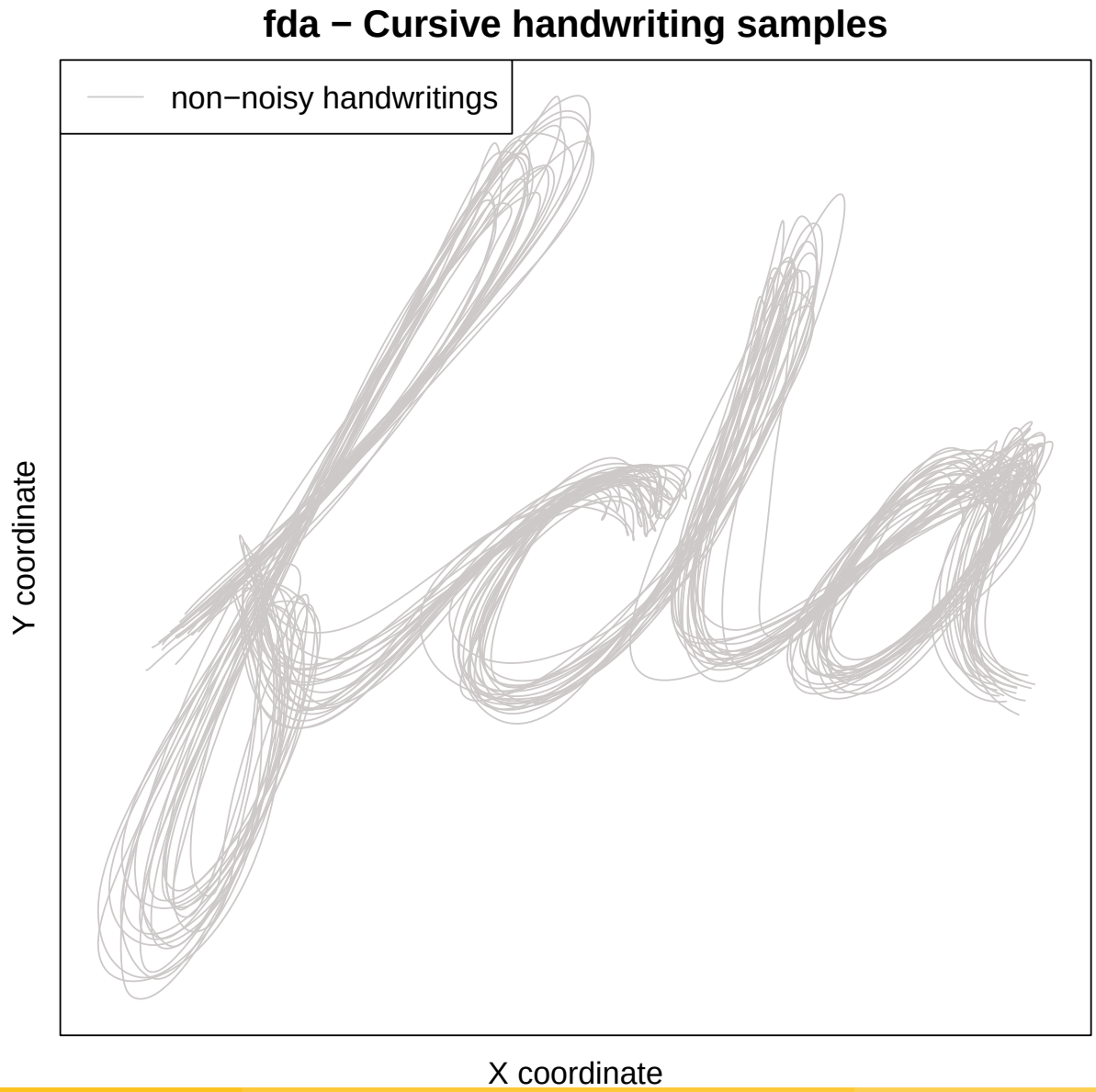
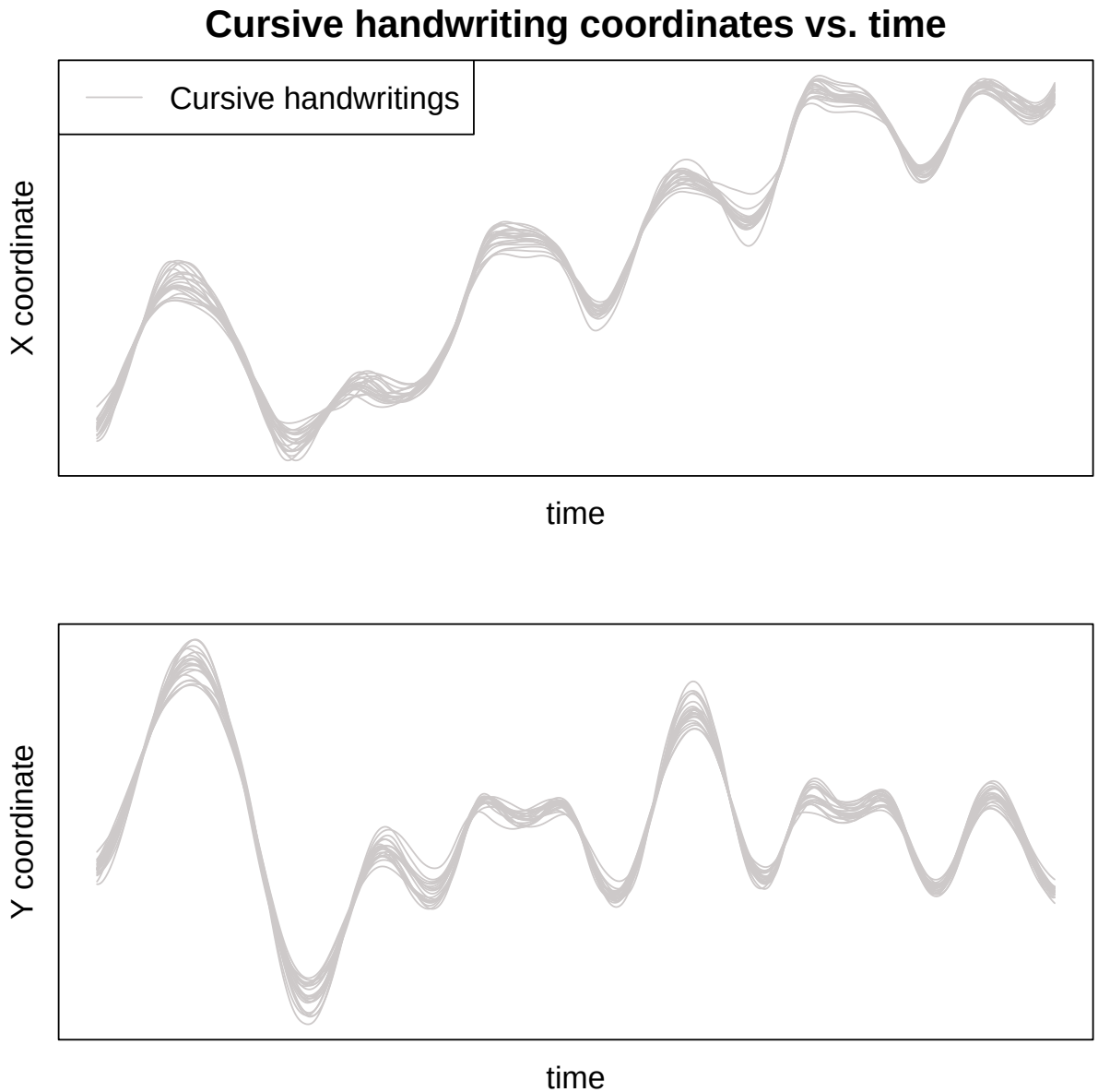
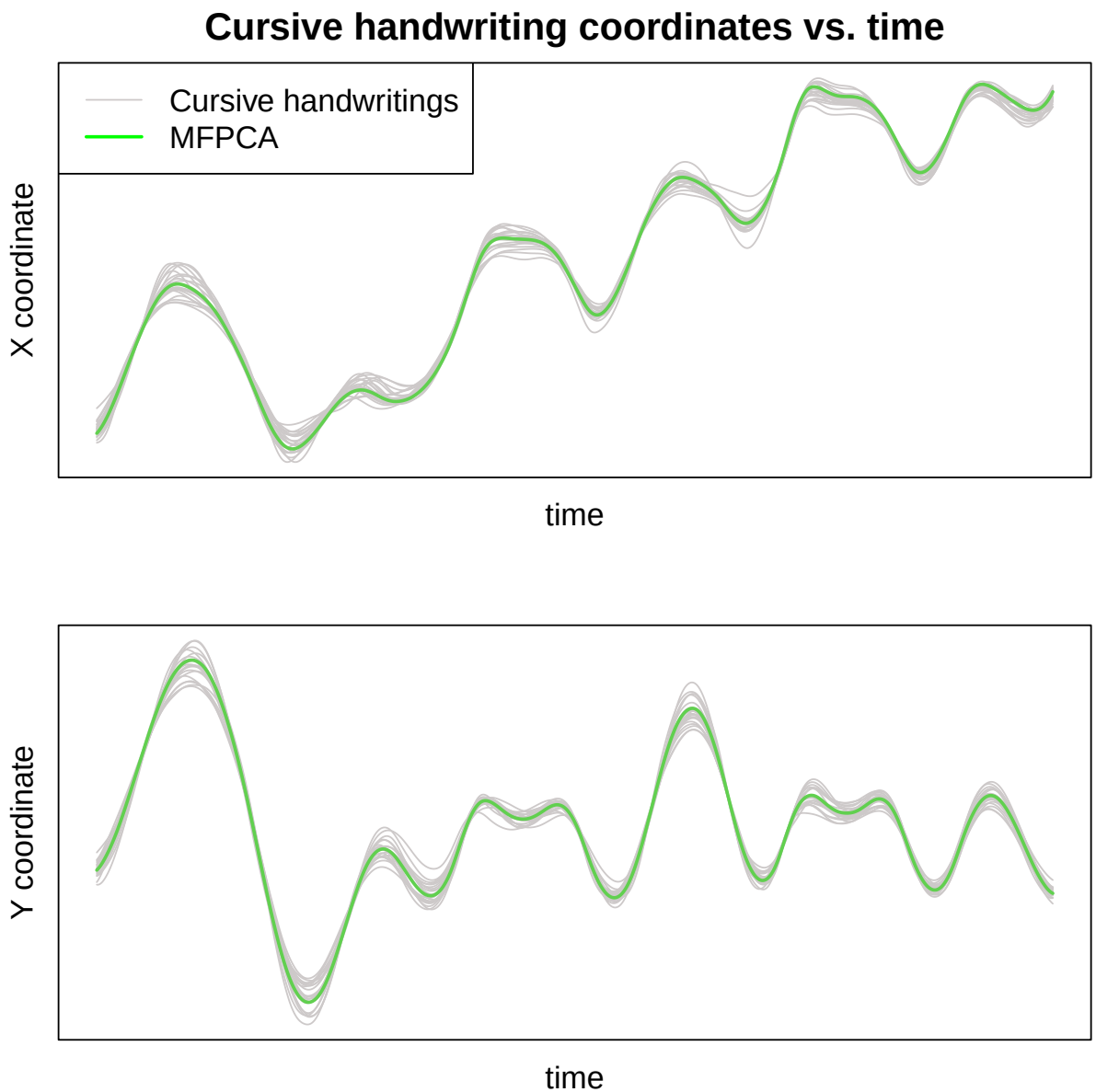
Motivating Example: Cursive Handwriting



