intro sur l'ACP

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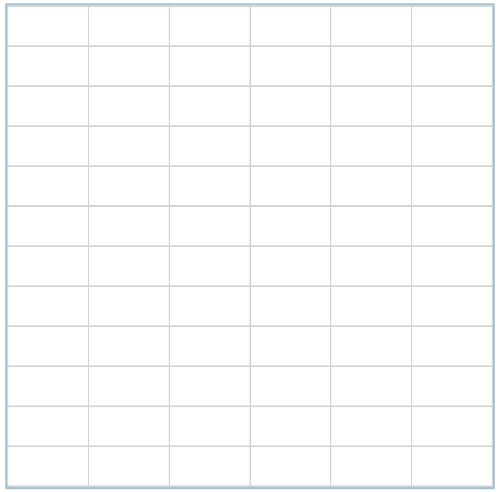
Le problème



données "brutes"
(p x k)

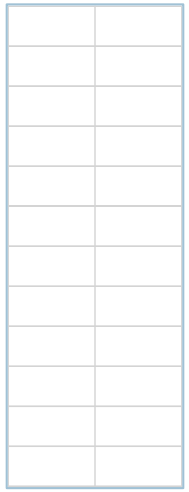
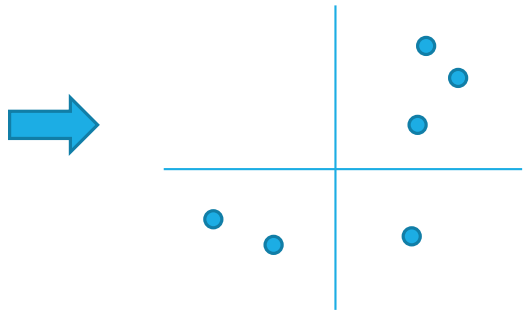
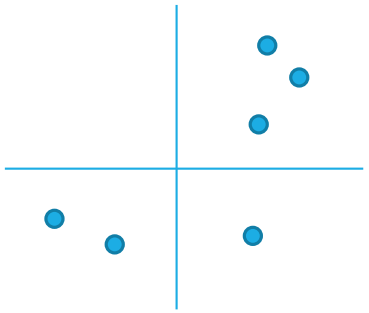
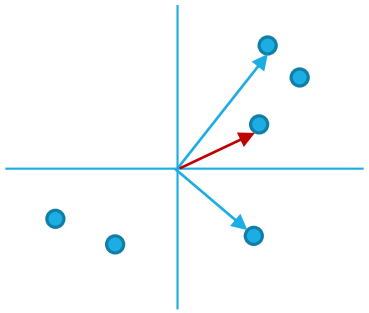


tableau "souhaité"
(p x 2)



