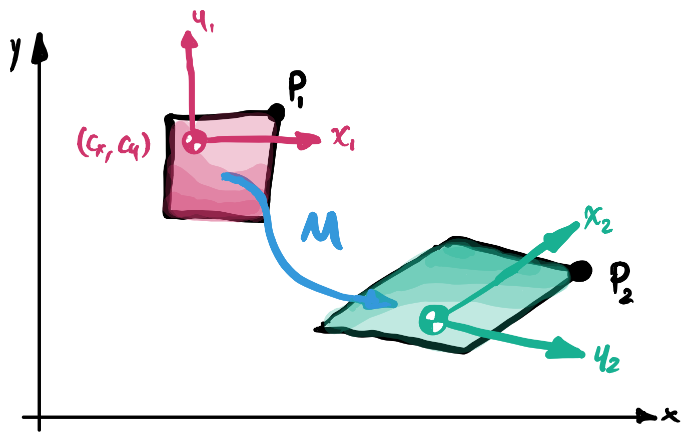
If we have an affine transform, we can decompose it into a number of transforms, to keep things general, we select a transformation origin (c_x, c_y) to rotate the object around. So we have:



Now we would like to express the matrix M in terms of a set of affine transforms, so we should be able to write

$$M = T\,R\,S\,\Gamma$$

$$T(T_x, T_y) = \begin{bmatrix} 1 & 0 & T_x \\ 0 & 1 & T_y \\ 0 & 0 & 1 \end{bmatrix}$$

$$R(\theta, c_x, c_y) = C^{-1} \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} C$$

$$S(s_x, s_y, c_x, c_y) = C^{-1} \begin{bmatrix} S_x & 0 & 0 \\ 0 & S_y & 0 \\ 0 & 0 & 1 \end{bmatrix} C$$

$$\Gamma(\lambda_x, \lambda_y, c_x, c_y) = C^{-1} \begin{bmatrix} 1 & \lambda_x & 0 \\ \lambda_y & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} C$$

Define a matrix to move our center to the origin so that:

$$C = \begin{bmatrix} 1 & 0 & -c_x \\ 0 & 1 & -c_y \\ 0 & 0 & 1 \end{bmatrix}$$

Now if we are careful, we notice two direct representations for the matrix M. Note that I've used the fact that $CC^{-1}=I$ between R and S and also between S and Γ:

$$M = \underbrace{\begin{bmatrix} 1 & 0 & T_x \\ 0 & 1 & T_y \\ 0 & 0 & 1 \end{bmatrix}}_{T} \underbrace{\begin{bmatrix} 1 & 0 & C_x \\ 0 & 1 & C_y \\ 0 & 0 & 1 \end{bmatrix}}_{C^{-1}} \underbrace{\begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{R} \underbrace{\begin{bmatrix} S_x & 0 & 0 \\ 0 & S_y & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{S} \underbrace{\begin{bmatrix} 1 & \lambda_x & 0 \\ \lambda_y & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{\Gamma} \underbrace{\begin{bmatrix} 1 & 0 & -C_x \\ 0 & 1 & -C_y \\ 0 & 0 & 1 \end{bmatrix}}_{C}$$

Lets do some multiplying: (define $C_\theta = \cos\theta$ $S_\theta = \sin\theta$)

$$M = \underbrace{\begin{bmatrix} 1 & 0 & T_x+C_x \\ 0 & 1 & T_y+C_y \\ 0 & 0 & 1 \end{bmatrix}}_{TC^{-1}} \underbrace{\begin{bmatrix} S_xC_\theta & -S_yS_\theta & 0 \\ S_xS_\theta & S_yC_\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}}_{RS} \underbrace{\begin{bmatrix} 1 & \lambda_x & -C_x-C_y\lambda_x \\ \lambda_y & 1 & -C_x\lambda_y-C_y \\ 0 & 0 & 1 \end{bmatrix}}_{\Gamma C}$$

Now is the time to make a critical observation:

$$M = \begin{bmatrix} a & c & e \\ b & d & f \\ 0 & 0 & 1 \end{bmatrix} \leftarrow$$ there are six degrees of freedom here:

we are proposing to have seven degrees of freedom here.