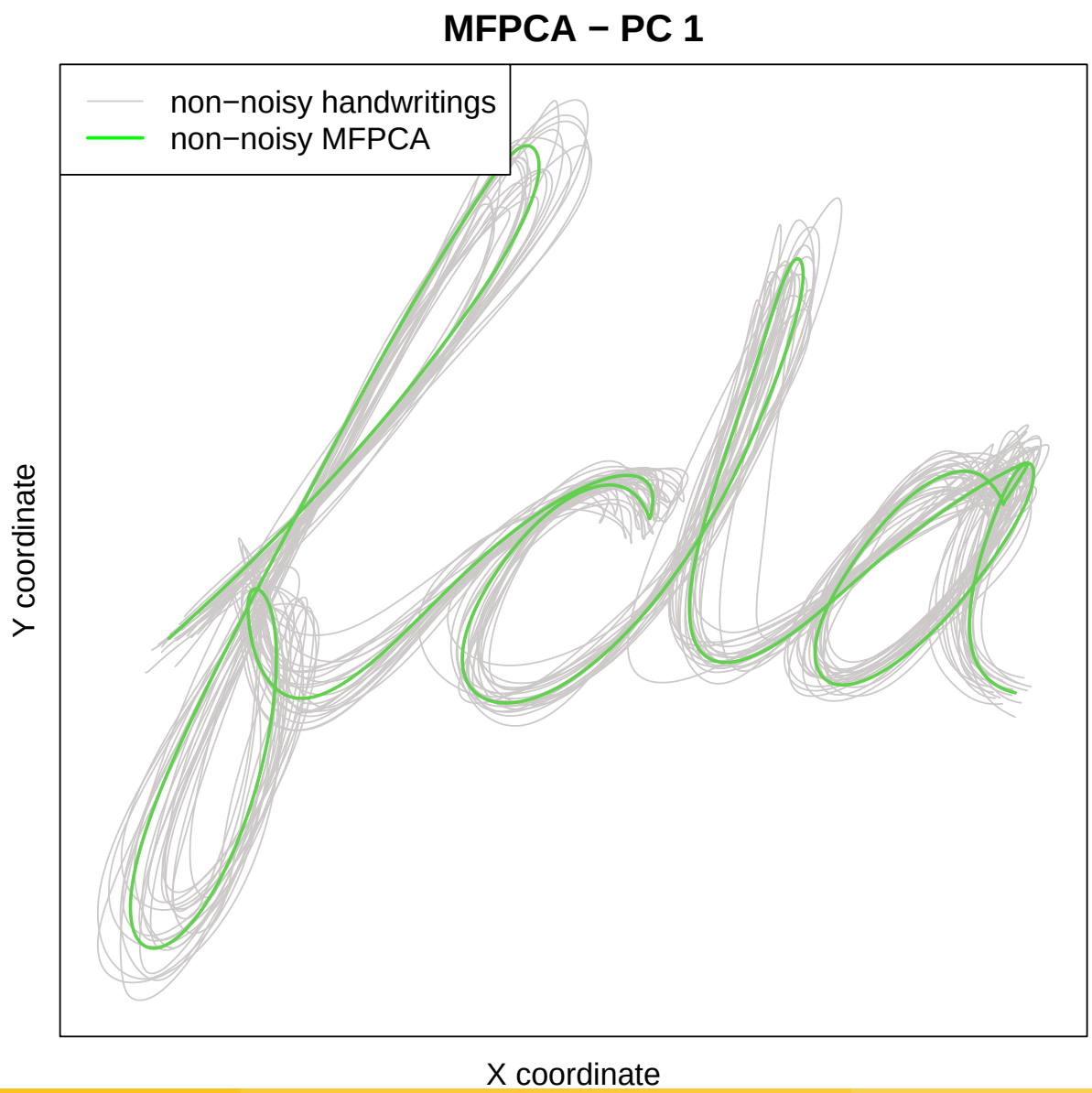
Motivating Example: Cursive Handwriting



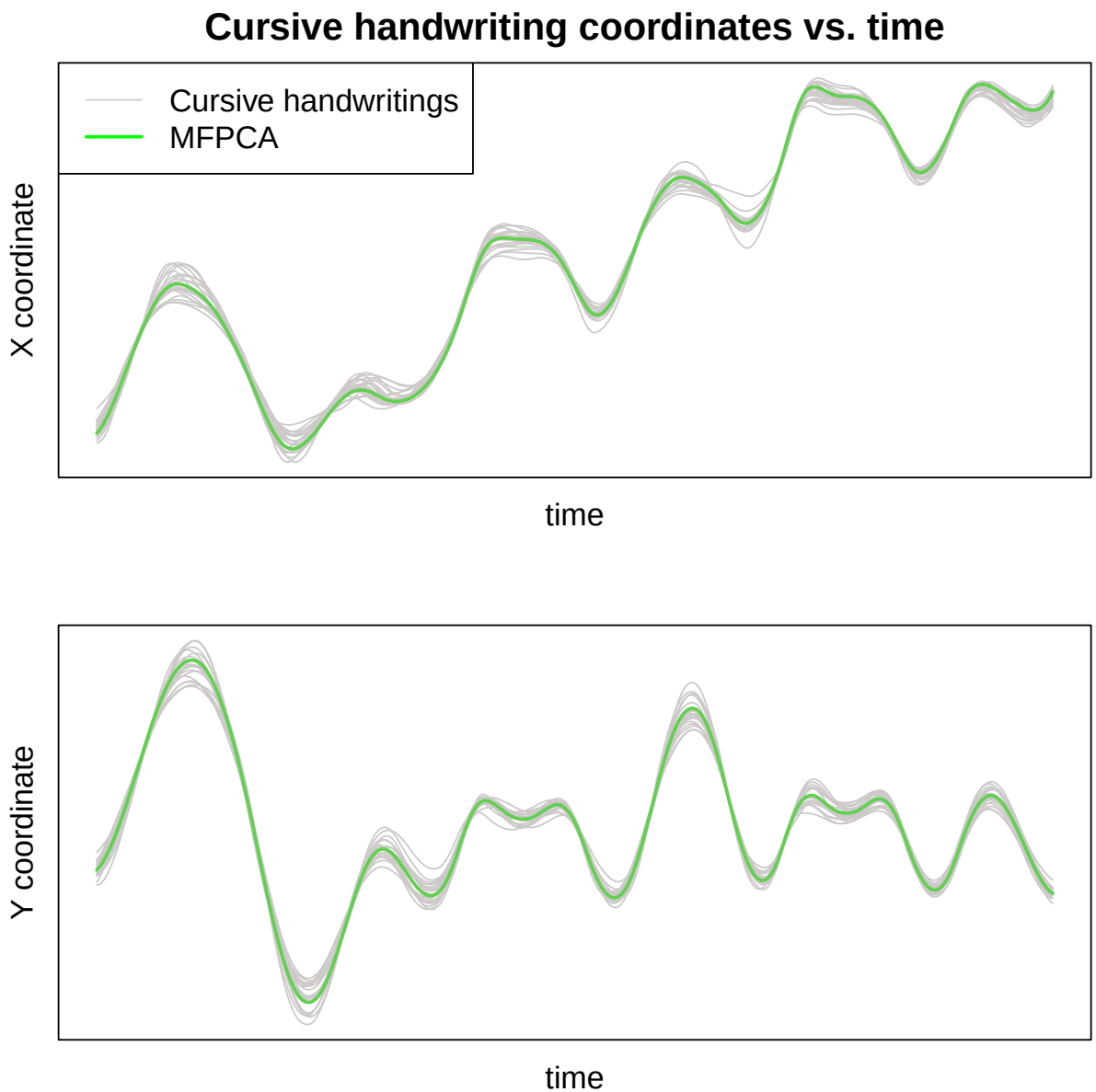
Motivating Example: Cursive Handwriting



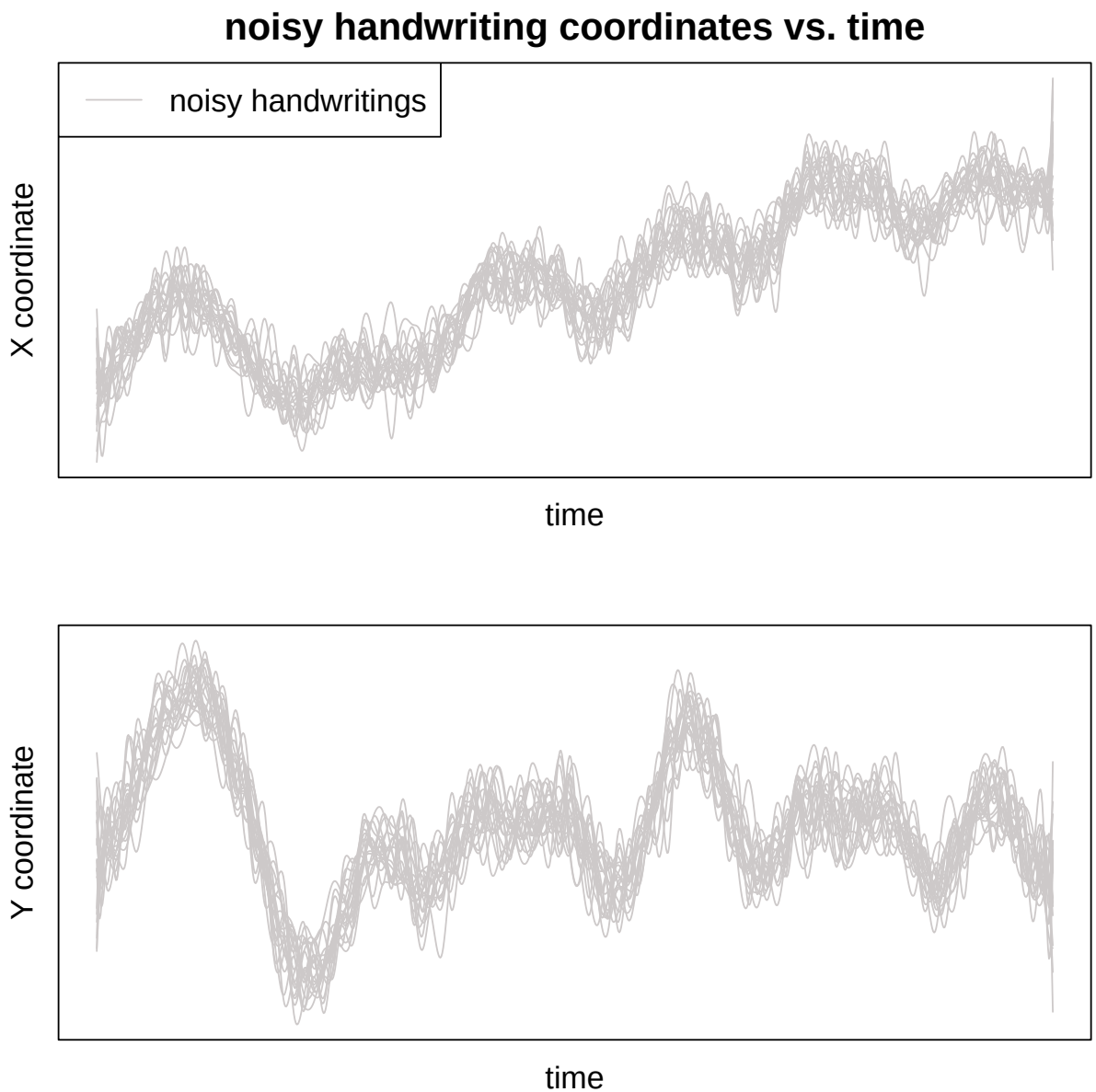
Motivating Example: Cursive Handwriting