1 point = 1 vecteur





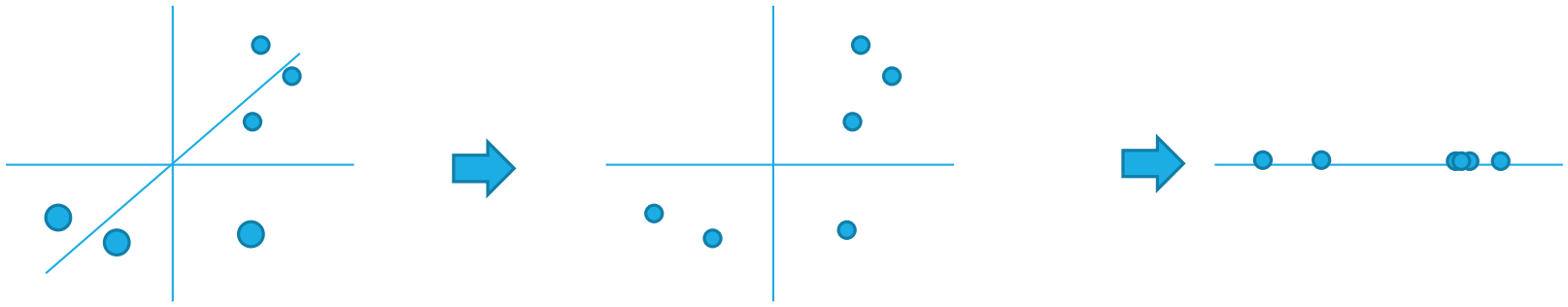
x	y
2	1
2	4

notation

$$\begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

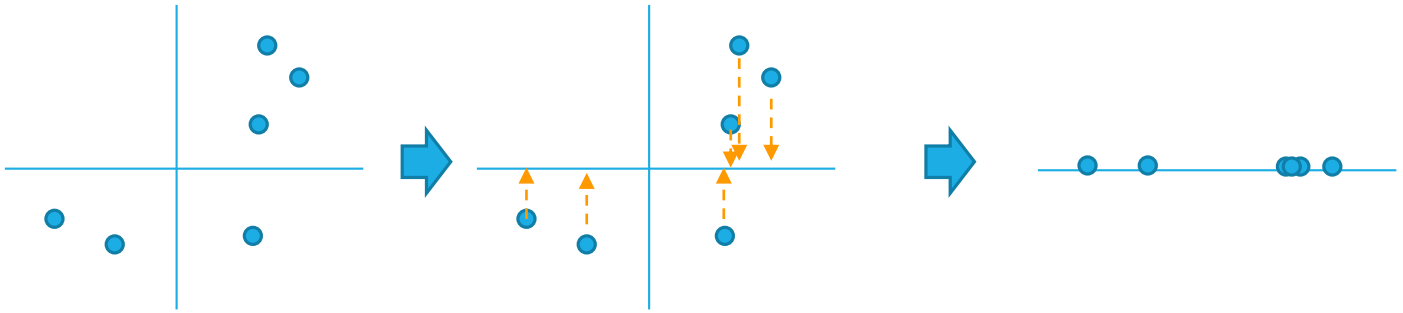
