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# L<sup>A</sup>T<sub>E</sub>X tables for bpca objects

Practical examples with xtable and clean formatting

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## Authors

José C. FARIA  
Ivan B. ALLAMAN

## L<sup>A</sup>T<sub>E</sub>X customization

José C. FARIA

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# 1 Quick start

This vignette presents a simple and reproducible workflow to generate publication-ready  $\text{\LaTeX}$  tables from `bpca` objects:

1. Fit a biplot model with `bpca()`.
2. Convert it to an `xtable` object.
3. Use `print()` options to refine labels and presentation.

## 1.1 Most used `print.xtable` arguments

Argument	Purpose
<code>caption</code>	Add a descriptive caption to reference in text.
<code>label</code>	Create a $\text{\LaTeX}$ label for cross-referencing ( <code>\ref{}</code> ).
<code>sanitize.colnames.function</code>	Customize the rendering of column labels (for example, bold text).
<code>sanitize.rownames.function</code>	Customize row labels (for example, italic text).

```
library(bpca)
library(xtable)
```

## 2 First table

Start with a minimal example using the `iris` data.

```
bp <- bpca(iris[-5])
tb_simple <- xtable(bp)

## Build with xtable and print with print() so the bpca S3 method is used.
print(tb_simple)
```

		Eigenvalues	
		PC1 ( $\lambda_1 = 20.85$ )	PC2 ( $\lambda_2 = 11.67$ )
Eigenvectors	Sepal.Length	0.52	-0.38
	Sepal.Width	-0.27	-0.92
	Petal.Length	0.58	-0.02
	Petal.Width	0.56	-0.07
Variance retained		0.73	0.23
Variance accumulated		0.73	0.96

## 3 Cross-referencing tables

Captions and labels make documents easier to navigate. The following examples are referenced as Table 1 and Table 2.

```
tb_iris <- xtable(
  bpca(iris[-5]),
  caption = "Biplot of iris data (package: datasets).",
  label = "tbl_iris"
)
print(tb_iris)
```

		Eigenvalues	
		PC1 ( $\lambda_1 = 20.85$ )	PC2 ( $\lambda_2 = 11.67$ )
Eigenvectors	Sepal.Length	0.52	-0.38
	Sepal.Width	-0.27	-0.92
	Petal.Length	0.58	-0.02
	Petal.Width	0.56	-0.07
Variance retained		0.73	0.23
Variance accumulated		0.73	0.96

Table 1: Biplot of iris data (package: datasets).

```
tb_gabriel <- xtable(
  bpca(gabriel1971),
  caption = "Biplot of gabriel1971 data (package: bpca).",
  label = "tbl_gabriel"
)
print(tb_gabriel)
```

		Eigenvalues	
		PC1 ( $\lambda_1 = 7.63$ )	PC2 ( $\lambda_2 = 1.77$ )
Eigenvectors	CRISTIAN	0.34	0.15
	ARMENIAN	0.34	0.17
	JEWISH	0.34	0.28
	MOSLEM	0.34	0.21
	MODERN.1	0.32	-0.58
	MODERN.2	0.31	-0.60
	OTHER.1	0.35	-0.11
	OTHER.2	0.34	0.07
	RUR	0.32	0.34
Variance retained		0.92	0.05
Variance accumulated		0.92	0.97

Table 2: Biplot of gabriel1971 data (package: bpca).

## 4 Formatting for readability

### 4.1 Bold column names

Table 3 highlights column names in bold.

```
tb_rock <- xtable(
  bpca(rock),
  caption = "Biplot of rock data (package: datasets).",
  label = "tbl_rock"
)

bold <- function(x) paste0("\\textbf{", x, "}")

print(tb_rock, sanitize.colnames.function = bold)
```

		Eigenvalues	
		PC1 ( $\lambda_1 = 11.07$ )	PC2 ( $\lambda_2 = 6.59$ )
Eigenvectors	area	0.47	-0.6
	peri	0.59	-0.24
	shape	-0.39	-0.71
	perm	-0.52	-0.28
Variance retained		0.65	0.23
Variance accumulated		0.65	0.88

Table 3: Biplot of rock data (package: datasets).

## 4.2 Italic row names

Table 4 highlights row names in italic.

```
tb_usarrests <- xtable(
  bpca(USArrests),
  caption = "Biplot of USArrests data (package: datasets).",
  label = "tbl_usarrests"
)

italic <- function(x) paste0("\\textit{" , x, "}")

print(tb_usarrests, sanitize.rownames.function = italic)
```

		Eigenvalues	
		PC1 ( $\lambda_1 = 11.02$ )	PC2 ( $\lambda_2 = 6.96$ )
<i>Eigenvectors</i>	<i>Murder</i>	-0.54	-0.42
	<i>Assault</i>	-0.58	-0.19
	<i>UrbanPop</i>	-0.28	0.87
	<i>Rape</i>	-0.54	0.17
<i>Variance retained</i>		0.62	0.25
<i>Variance accumulated</i>		0.62	0.87

Table 4: Biplot of USArrests data (package: datasets).

## 5 Localization of labels

You can adapt labels to Portuguese and keep the same table structure. Table 5 shows this approach.

```
tb_rock_pt <- xtable(
  bpca(rock),
  caption = "Biplot of rock data (package: datasets), Portuguese labels.",
  label = "tbl_rock_pt"
)

rownames(tb_rock_pt) <- gsub(
  "Eigenvalues",
  "Autovalores",
  rownames(tb_rock_pt)
)

rownames(tb_rock_pt) <- gsub(
```

```

"Eigenvectors",
"Autovetores",
rownames(tb_rock_pt)
)
rownames(tb_rock_pt) <- gsub(
  "Variance retained",
  "Variância retida",
  rownames(tb_rock_pt)
)
rownames(tb_rock_pt) <- gsub(
  "Variance accumulated",
  "Variância acumulada",
  rownames(tb_rock_pt)
)

colnames(tb_rock_pt) <- c("CP1", "CP2")

print(tb_rock_pt)

```

		Autovalores	
		CP1 ( $\lambda_1 = 11.07$ )	CP2 ( $\lambda_2 = 6.59$ )
Autovetores	area	0.47	-0.6
	peri	0.59	-0.24
	shape	-0.39	-0.71
	perm	-0.52	-0.28
Variância retida		0.65	0.23
Variância acumulada		0.65	0.88

Table 5: Biplot of rock data (package: datasets), Portuguese labels.

## 6 Custom print options in one call

It is often convenient to customize row and column formatting directly in a single `print()` call (Table 6).

```

print(
  xtable(
    bpca(rock),
    caption = "Direct customization using print() on an xtable.bpca object.",
    label = "tbl_directly"
  ),
  sanitize.colnames.function = bold,
  sanitize.rownames.function = italic
)

```

## 7 Takeaways

- Use `xtable(bpca(...)) + print()` as the default workflow.
- Add `caption` and `label` early when writing reports.
- Use sanitization functions to improve readability (bold/italic, localized labels).
- Keep examples compact and reproducible to simplify maintenance.

		<b>Eigenvalues</b>	
		<b>PC1 (<math>\lambda_1 = 11.07</math>)</b>	<b>PC2 (<math>\lambda_2 = 6.59</math>)</b>
<i>Eigenvectors</i>	<i>area</i>	0.47	-0.6
	<i>peri</i>	0.59	-0.24
	<i>shape</i>	-0.39	-0.71
	<i>perm</i>	-0.52	-0.28
<i>Variance retained</i>		0.65	0.23
<i>Variance accumulated</i>		0.65	0.88

Table 6: Direct customization using `print()` on an `xtable.bpca` object.