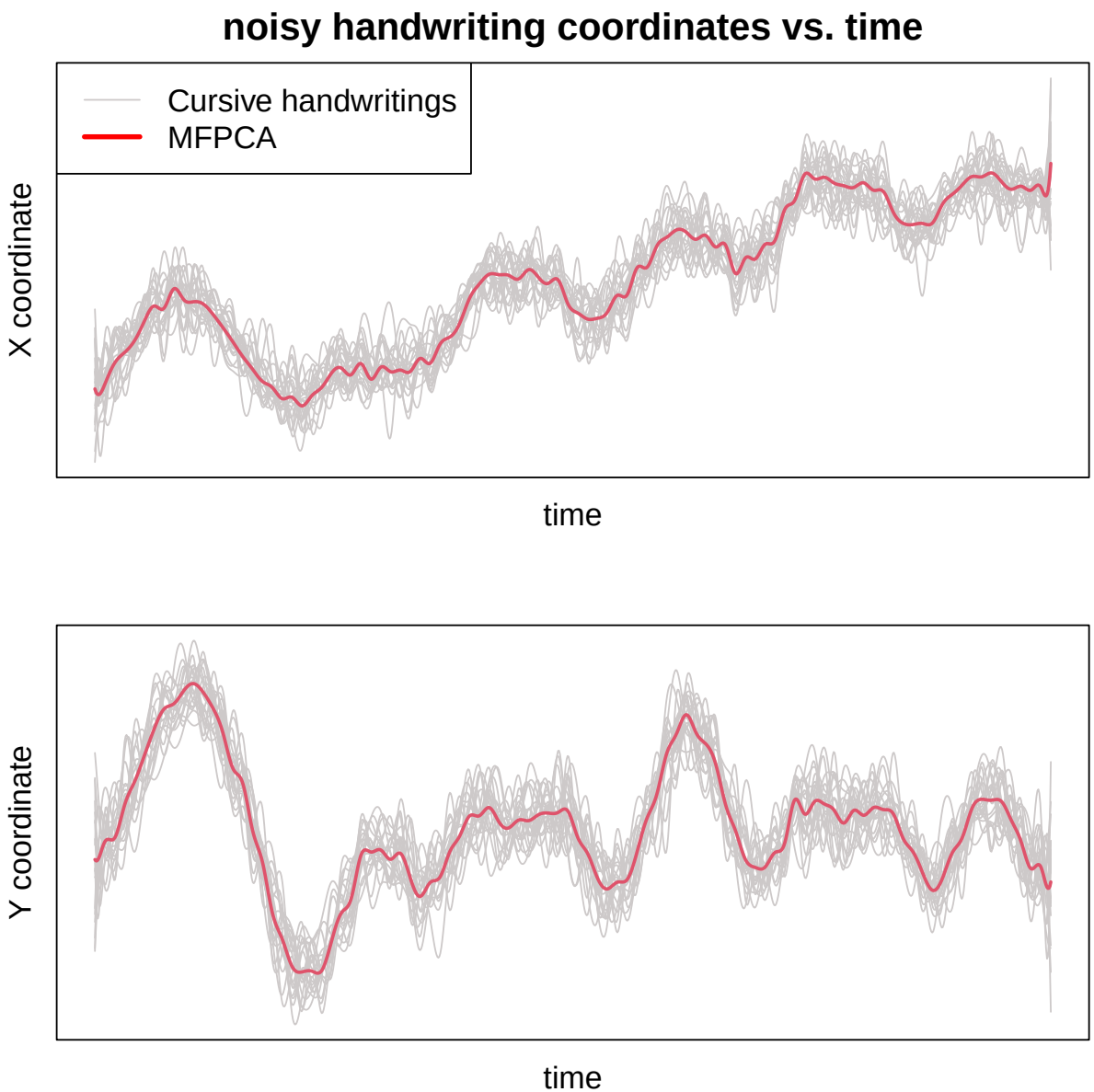
Motivating Example: Cursive Handwriting



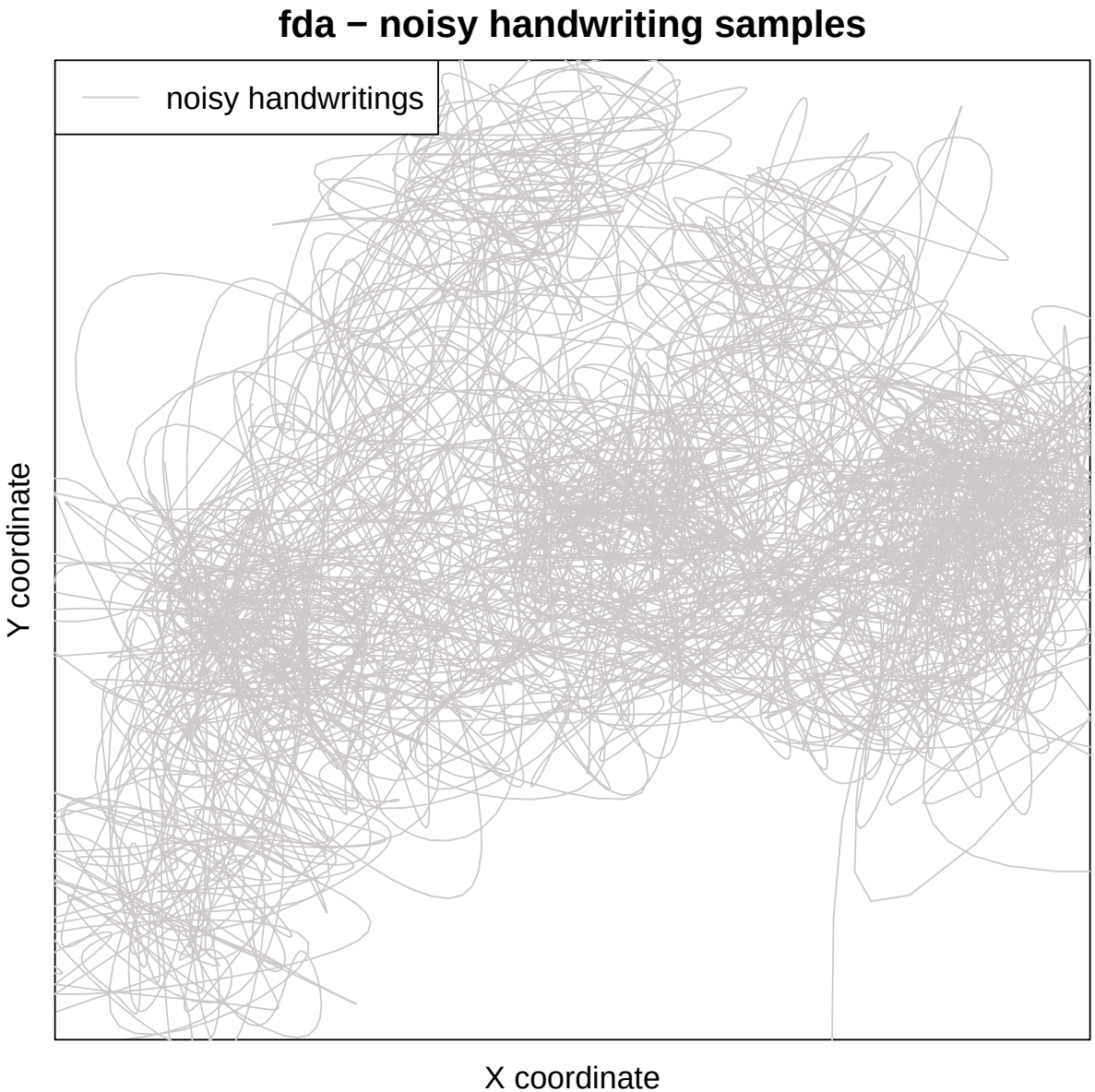
Motivating Example: Cursive Handwriting



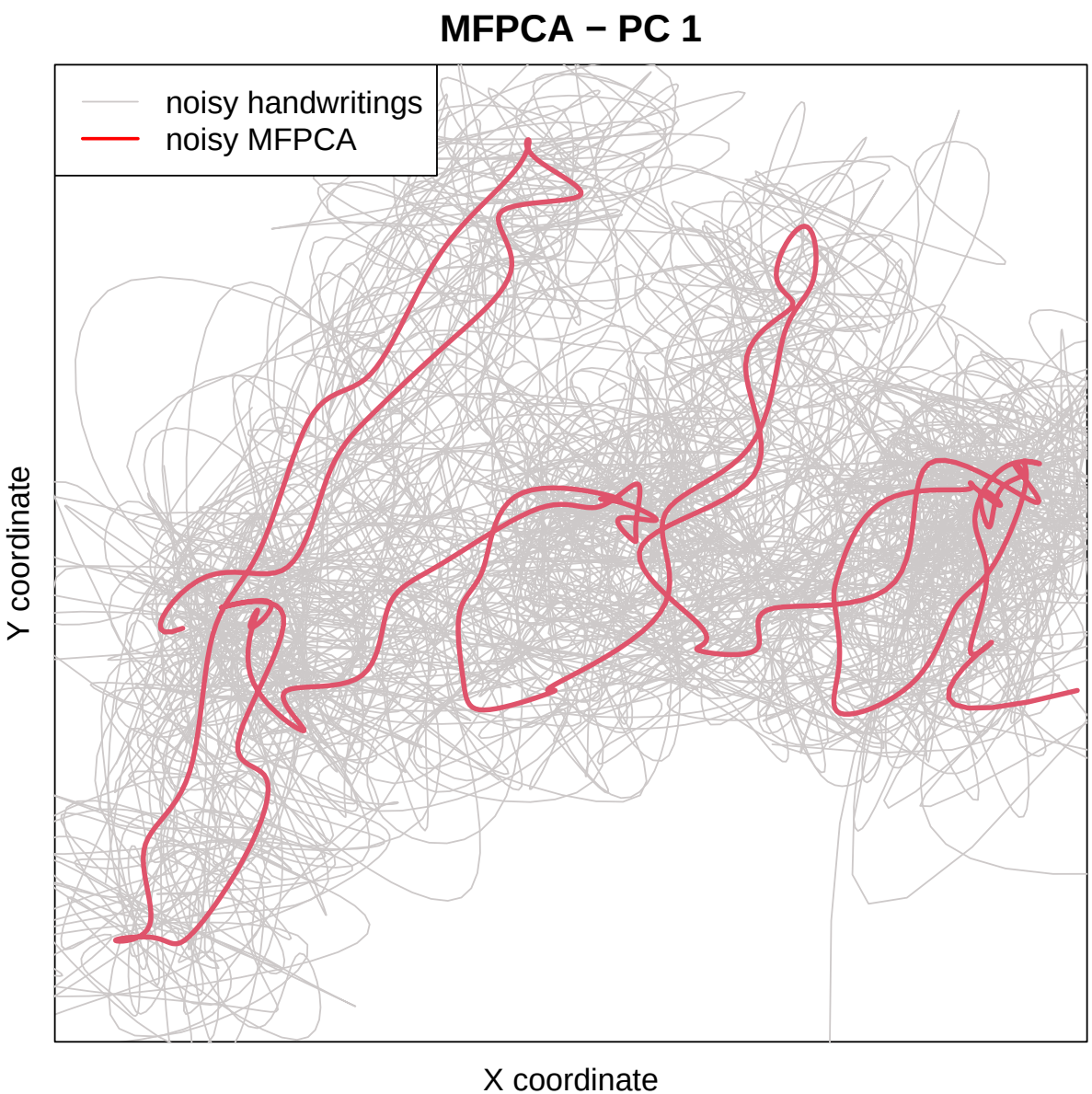
Motivating Example: Cursive Handwriting