solution simple…

Réduction de dimension



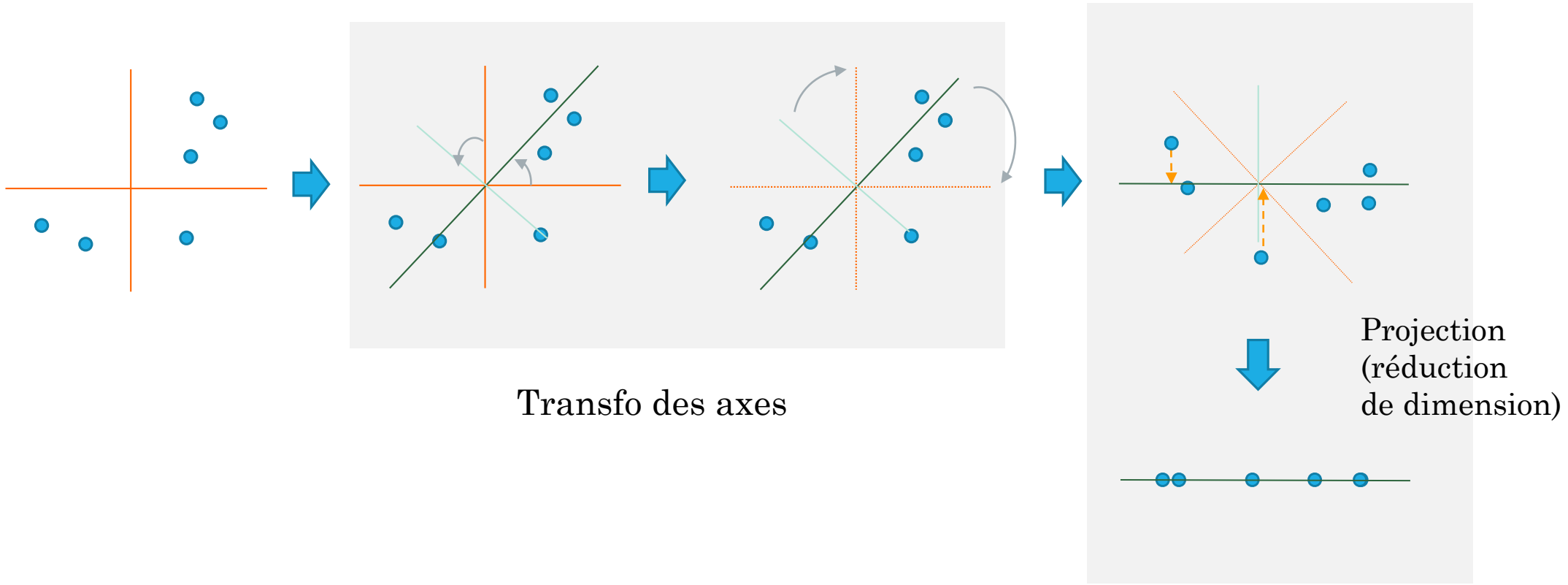
3D 2D 1D

Réduction de dim 2D -> 1D

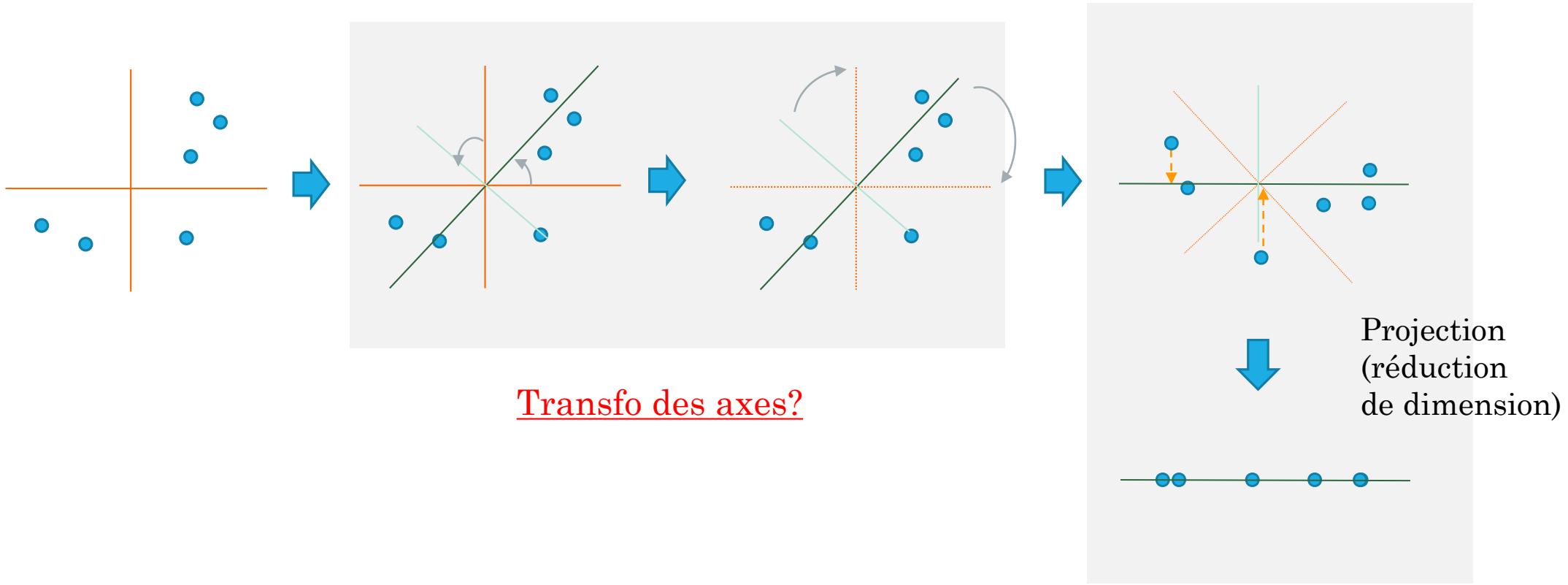