But:
$$M = T(T_x, T_y)\, C^{-1}(C_x, C_y)\, R(\theta)\, S(S_x, S_y)\, \Gamma(\lambda_x, \lambda_y)\, C(C_x, C_y)$$

So we have ● - free ● - fixed ● - extra.

Since it seems that we are proposing seven degrees of freedom, we must fix at least one of them based on our taste. I think few people will be skewing svgs constantly so we should fix $\lambda_y = 0$. whilst this choice is arbitrary, it should work well in practice.

Now we can apply this simplification to our matrix, and continue multiplying it out:

$$M = \underbrace{\begin{bmatrix} S_x C_\theta & -S_y S_\theta & T_x + C_x \\ S_x S_\theta & S_y C_\theta & T_y + C_y \\ 0 & 0 & 1 \end{bmatrix}}_{TC^{-1}RS} \underbrace{\begin{bmatrix} 1 & \lambda_x & -C_x - C_y \lambda_x \\ 0 & 1 & -C_y \\ 0 & 0 & 1 \end{bmatrix}}_{\Gamma C}$$

Now:

$$M = \begin{bmatrix} S_x C_\theta & \lambda S_x C_\theta - S_y S_\theta & C_x - C_x C_\theta S_x - C_y(\lambda C_\theta S_x - S_\theta S_y) + T_x \\ S_x S_\theta & \lambda S_x S_\theta + S_y C_\theta & C_y - C_x S_\theta S_x - C_y(\lambda S_\theta S_x + C_\theta S_y) + T_y \\ 0 & 0 & 1 \end{bmatrix}$$

So we can directly write that

$$a = S_x C_\theta$$
$$b = S_x S_\theta$$
$$c = \lambda \overset{a}{S_x C_\theta} - S_y S_\theta$$
$$d = \lambda \overset{b}{S_x S_\theta} + S_y C_\theta$$
$$e = C_x - C_x C_\theta S_x - C_y(\lambda C_\theta S_x - S_\theta S_y) + T_x$$
$$f = C_y - C_x S_\theta S_x - C_y(\lambda S_\theta S_x - C_\theta S_y) + T_y$$

But we want

$(T_x, T_y, \theta, s_x, s_y, \lambda_x)$

so lets solve them

Solving for S_x and θ:

$$a^2 + b^2 = S_x^2 (C_\theta^2 + S_\theta^2) = S_x^2 \longrightarrow \boxed{S_x = \sqrt{a^2 + b^2}}$$

$$\frac{b}{a} = \tan(\theta) \longrightarrow \boxed{\theta = \operatorname{atan2}(b, a)}$$

Now we solve for λ

$$c C_\theta = \lambda a C_\theta - S_y C_\theta S_\theta$$
$$d S_\theta = \lambda b S_\theta + S_y C_\theta S_\theta \quad \oplus$$
$$\overline{c C_\theta + d S_\theta = \lambda(a C_\theta + b S_\theta)} \longrightarrow \boxed{\lambda = \frac{c C_\theta + d S_\theta}{a C_\theta + b S_\theta}}$$

Now for S_y:

$$S_y^2 s_\theta^2 + S_y^2 c_\theta^2 = S_y^2 = (a\lambda - c)^2 + (d - b\lambda)^2$$

$$\boxed{\therefore \quad S_y = \sqrt{(a\lambda - c)^2 + (d - b\lambda)^2}}$$

Now for T_x and T_y:

$$e = C_x - C_x c_\theta S_x - C_y(\lambda c_\theta S_x - s_\theta S_y) + T_x$$
$$f = C_y - C_x s_\theta S_x - C_y(\lambda s_\theta S_x + c_\theta S_y) + T_y$$

$$T_x = e - C_x + C_x c_\theta S_x + C_y(\lambda c_\theta S_x - s_\theta S_y)$$

$$T_y = f - C_y + C_x s_\theta S_x + C_y(\lambda s_\theta S_x + c_\theta S_y)$$

Proof Complete.