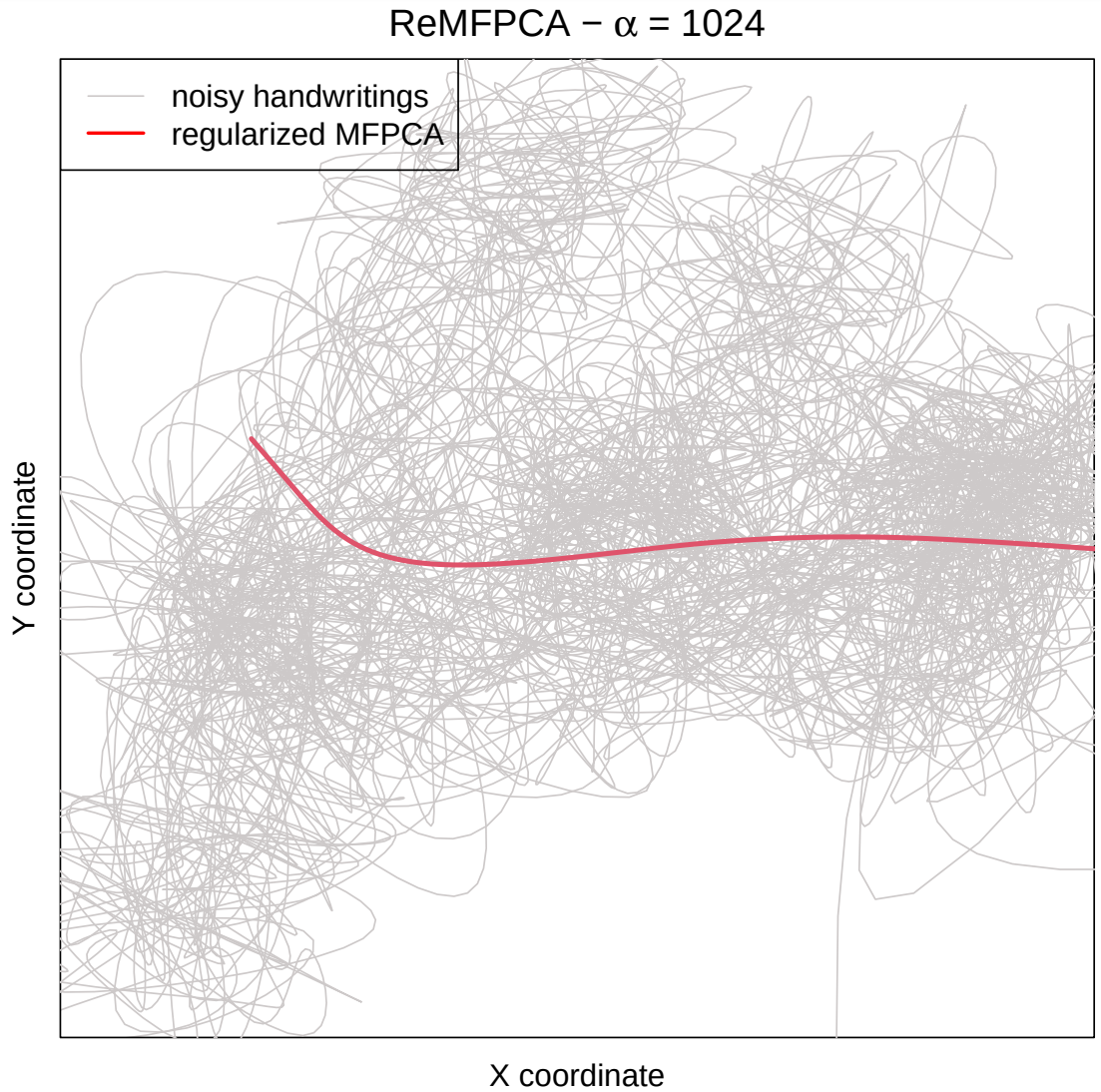
Motivating Example: Cursive Handwriting



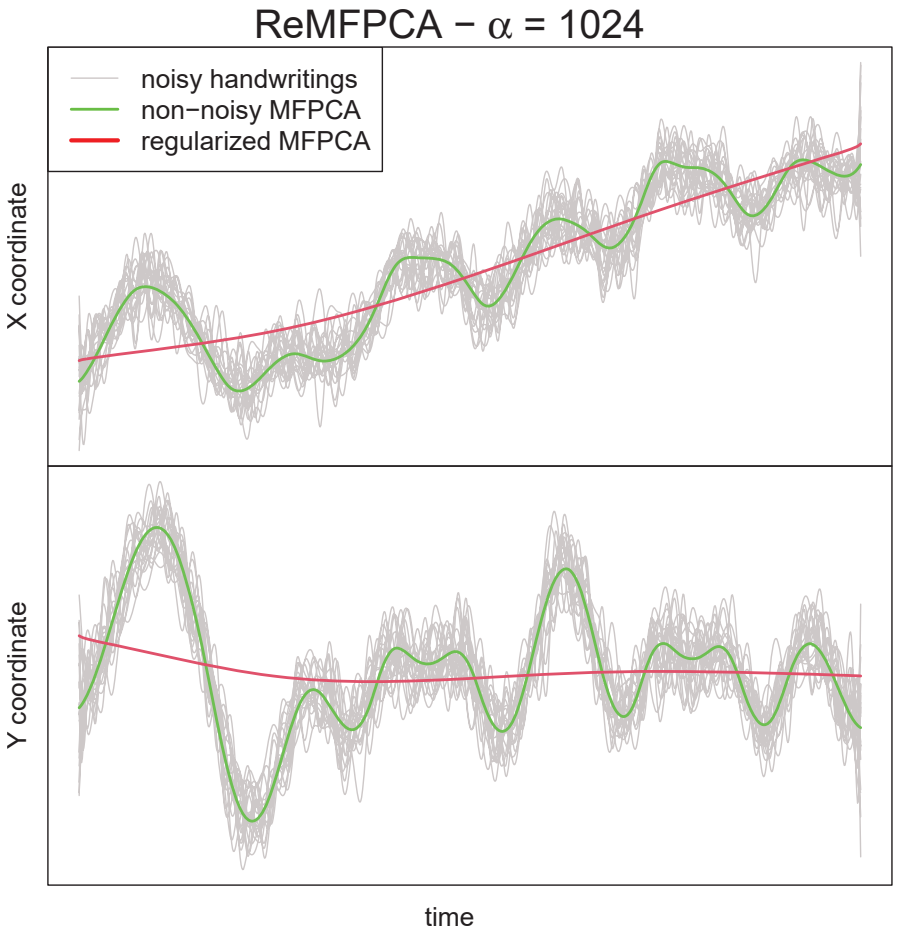
Motivating Example: Cursive Handwriting

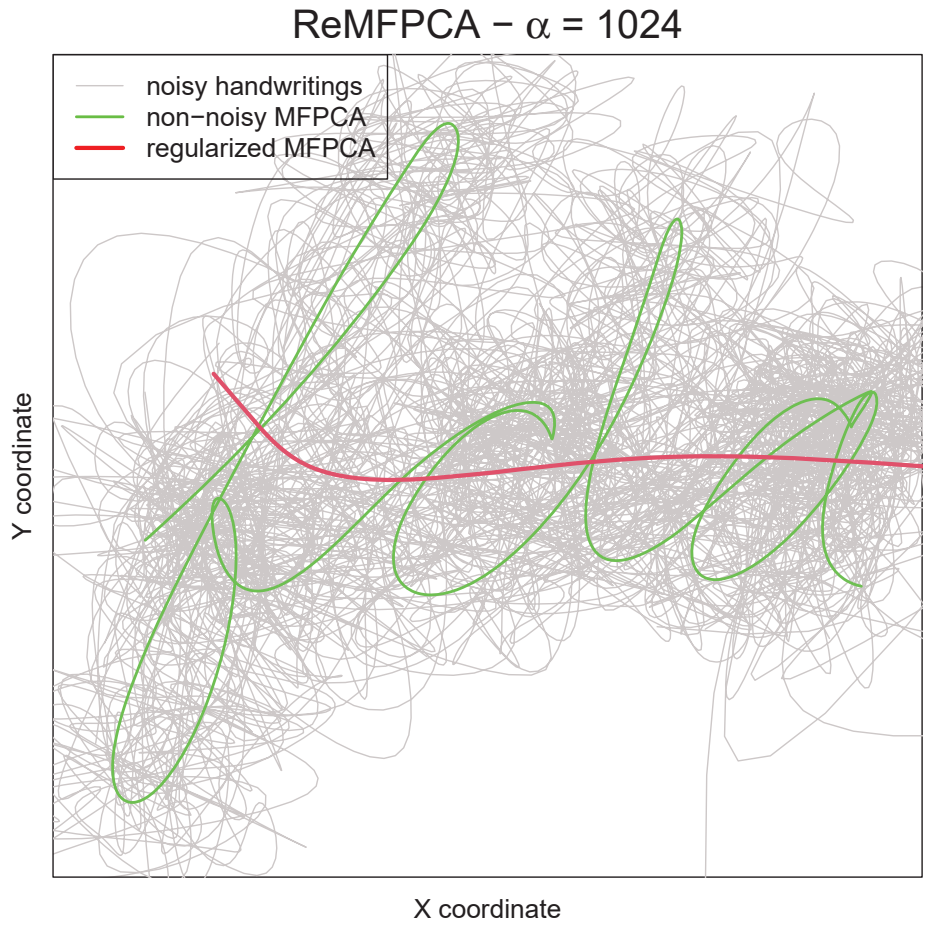


Motivating Example: Cursive Handwriting