solution simple…

2D -> 1D version acp



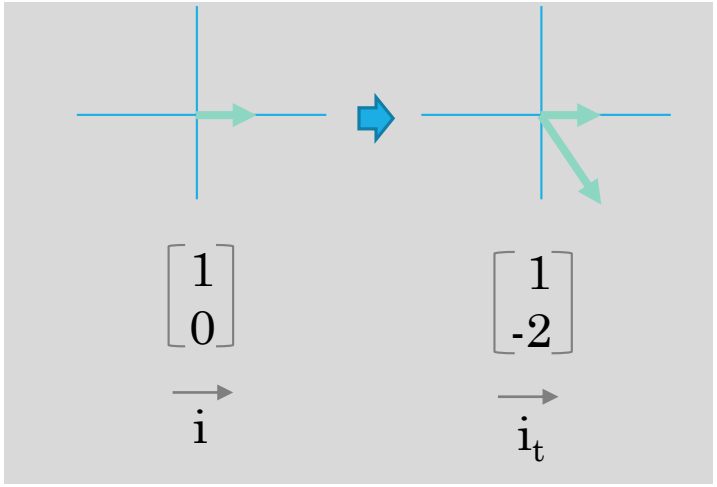
comment trouver la transfo?



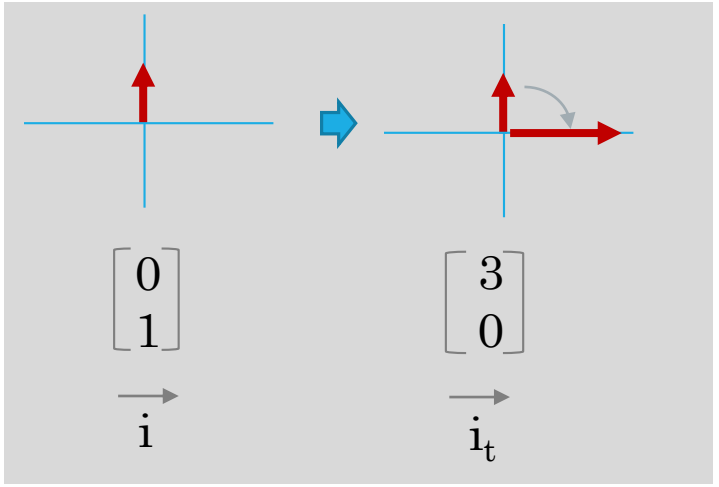
Transfo des axes?

