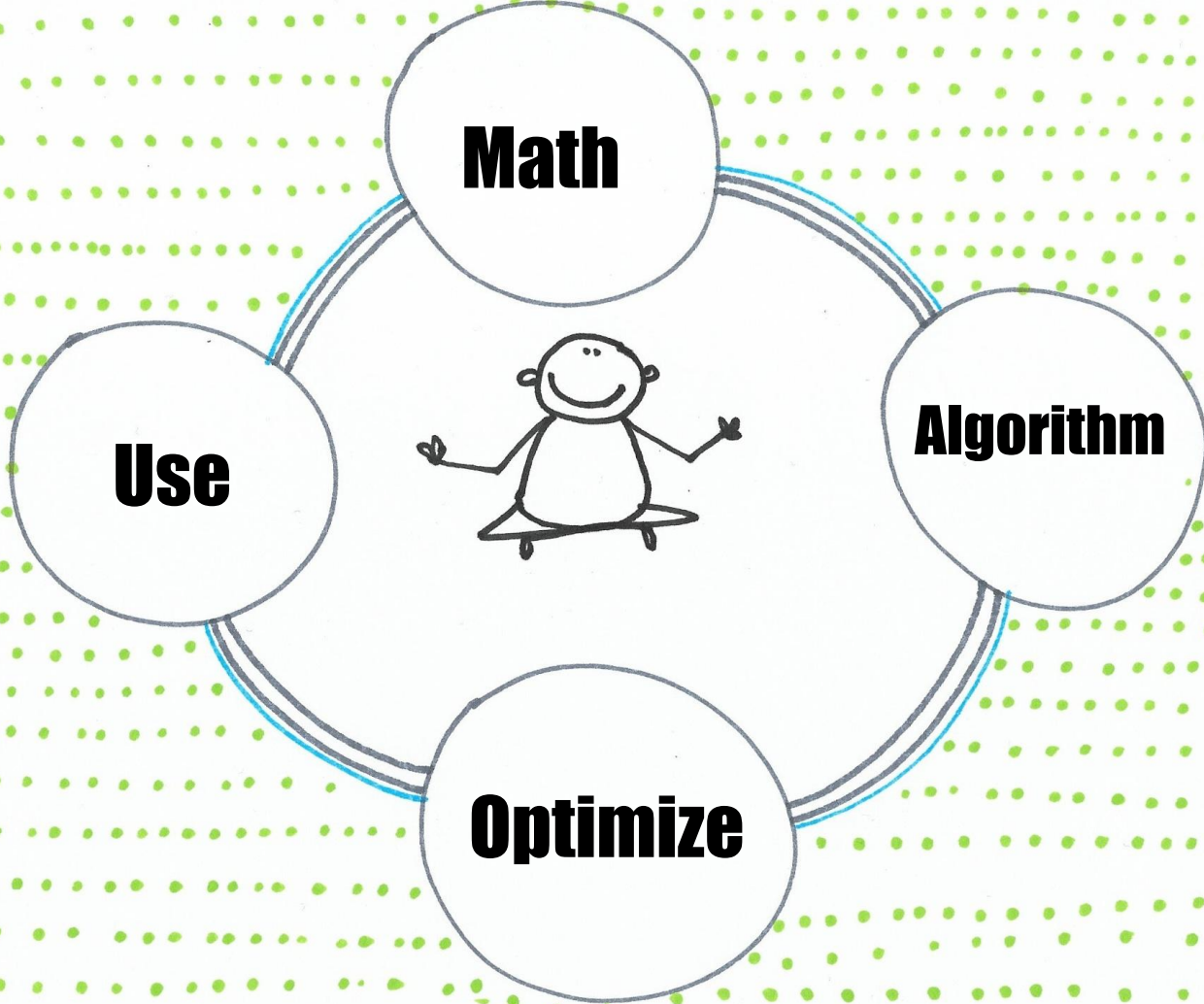
Remaining:

- Clean up CFF code
- Implement varLib
- Implement CFF→CFF2
- Implement in subsetter
- Implement in compreffor
- Implement in fontmake