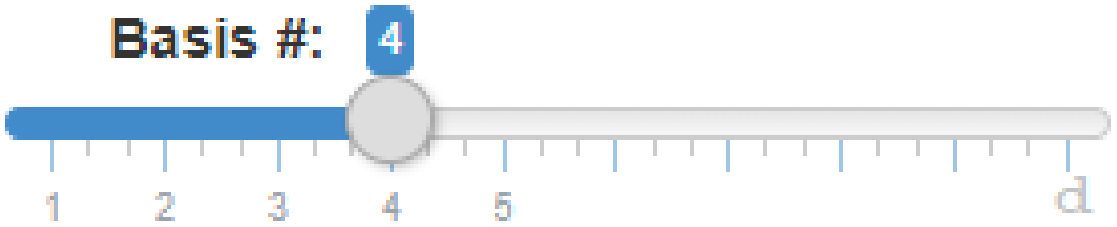


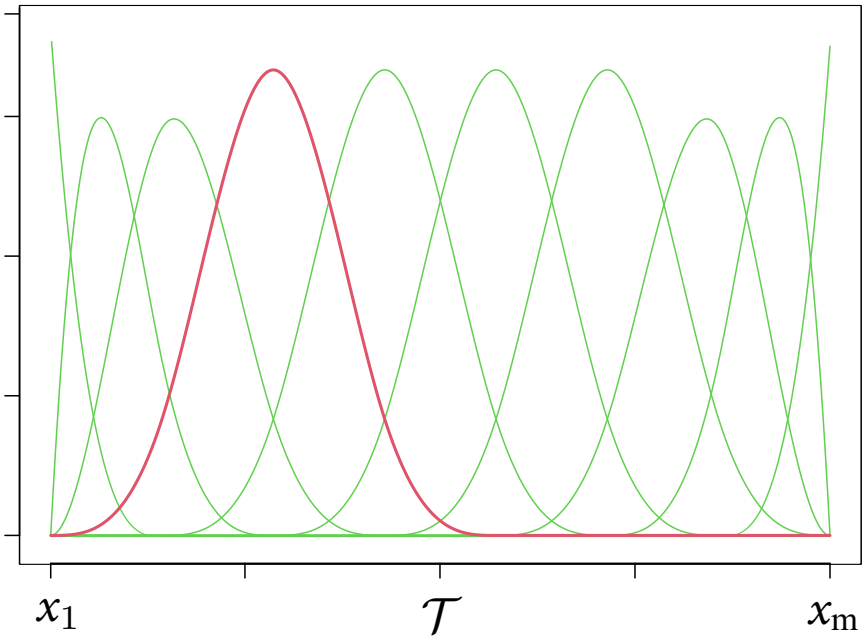
Motivating Example: Cursive Handwriting





Representation of the functional data (FD) in ReMFPCA

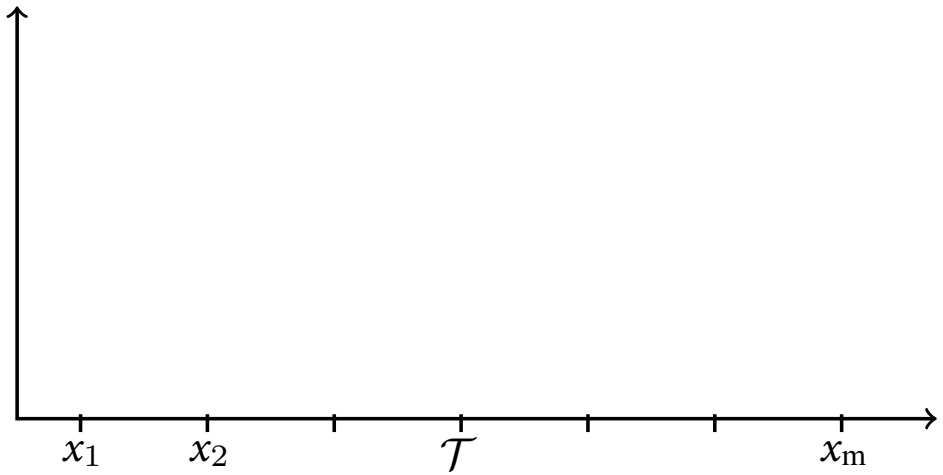




As `Basis` object:

`@grid:`	`vector`	$(x_1, x_2, \ldots, x_m)$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \cdots & b_{d1} \\ \vdots & \cdots & \vdots \\ b_{1m} & \cdots & b_{dm} \end{pmatrix}$

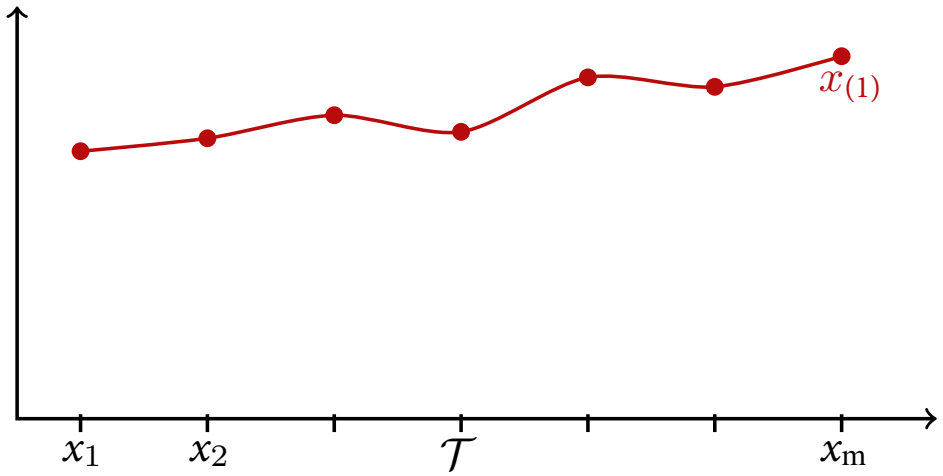
Representation of the functional data (FD) in ReMFPCA



As `fd` object:

`@grid:`	`vector`	$(x_1, x_2, \ldots, x_m)$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \cdots & b_{d1} \\ \vdots & \cdots & \vdots \\ b_{1m} & \cdots & b_{dm} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} & & \end{pmatrix}$

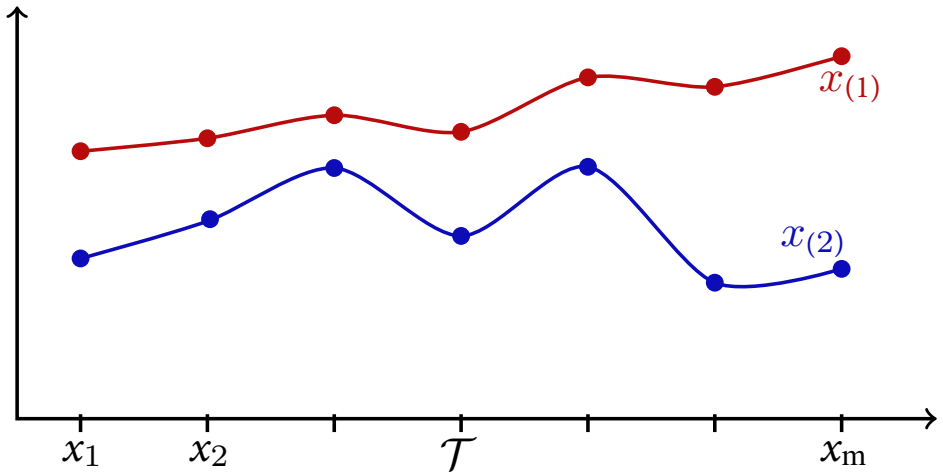
Representation of the functional data (FD) in ReMFPCA



As `fd` object:

`@grid:`	`vector`	$(x_1, x_2, \ldots, x_m)$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \cdots & b_{d1} \\ \vdots & \cdots & \vdots \\ b_{1m} & \cdots & b_{dm} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} c_{11} \\ \vdots \\ c_{1d} \end{pmatrix}$

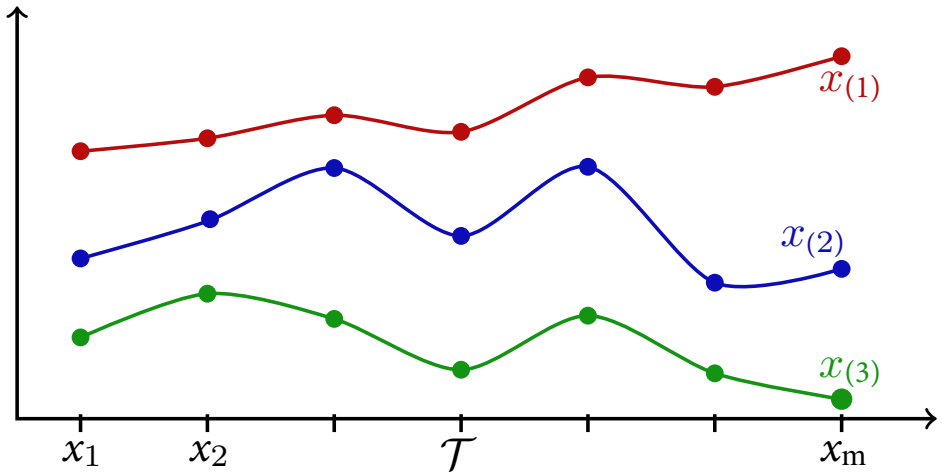
Representation of the functional data (FD) in ReMFPCA



As `fd` object:

`@grid:`	`vector`	$(x_1, x_2, \ldots, x_m)$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \cdots & b_{d1} \\ \vdots & \cdots & \vdots \\ b_{1m} & \cdots & b_{dm} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} c_{11} & c_{21} \\ \vdots & \vdots \\ c_{1d} & c_{2d} \end{pmatrix}$

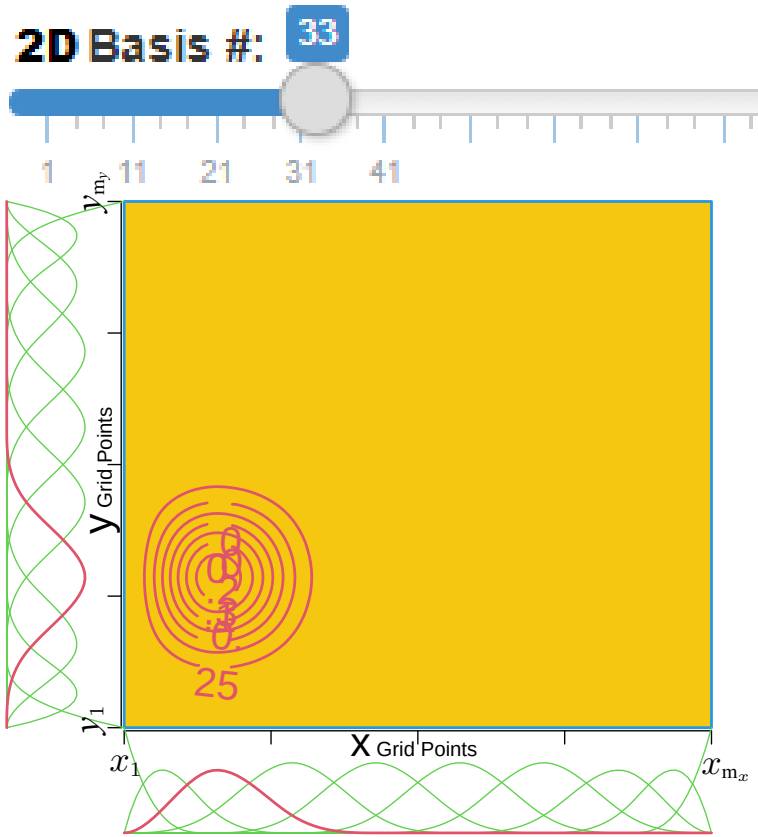
Representation of the functional data (FD) in ReMFPCA



As `fd` object:

`@grid:`	`vector`	$(x_1, x_2, \ldots, x_m)$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \cdots & b_{d1} \\ \vdots & \cdots & \vdots \\ b_{1m} & \cdots & b_{dm} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} c_{11} & c_{21} & c_{31} & \cdots \\ \vdots & \vdots & \vdots & \vdots \\ c_{1d} & c_{2d} & c_{3d} & \cdots \end{pmatrix}$