Transformation = multiplication matricielle

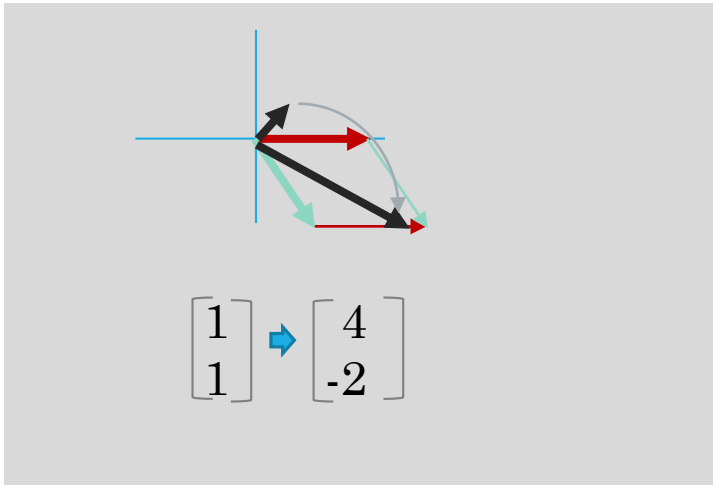
transfo axe 1



transfo axe 2



Transfo totale

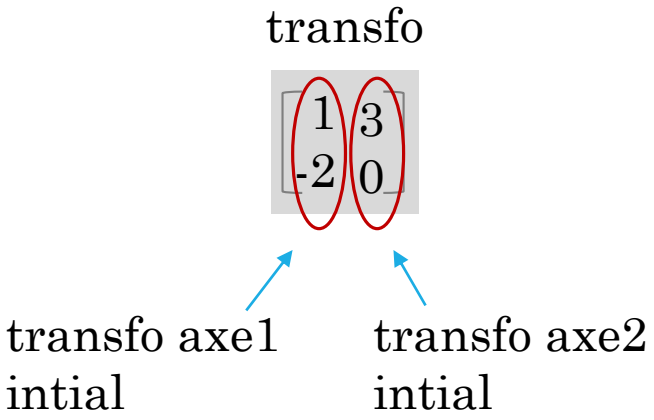


$\vec{i}.\begin{bmatrix}1\\-2\end{bmatrix} + \vec{j}.\begin{bmatrix}3\\0\end{bmatrix}$

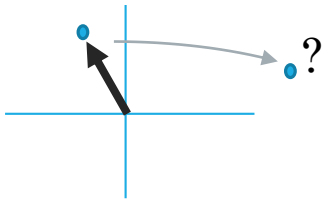
$$\begin{bmatrix}1 & 3\\-2 & 0\end{bmatrix}\begin{bmatrix}1\\1\end{bmatrix} = \begin{matrix}1*1 + 3*1\\-2*1 + 0*1\end{matrix} = \begin{bmatrix}4\\-2\end{bmatrix}$$

transfo x $\vec{Y}$ $\vec{Y_t}$

interprétation



Application d'une transfo sur un vecteur quelconque

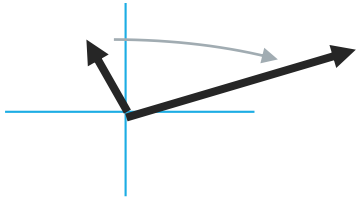


transfo

$$\begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix}$$

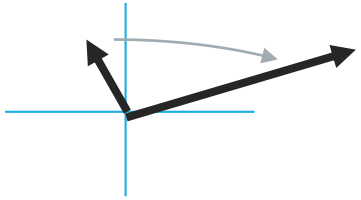
$$\begin{bmatrix} -1 \\ 2 \end{bmatrix} \text{ x transfo } = \quad ?$$

Application d'une transfo



$$\begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix} \begin{bmatrix} -1 \\ 2 \end{bmatrix} =$$

