Structure of Individuals

- Individual space

$$I = I\!R^n \times \mathcal{S}$$

- Strategy parameters

$$\mathcal{S} = I\!R_+^{n_\sigma} \times [-\pi, \pi]^{n_\alpha}$$

$$\vec{a} = (\underbrace{(x_1, \ldots, x_n)}_{\vec{x}}, \underbrace{(\sigma_1, \ldots, \sigma_{n_\sigma})}_{\vec{\sigma}}, \underbrace{(\alpha_1, \ldots, \alpha_{n_\alpha})}_{\vec{\alpha}}) \in I$$

$\vec{x}$: Object variables $\Rightarrow$ Fitness $f(\vec{x})$
$\vec{\sigma}$: Standard deviations $\Rightarrow$ Variances
$\vec{\alpha}$: Rotation angles $\Rightarrow$ Covariances

n_σ	n_α	Remark
1	0	standard mutations
n	0	standard mutations
n	$n \cdot (n-1)/2$	correlated mutations
$1 \leq n_\sigma \leq n$	$(n - \frac{n_\alpha}{2})(n_\sigma - 1)$	general case (correlated mutations)

Table 1: Possible settings of n_σ and n_α.

- If $1 < n_\sigma < n$: All x_i $(i > n_\sigma)$ are mutated according to σ_{n_σ}.
- E.g.: $n_\sigma = 2$, $n_\alpha = n - 1$ facilitates learning of one preference direction.