Representation of the functional data (FD) in ReMFPCA



As `Basis` object:

`@grid:`	`matrix`	$\begin{pmatrix} x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x} \\ y_1, y_1, \ldots, y_1 \ , y_2, y_2, \ldots, y_2 \ , \quad \ldots \quad , y_{m_y} \end{pmatrix}$ $\tilde{m} = m_x * m_y$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \ldots & b_{dx,1} & \ldots & b_{đ1} \\ \vdots & \ldots & \vdots & \ldots & \vdots \\ b_{1\tilde{m}} & \ldots & b_{dx,\tilde{m}} & \ldots & b_{đ\tilde{m}} \end{pmatrix}$ $đ = d_x * d_y$

Representation of the functional data (FD) in ReMFPCA

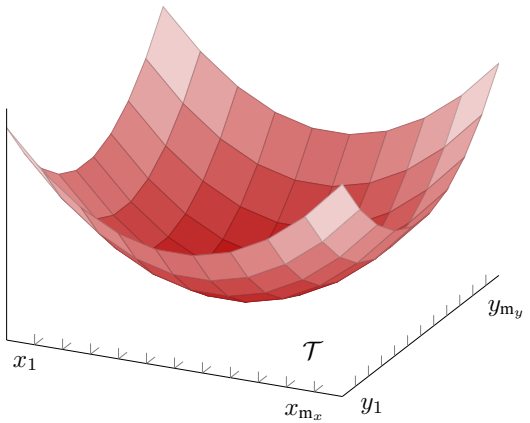
As `fd` object:

`@grid:`	`matrix`	$\begin{pmatrix} x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x} \\ y_1, y_1, \ldots, y_1 \ , y_2, y_2, \ldots, y_2 \ , \quad \ldots \quad , y_{m_y} \end{pmatrix}$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \ldots & b_{dx,1} & \ldots & b_{đ1} \\ \vdots & \ldots & \vdots & \ldots & \vdots \\ b_{1\tilde{m}} & \ldots & b_{dx,\tilde{m}} & \ldots & b_{đ\tilde{m}} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} \\ \\ \end{pmatrix}$

Representation of the functional data (FD) in ReMFPCA

As `fd` object:

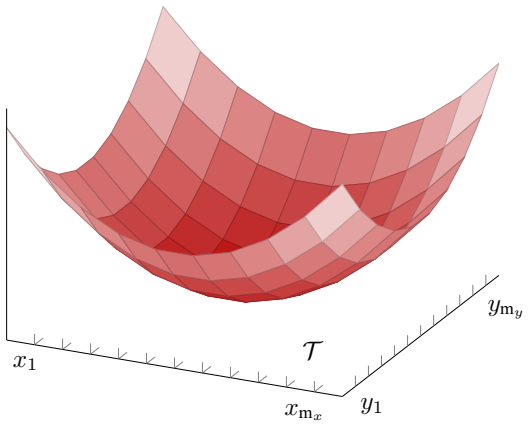
`@grid:`	`matrix`	$\begin{pmatrix} x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x} \\ y_1, y_1, \ldots, y_1 \ , y_2, y_2, \ldots, y_2 \ , \quad \ldots \quad , y_{m_y} \end{pmatrix}$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \ldots & b_{dx,1} & \ldots & b_{đ1} \\ \vdots & \ldots & \vdots & \ldots & \vdots \\ b_{1\tilde{m}} & \ldots & b_{dx,\tilde{m}} & \ldots & b_{đ\tilde{m}} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} c_{11} \\ \vdots \\ c_{1đ} \end{pmatrix}$

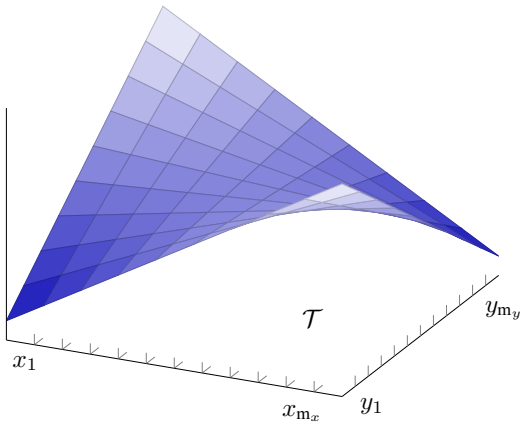


Representation of the functional data (FD) in ReMFPCA

As `fd` object:

`@grid:`	`matrix`	$\begin{pmatrix} x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x}, x_1, x_2, \ldots, x_{m_x} \\ y_1, y_1, \ldots, y_1 \ , y_2, y_2, \ldots, y_2 \ , \quad \ldots \quad , y_{m_y} \end{pmatrix}$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \ldots & b_{dx,1} & \ldots & b_{đ1} \\ \vdots & \ldots & \vdots & \ldots & \vdots \\ b_{1\tilde{m}} & \ldots & b_{dx,\tilde{m}} & \ldots & b_{đ\tilde{m}} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} c_{11} & c_{21} \\ \vdots & \vdots \\ c_{1đ} & c_{2đ} \end{pmatrix}$

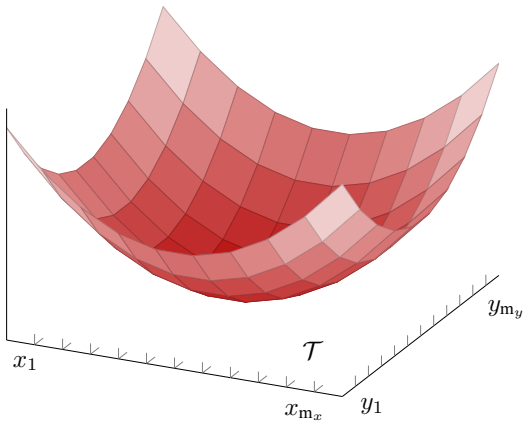


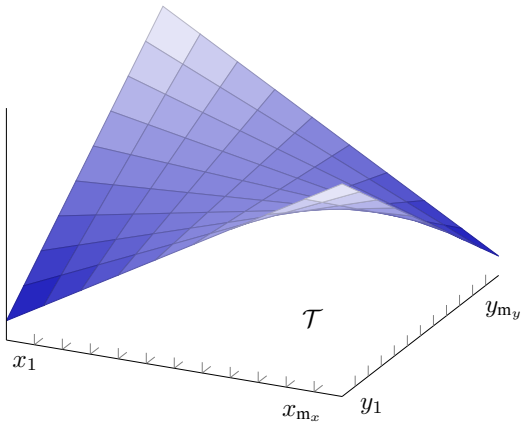


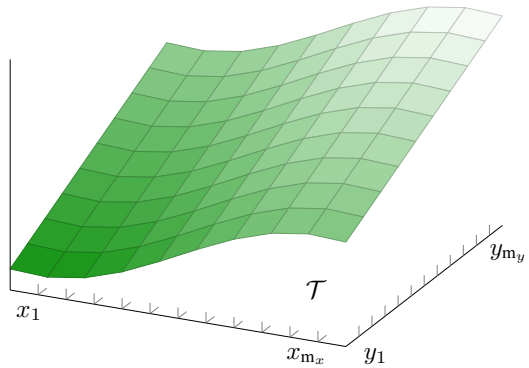
Representation of the functional data (FD) in ReMFPCA

As `fd` object:

`@grid:`	`matrix`	$\begin{pmatrix} x_1, x_2, \ldots, x_{\mathrm{m}_x}, x_1, x_2, \ldots, x_{\mathrm{m}_x}, x_1, x_2, \ldots, x_{\mathrm{m}_x} \\ y_1, y_1, \ldots, y_1 \ , y_2, y_2, \ldots, y_2 \ , \quad \ldots \quad , y_{\mathrm{m}_y} \end{pmatrix}$
`@B:`	`matrix`	$\begin{pmatrix} b_{11} & \ldots & b_{\mathrm{dx},1} & \ldots & b_{đ1} \\ \vdots & \ldots & \vdots & \ldots & \vdots \\ b_{1\tilde{\mathrm{m}}} & \ldots & b_{\mathrm{dx},\tilde{\mathrm{m}}} & \ldots & b_{đ\tilde{\mathrm{m}}} \end{pmatrix}$
`@C:`	`matrix`	$\begin{pmatrix} c_{11} & c_{21} & c_{31} & \ldots \\ \vdots & \vdots & \vdots & \vdots \\ c_{1đ} & c_{2đ} & c_{3đ} & \ldots \end{pmatrix}$