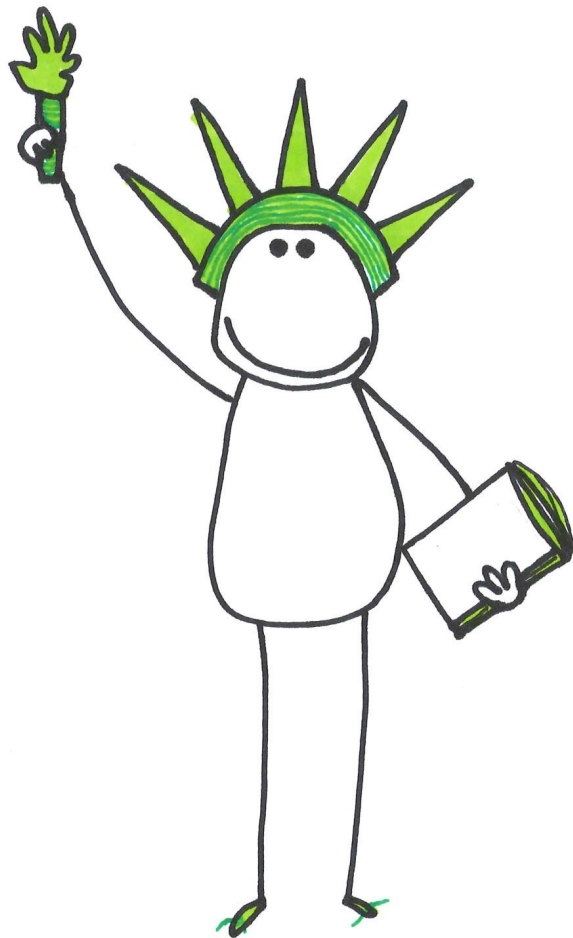
varLib.interpolatable

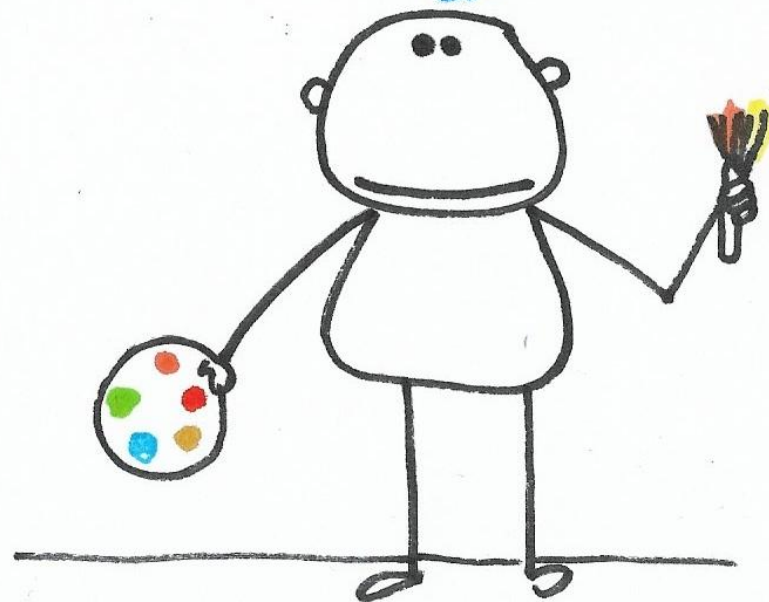




varLib.interpolatable

DEMO!





