Quantum space

Jean-luc Doumont
www.principiae.be

TUG 2010
Wed 30 Jun 2010
“I have found that all ugly things are made by those who strive to make something beautiful,

—Oscar Wilde
Quantum space: designing pages on grids

TUG | X 004 | Wed 30 Jun 2010

“I have found that all ugly things are made by those who strive to make something beautiful, and that all beautiful things are made by those who strive to make something useful.”

—Oscar Wilde
Quantum space: designing pages on grids

Arrange...
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Arrange... text
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Arrange... text
a title
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Arrange... text
a title
a blurb
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Arrange... text bibliographical references

a title

a blurb
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Quantum space: designing pages on grids

Arrange... text bibliographical references
a title a photograph with its caption
a blurb a line graph with labeled axes
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How do you do this with $\TeX$?
Quantum space

1. René Descartes
   Plane coordinates

2. Albert Einstein
   Quantum physics

3. Piet Mondriaan
   Strictest harmony
Quantum space: designing pages on grids

Quantum space

René Descartes
Plane coordinates

Albert Einstein
Quantum physics

Piet Mondriaan
Strictest harmony
A page has two dimensions
Quantum space: designing pages on grids

A page has two dimensions
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Let’s position the items in cartesian coordinates
Let’s position the items in cartesian coordinates

\def\xy#1#2#3{\setbox0=\hbox to\z@{\kern#1\raise#2\hbox{#3}\hss}\
\kern#1\raise#2\hbox{#3}\hss}\
\ht0=\z@\dp0=\z@\box0
Let’s position the items in cartesian coordinates

\def\xy#1#2#3{\setbox0=\hbox to\z@{\kern#1\raise#2\hbox to\z@{#3}\hss}\
\kern#1\raise#2\hbox to\z@{#3}\hss}\
\ht0=\z@\dp0=\z@\box0}

\def\xyl#1#2#3{\xy{#1}{#2}{\hss#3}}
\def\xyr#1#2#3{\xy{#1}{#2}{#3\hss}}
\def\xyc#1#2#3{\xy{#1}{#2}{\hss#3}\hss}
Let’s position the items in cartesian coordinates… on the whole page

\[
\begin{align*}
&\text{beginpage}\{
\null\vfill\bgroup \\
\text{offinterlineskip leftskip=z@} \\
&\text{endpage}\{\egroup\eject}
\end{align*}
\]

\beginpage

\beginpage
\text{...}
\endpage
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Let’s place the text in scrolls and chunk these into pieces

\newbox\galley

\def\text{\setbox\galley=\vbox\bgroup
  \hsize=…}

\def\endtext{\vskip-\prevdepth
  \vfil\egroup}

\def\lines#1{\vsplit\galley
  to #1\baselineskip}
Let's place the text in scrolls and chunk these into pieces

\newbox\galley

\def\text{\setbox\galley=\vbox\bgroup
   \hsize=...
   \hrule}

\def\endtext{\vskip-\prevdepth
   \vfil\egroup
   \setbox0=\vsplit\galley to\z@}

\def\lines#1{\vsplit\galley
   to #1\baselineskip}
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Quantum space

René Descartes
Plane coordinates

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Let’s quantize space
Quantum space: designing pages on grids

Let’s quantize space
Let’s quantize space

Let’s quantize space, with an offset between possible positions for text and those for more geometric items, such as frames, rules, or photographs. These geometric items should thus be dimensioned so their total height is an integer number of the quantum, which is equivalent to a baselineskip.
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Let’s quantize space
Let’s quantize space, both \textit{vertically} and \textit{horizontally}
Let’s quantize space, both \textit{vertically} and \textit{horizontally}

\newdimen\pc \pc=14bp
\def\XY#1#2{\xy{#1\pc}{#2\pc}}
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A quantum space is a flexible way to create harmonious designs
We can… use a subset of the grid
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We can... use a subset of the grid locally refine or offset it
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We can... use a subset of the grid
split or span text columns
locally refine or offset it
We can quantize beyond space

Font size
Line width
Marker size
Color

On a log\(_2\) scale, too
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Quantum space

René Descartes
Plane coordinates

Albert Einstein
Quantum physics

Piet Mondriaan
Strictest harmony
We can coordinate other elements with the grid, including **line width**
We can coordinate other elements with the grid, including line width
We can coordinate other elements with the grid, including line width

\newdimen\pt
\pt=.0625\pc
We can coordinate other elements with the grid, including line width

\newdimen\pt
\pt=.0625\pc
\newdimen\lw
\def\lwset#1{\lw=#1\pt}
\def\sline{\lwset{.25}}
\def\mline{\lwset{.5}}

:\
We can coordinate other elements with the grid, including *font size*

My three laws of communication:
- adapt to your audience
- maximize the signal-to-noise ratio
- use effective redundancy
We can coordinate other elements with the grid, including *font size*

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We can coordinate other elements with the grid, including font size

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x-height = 1\pc (14bp)

\def\setxfnt#1#2#3{\fntsize=26.415bp \fntsize=#3\fntsize\font#1=#2 at the\fntsize}

\setxfnt\slidetitle{hlsr8r}{.5}
We can coordinate other elements with the grid, including font size

<table>
<thead>
<tr>
<th>Position</th>
<th>Percentage</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD students</td>
<td>35%</td>
<td>356</td>
</tr>
<tr>
<td>Technicians</td>
<td>30%</td>
<td>311</td>
</tr>
<tr>
<td>Postdocs</td>
<td>22%</td>
<td>225</td>
</tr>
<tr>
<td>Group leaders</td>
<td>7%</td>
<td>76</td>
</tr>
<tr>
<td>Admin. support</td>
<td>6%</td>
<td>62</td>
</tr>
</tbody>
</table>

1030 employees
We can coordinate other elements with the grid, including **font size**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD students</td>
<td>35%</td>
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<tr>
<td>Admin. support</td>
<td>6%</td>
<td>62</td>
</tr>
</tbody>
</table>

1030 employees

```latex
\def\setXfnt#1#2#3{\fntsize=19.364bp \ldots}
```
We can coordinate other elements with the grid, including PDF items

\pdfpc{0 0 m 1 1 l -1 1 l h f}
We can coordinate other elements with the grid, including PDF items

\pdfpc{0 0 m 1 1 l -1 1 l h f}
\lwset2
\pdfpc{0 0 m .5 0 l 2.5 1 l 3 1 l S}
We can coordinate other elements with the grid, including **PDF items**

For `\pc=14bp`

\[
0.071162 = \frac{1}{14} \times \frac{72.00}{72.27}
\]
We can design the grid (or select parts) toward overall harmony of the page.
We can design the grid (or select parts) toward overall harmony of the page
Effective graphical displays

Graphical displays complement verbal discourse in written documents and in oral presentations as a most powerful form of effective redundancy. Through spatial relationships and potential richness of detail, they provide insights into ways that text cannot hope to match. They include not only illustrations such as drawings, graphs, and photographs, but also the visual appearance of anything that can be seen, such as a printed page or a presentation slide.

Because they are non-sequential, visual components are more difficult to analyze and to design than verbal ones. No methodology can state what type of information to locate in the beginning, middle, and end of a true graphical display, for visual codings simply have no beginning, middle, or end. This part first proposes alternative descriptions of pictures, focusing on the display of numbers, then discusses how to plan, design, and construct graphs, and how to add captions.
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Because they occur as nonsequential, visual components are more difficult to analyze and to design than verbal ones. No methodology can state what type of information is located in the beginning, middle, and end of a true graphical display, for textual codings simply flow as beginning, middle, or end. This part first proposes alternative descriptions of pictures, focusing on the display of numbers, and then discusses how to plan, design, and construct graphs, and how to add captions.
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We can design the grid (or select parts) toward overall harmony of the page

A4 page
We can design the grid (or select parts) toward overall harmony of the page

A4 page
By default, draw lines to reveal an evolution.

Current [µA]

Voltage [V]

0  50  100 s
By default, draw lines to reveal an evolution
To achieve strict alignments,
we need strict rectangles
To achieve strict alignments, we need strict rectangles

My three laws of communication
To achieve strict alignments, we need strict rectangles

My three laws of communication:
- adapt to your audience
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Jean-luc’s three laws of communication:

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Rational page layout:
useful and beautiful?