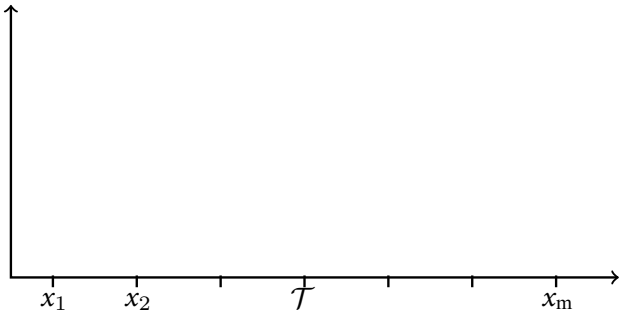




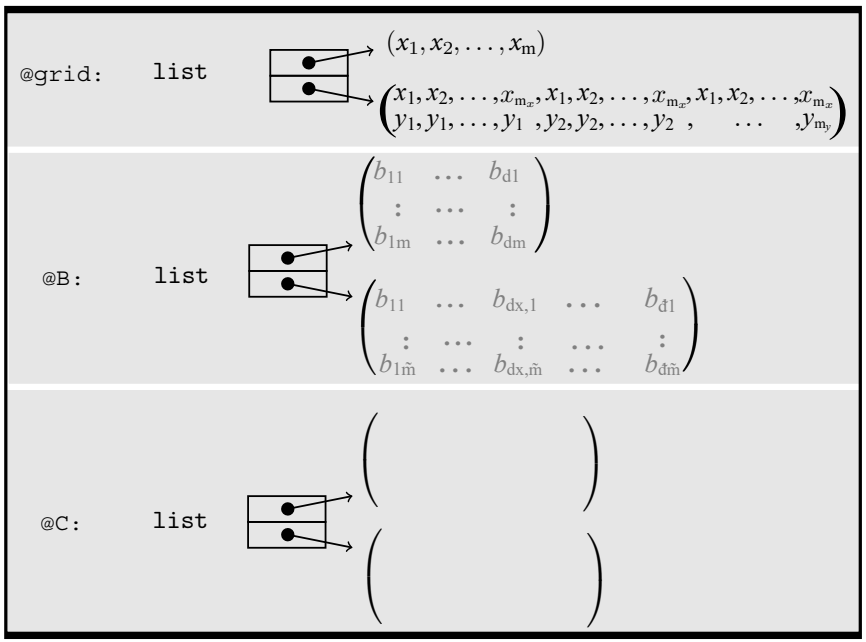


Representation of the functional data (FD) in ReMFPCA

- How about Multivariate Functional Data (MFD) observed over different dimensional domains?

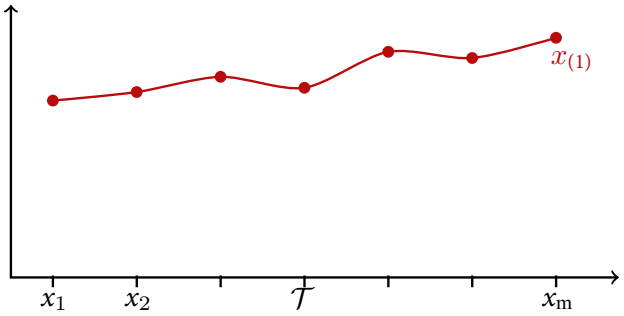


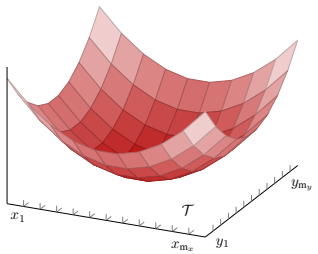
As `fd` object:



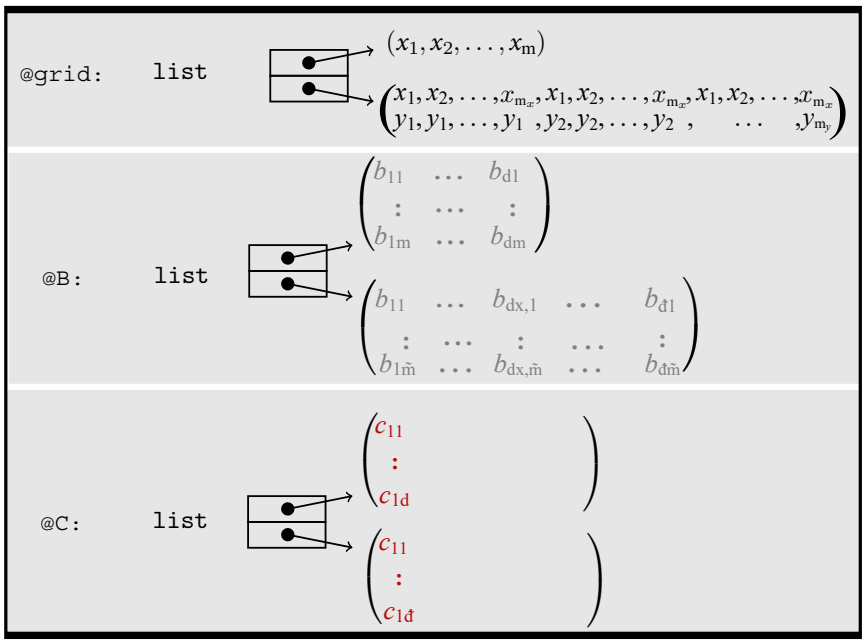
Representation of the functional data (FD) in ReMFPCA

- How about Multivariate Functional Data (MFD) observed over different dimensional domains?



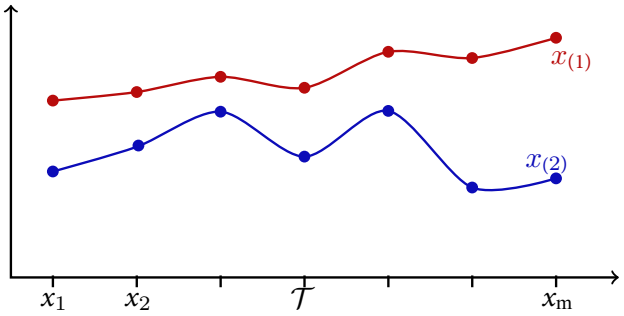


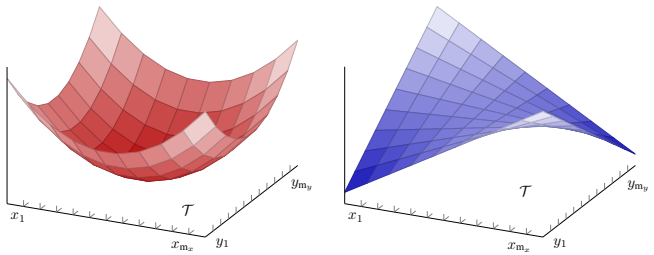
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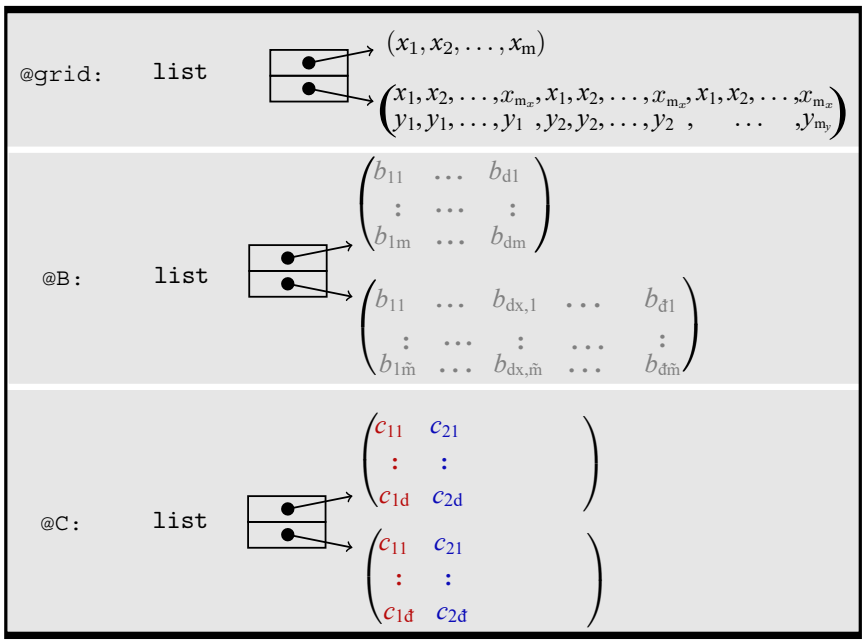
Representation of the functional data (FD) in ReMFPCA

- How about Multivariate Functional Data (MFD) observed over different dimensional domains?



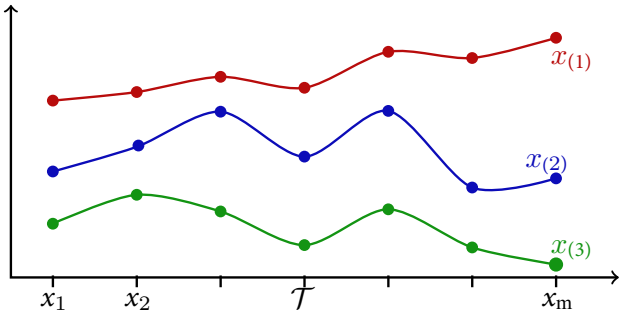


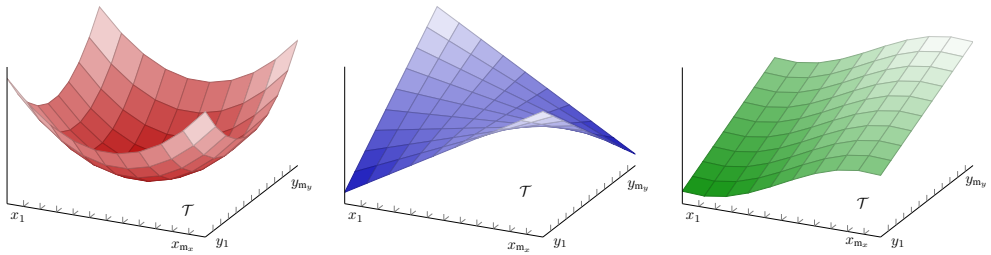
As `fd` object:



Representation of the functional data (FD) in ReMFPCA

- How about Multivariate Functional Data (MFD) observed over different dimensional domains?





As `fd` object:

