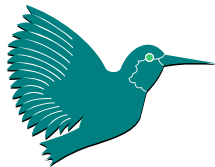


# Taming the beast — Advances in paragraph tagging with pdfTeX and XeTeX

Frank Mittelbach, L<sup>A</sup>T<sub>E</sub>X Project

TUG-Online, August 2021



# Stating the problem — A simple example

```
\documentclass[12pt]{article}
\usepackage[paperheight=24\baselineskip,           % special geometry
             height=19\baselineskip]{geometry}      % for slides
\usepackage{kantlipsum,multicol}

\begin{document}
\kant[1] \par \kant[2]                             % two long paragraphs
\begin{multicols}{2}
  Hello? \par Hallo?? \par Halli hallo! \par % a multicol with
  \kant[3] \par \kant[4]                       % five paragraphs
\end{multicols}
\begin{multicols}{3}                               % another multicol
  Hello? \par Hallo?? \par Halli hallo!         % with three short
\end{multicols}                                   % paragraphs
\end{document}
```



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ural causes in general. Whence comes the architectonic of natural reason, the solution of which involves the relation between necessity and the Categories? Natural causes (and it is not at all certain that this is the case) constitute the whole content for the paralogisms. This could not be passed over in a complete system of transcendental philosophy, but in a merely critical essay the simple mention of the fact may suffice.

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# Stating the problem — The output ...

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• Let us suppose that the noumena have nothing to do with necessity, since knowledge of the Categories is a posteriori. Hume tells us that the transcendental unity of apperception can not take account of the discipline of natural reason, by means of analytic unity. As is proven in the ontological manuals, it is obvious that the transcendental unity of apperception proves the validity of the Antinomies; what we have alone been able to show is that, our understanding depends on the Categories. It remains a mystery why the Ideal stands in need of reason. It must not be supposed that our faculties have lying before them, in the case of the Ideal, the Antinomies;

1

```
• \tagstructbegin{tag=P}  
  \tagmcbegin{tag=P}  
  ...  
  \tagmcbend  
• \tagstructend
```

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# Improving (??) on the example source

```
\documentclass[12pt]{article}
\usepackage[paperheight=24\baselineskip,
            height=19\baselineskip]{geometry}
\usepackage{kantlipsum,multicol}

% Code to handle the page footer as an
% artifact not shown ...

\begin{document}
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  \kant[1]\par\tagmcend\tagstructend
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  \kant[2]\par\tagmcend\tagstructend

\begin{multicols}{2}
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  Hello?\par\tagmcend\tagstructend
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  Hallo??\par\tagmcend\tagstructend
```

```
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  Halli hallo!\par\tagmcend\tagstructend
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  \kant[3]\par\tagmcend\tagstructend
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  \kant[4]\par\tagmcend\tagstructend
\end{multicols}
\begin{multicols}{3}
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  Hello?\par\tagmcend\tagstructend
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  Hallo??\par\tagmcend\tagstructend
\tagstructbegin{tag=P}\tagmcbegin{tag=P}
  Halli hallo!\par\tagmcend\tagstructend
\end{multicols}
\end{document}
```



# New tools for paragraph control

- ▶ They consist of
  - ▶ four public hooks for packages and users: `para/before`, `para/begin`, `para/end` and `para/after`
  - ▶ two kernel hooks to support paragraph tagging
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- ▶ The approach is transparent for packages and user documents
- ▶ Available since June 2021 release of  $\text{\LaTeX}$
- ▶ Documentation in: `texdoc ltpara-code`



# Extending the example with para hooks

- ▶ In preamble:

```
\usepackage{color} \newcounter{pnumber}
\AddToHook{para/begin}{\refstepcounter{pnumber}%
                      \llap{\tiny\color{red}\thepnumber\ }}
\AddToHook{para/end}{\rlap{\tiny\color{red}\ \thepnumber}}
```

- ▶ In first multicol:

```
Hello? \par Hallo?? \par Halli\label{p-num} hallo! \par
```

- ▶ At the end of the document:

A paragraph interrupted by a display formula  
$$\begin{equation}(a+b)^2 = a^2 + 2ab + b^2 \end{equation}$$
  
is correctly recognized as a single paragraph.

See also paragraph~\ref{p-num} on page~\pageref{p-num}.



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so, the transcendental aesthetic is just as necessary as our experience. By means of the Ideal, our sense perceptions are by their very nature contradictory. <sup>2</sup>

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<sup>8</sup> Hello? <sup>8</sup> <sup>9</sup> Hallo?? <sup>9</sup> <sup>10</sup> Halli hallo! <sup>10</sup>

<sup>11</sup> A paragraph interrupted by a display formula

$$(a + b)^2 = a^2 + 2ab + b^2 \tag{1}$$

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<sup>12</sup> See also paragraph 5 on page 2. <sup>12</sup>





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The way written the example is too simple-minded:

- ▶ The paragraph number is globally set and reused at the end but in  $\text{\LaTeX}$  paragraphs can be nested



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- ▶ The paragraph number is globally set and reused at the end but in  $\text{\LaTeX}$  paragraphs can be nested
- ▶ Using `\refstepcounter` allows you to reference paragraphs, but it alters existing documents
- ▶ There are many places where  $\text{\LaTeX}$  uses the paragraph mechanism that are not “traditional” paragraphs

```
\section{Title\label{sec:a}} \label{sec:b}
```

The Title would be marked up as a paragraph and the label `sec:a` would refer to the paragraph number and not the section number



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# Previous advice to handle the split MC problem

- ▶ The advice in the past how to handle the MC split in pdfTeX was to manually add something like

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\vadjust{\tagmccend\pagebreak\tagmcbegin{tag=P}}
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in the last line of the page.