fontTools.pens

- RecordingPen
- TeePen
- PerimeterPen
- AreaPen
- StatisticsPen
- MomentsPen



**how I learned
to stop
worrying and
love the
integral**



$$\int F(t) \, dt$$

$$\int |B'(t)| \, dt$$

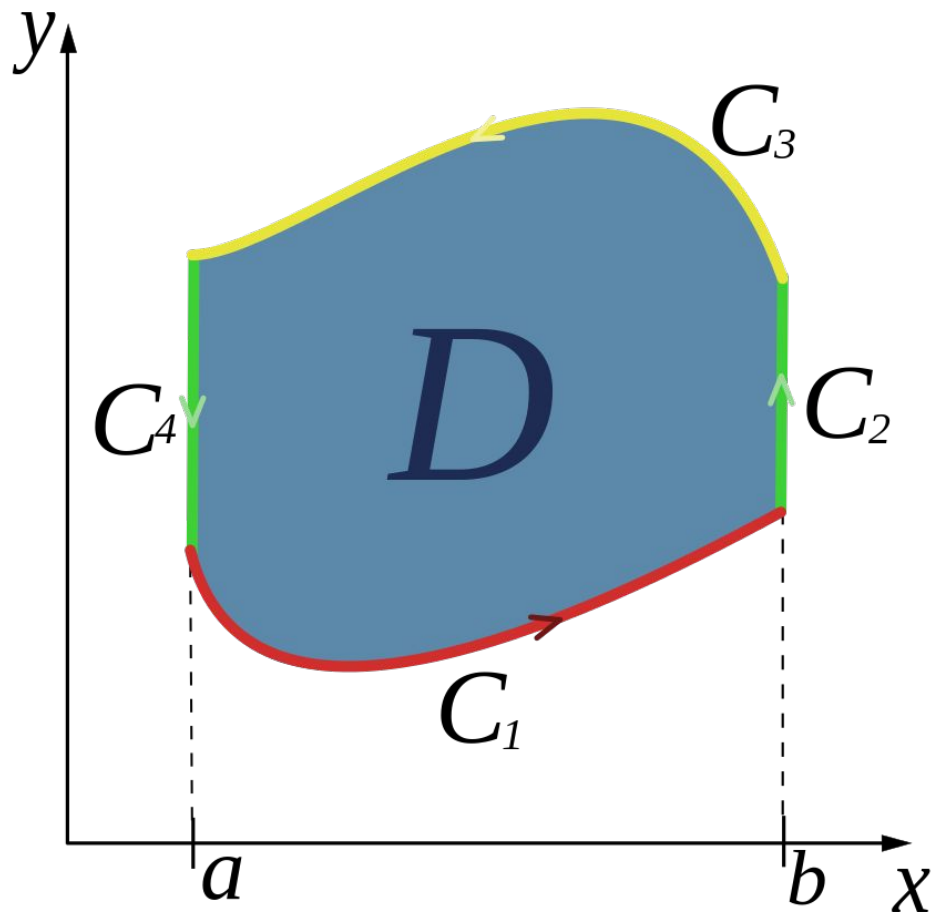
$$\int \sqrt{x^2 + y^2} \, dt$$

PerimeterPen

DEMO!

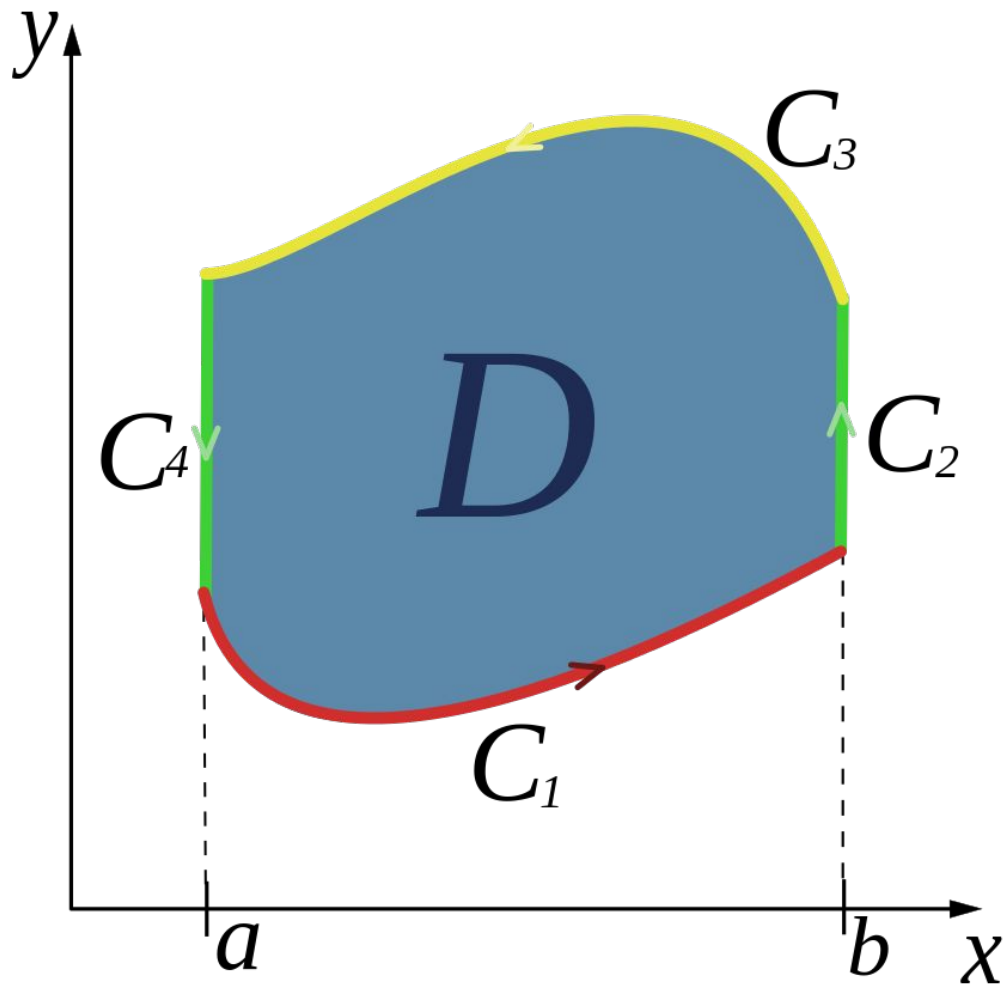


Green's Theorem



$$\oint_C (L \, dx + M \, dy) = \iint_D \left(\frac{\partial M}{\partial x} - \frac{\partial L}{\partial y} \right) \, dx \, dy$$