Application d'une transfo

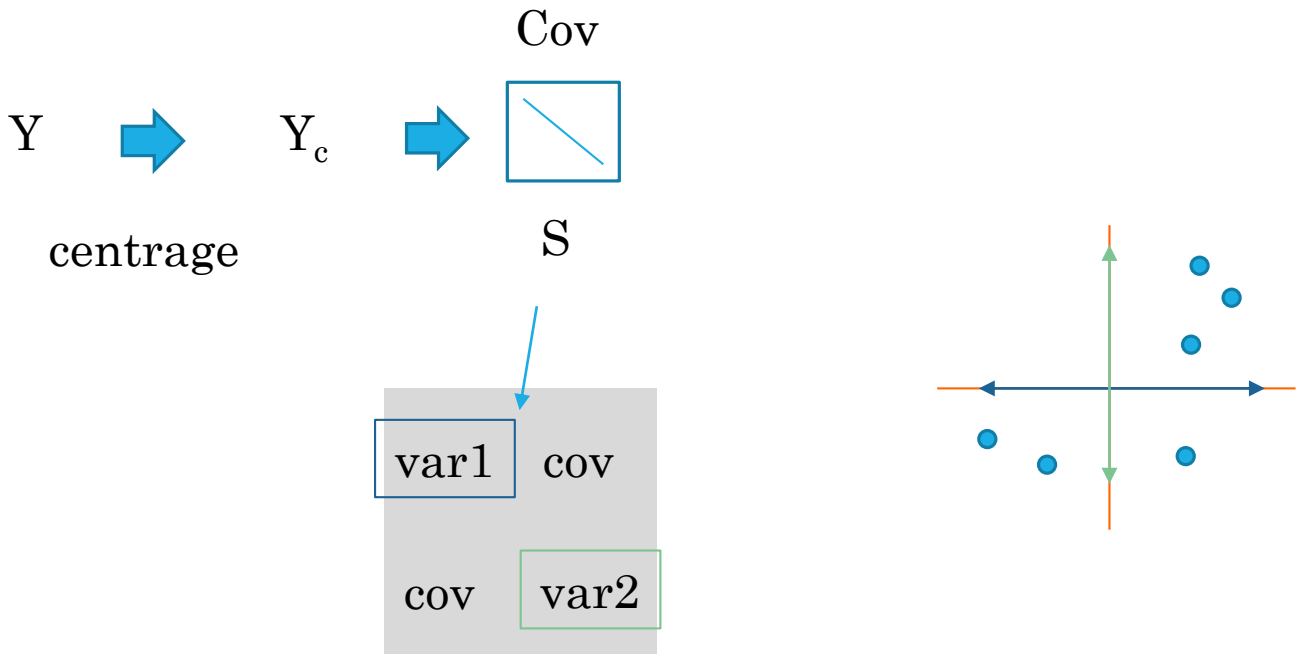


$$\begin{bmatrix} 1 & 3 \\ -2 & 0 \end{bmatrix} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{matrix} 1*-1 + 3*2 \\ -2*-1 + 0*2 \end{matrix} = \begin{bmatrix} 5 \\ -2 \end{bmatrix}$$

```
> matrix(c(1,-2,3,0),2,2)%*%c(-1,2)
     [,1]
[1,]    5
[2,]    2
```

Comment trouver la matrice de transfo pour l'acp?