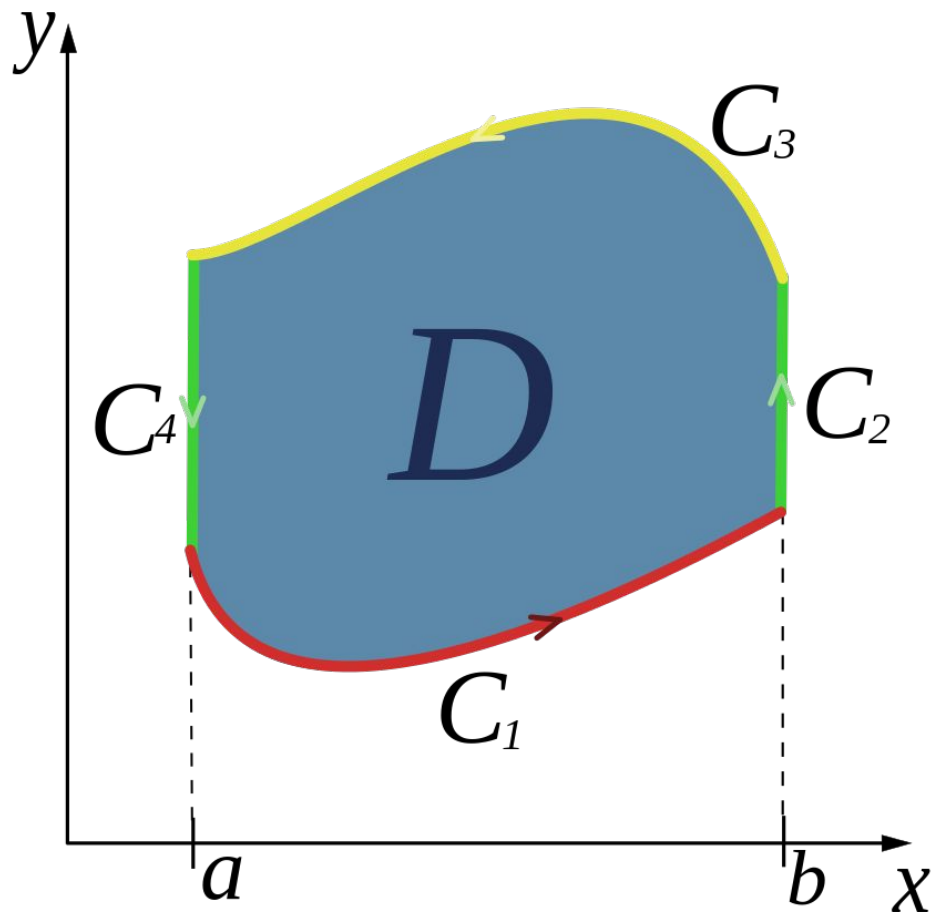
$$\oint_C L \, dx = \iint_D -\frac{\partial L}{\partial y} \, dx \, dy$$



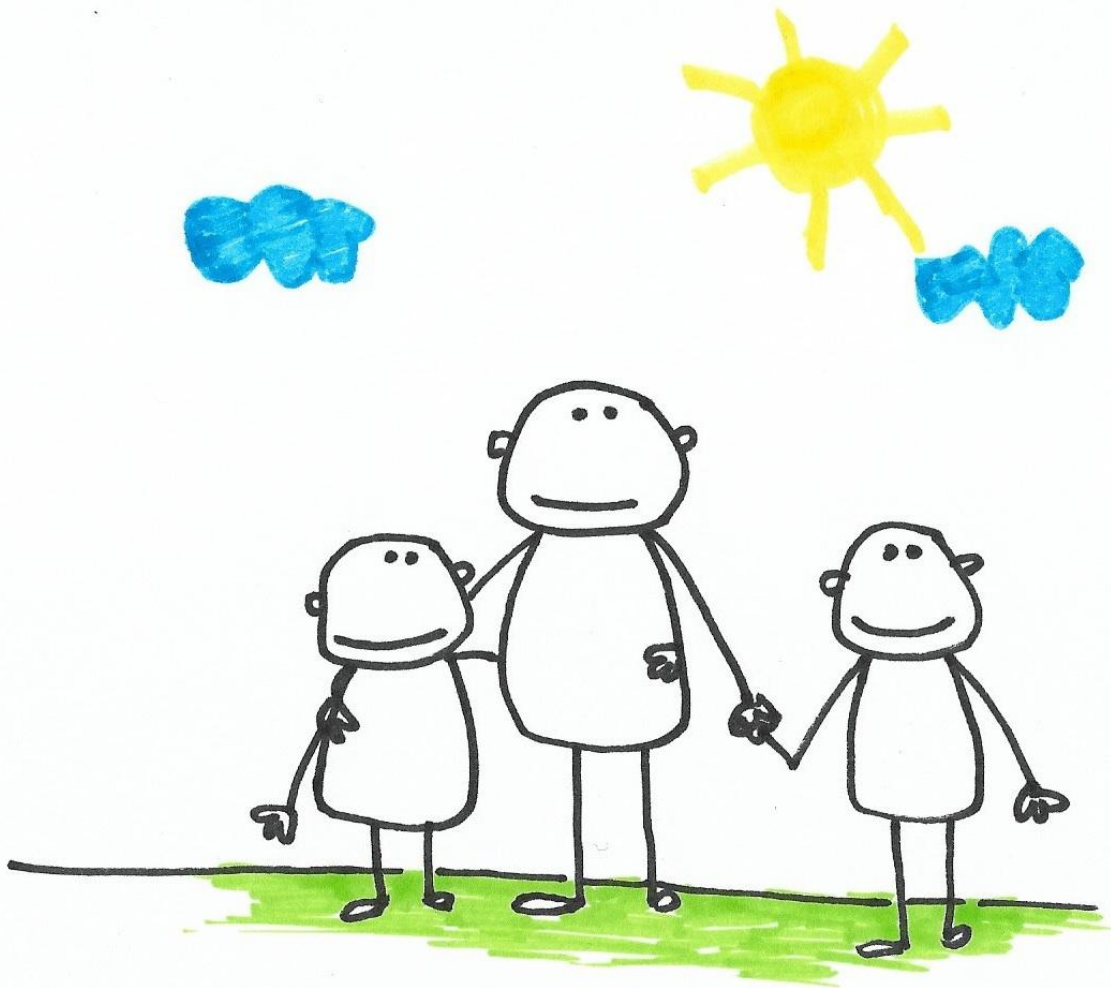
$$\oint_C L \, dx = \iint_D -\frac{\partial L}{\partial y} \, dx \, dy$$

Green's Theorem

DEMO!



**Thank
you!**

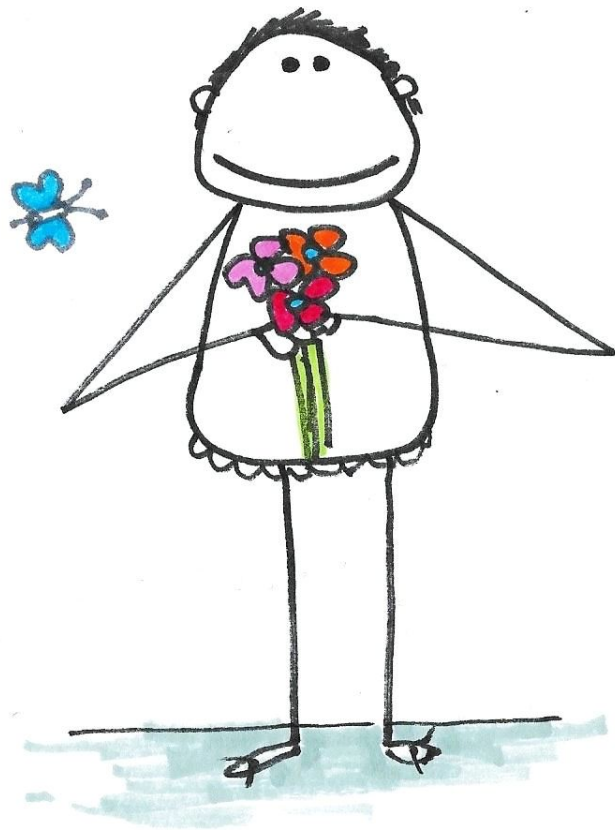


Cuteness

Shimana Sadeghi



Qq



FontTools & Chrome & Math Variations

Behdad Esfahbod | behdad@google.com

Dominik Röttsches | drott@google.com

TYPO Labs 2017 ([video](#))