- On décompose la matrice de variance covariance des données centrées



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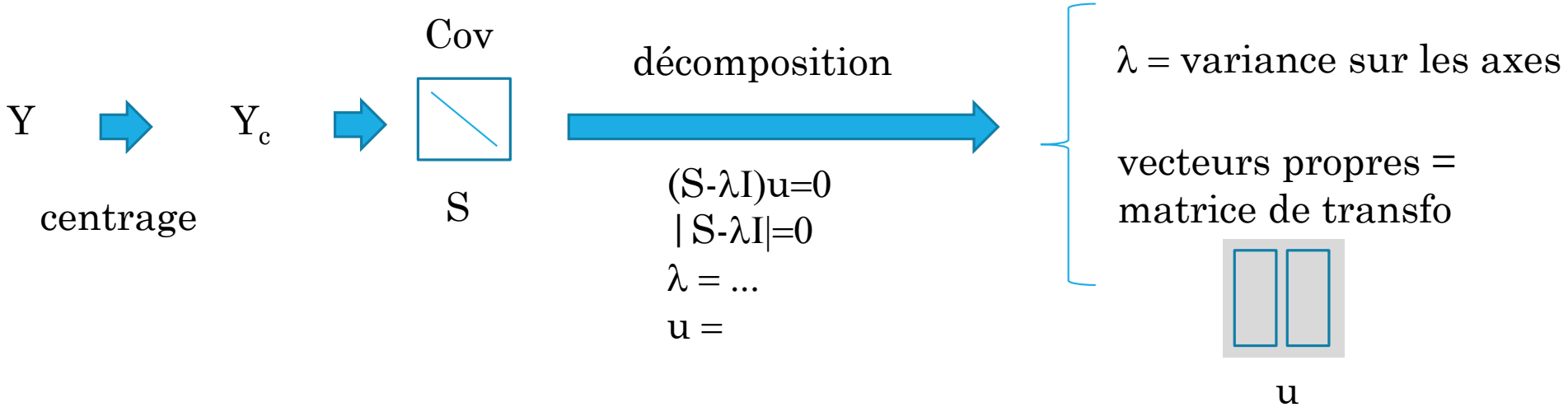
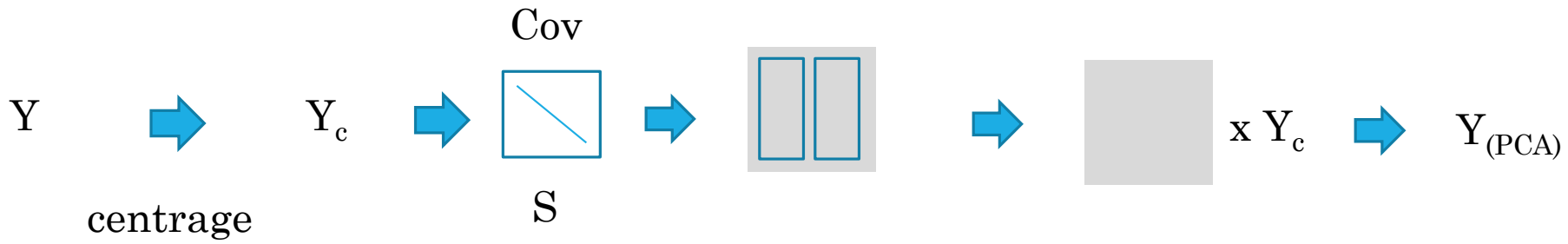
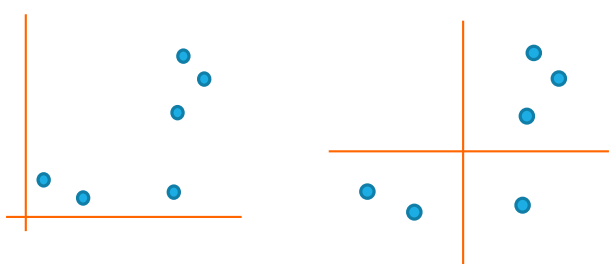
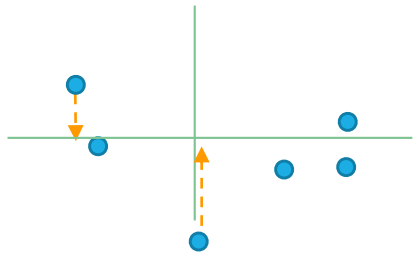


ACP

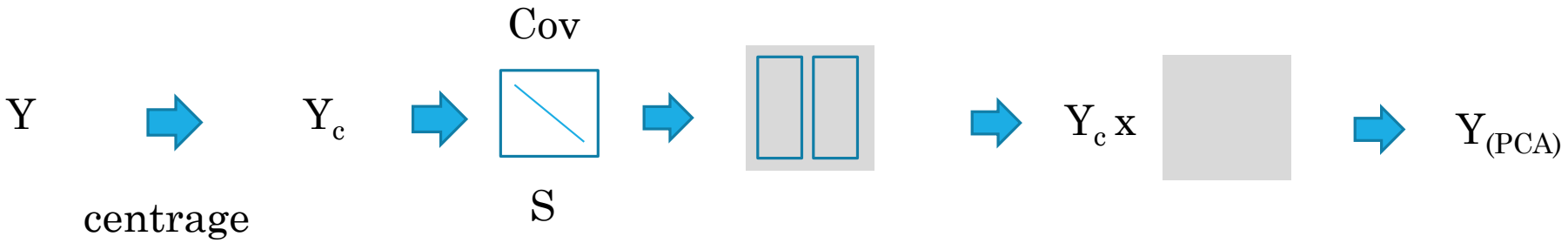
- On décompose la matrice de variance covariance des données centrées







ACP



`scale(scale =F)` `cov()` `eigen()` `Yc %*% S` `plot()`