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  - ▶ Impossible to use at all if break happens in an area which is not under user control, e.g., generated text
  - ▶ Needs redoing whenever the document changes — thus likely to be incorrect, resulting in an incorrect PDF



# Taming the beast

Dance a rain dance?



# Taming the beast

~~Dance a rain dance?~~ Instead ...

- ▶ Allocate a private marks register with `\newmarks\ptags`



# Taming the beast

~~Dance a rain dance?~~ Instead ...

- ▶ Allocate a private marks register with `\newmarks\ptags`
- ▶ Each paragraph gets a unique number and at the start we add two marks  $\langle number \rangle, b-$ ,  $\langle info \rangle$  and  $\langle number \rangle, b+$ ,  $\langle info \rangle$
- ▶ The paragraph end also add two marks but uses  $e-$  and  $e+$  instead





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~~Dance a rain dance?~~ Instead ...

- ▶ Allocate a private marks register with `\newmarks\ptags`
- ▶ Each paragraph gets a unique number and at the start we add two marks `\langle number \rangle, b-`, `\langle info \rangle` and `\langle number \rangle, b+`, `\langle info \rangle`
- ▶ The paragraph end also add two marks but uses `e-` and `e+` instead
- ▶ In the output routine we look at `\firstmarks\ptags` to determine if we need to restart an MC-block
- ▶ and at `\botmarks\ptags` to see if we need to close a block
- ▶ For other boxes we artificially `\vsplit` the box to get to the marks



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This can not only handle the text on the main galley but also correctly works for other streams that can split, such as footnotes



# A final example — The input

```
\documentclass[12pt,a4paper,twocolumn]{article}
\usepackage{kantlipsum,calc}
\usepackage[paperheight=16\baselineskip,
             height=11\baselineskip+\topskip]{geometry}
\setlength{\dimen\footins}{.4\textheight}

\begin{document}
  Hello Hello and a few more hellos to fill the
  line.\footnote{\kant*[1]} Or even more than a line.

  \kant*[2]\footnote{A shorter footnote but still enough to
                     fill two lines I hope.} \kant[3]

  \vfill
  Hurrah, we are getting to the end!
\end{document}
```



# A final example — The output ...

Hello Hello and a few more hellos to fill the line.<sup>1</sup> Or even more than a line.

Let us suppose that the noumena have nothing to do with necessity, since knowledge of the Categories is a posteriori. Hume tells us that the transcenden-

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<sup>1</sup>As any dedicated reader can clearly see, the Ideal of practical reason is a representation of, as far as I know, the things in themselves; as I have shown elsewhere, the phenomena should only be used as a canon for our understanding. The paralogisms of practical reason are

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# A final example — Not yet accessible


Accessibility Checker


 ▾


Document (5 issues)


Accessibility permission flag - Passed

Image-only PDF - Passed


 Tagged PDF - Failed

 Logical Reading Order - Needs manual check


 Primary language - Failed

 Title - Failed

Bookmarks - Passed

 Color contrast - Needs manual check

Page Content (2 issues)

 Tagged content - Failed

Tagged annotations - Passed

Tab order - Failed

Page 1

Page 2

Page 3

Character encoding - Passed

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# A final example — Making it accessible

```
\RequirePackage{pdfmanagement-testphase}
\DeclareDocumentMetadata{
  testphase={tagpdf,ptagging,demo-footnotes},
  debug={para=show,log=v,uncompress},
  activate=tagging,
}

\documentclass[12pt,a4paper,twocolumn]{article}
\usepackage{kantlipsum,calc}
\usepackage[paperheight=16\baselineskip,
             height=11\baselineskip+\topskip]{geometry}
\setlength{\dimen\footins}{.4\textheight}

\begin{document}
  ...
```



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\RequirePackage{pdfmanagement-testphase}
\DeclareDocumentMetadata{
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# A final example — Accessible output ...

1 Hello Hello and a few more hellos to  
fill the line.<sup>1</sup> Or even more than a line. 1  
2 Let us suppose that the noumena  
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knowledge of the Categories is a posteri-  
ori. Hume tells us that the transenden-

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and time in general. 2

Hurrah, we are getting to the end! 2

3



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Only visible change —  
paragraph ids  
because of  
para=show

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3 Hurrah, we are getting to the end.



# A final example — Now accessible

Accessibility Checker

Document (3 issues)

Accessibility permission flag - Passed

Image-only PDF - Passed

Tagged PDF - Passed

Logical Reading Order - Needs manual check

Primary language - Passed

Title - Failed

Bookmarks - Passed

Color contrast - Needs manual check

Page Content

Tagged content - Passed

Tagged annotations - Passed

Tab order - Passed

Character encoding - Passed

Tagged multimedia - Passed

Screen flicker - Passed

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# A final example — Structured content information

Content

test4-footnotes-accessible.pdf

Page 1

Annotations

Container <Artifact>

Container <Artifact> 1

Text: 1

Container <P> Hello Hello and a few more hellos to fill the line.

Container <Lbl> 1

Text: 1

Container <P> Or even more than a line.

Container <Artifact> 1

Text: 1

Container <Artifact> 2

Text: 2

Container <P> Let us suppose that the noumena have nothing

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# A final example — Tag structure

Tags

Tags

- <Document>
  - <P>
    - Hello Hello and a few more hellos to fill the line...
  - <Note>
    - <Lb>
      - As any dedicated reader can clearly see, the Ideal...
    - <Lb>
      - what first give rise to the architectonic of prac-...
    - on, when thus treated as the practical employ- men...
    - rise to human reason.
    - Or even more than a line.
  - <P>
    - Let us suppose that the noumena have nothing to do...
  - <Note>
    - As is shown in the writings of Aristotle, the things...
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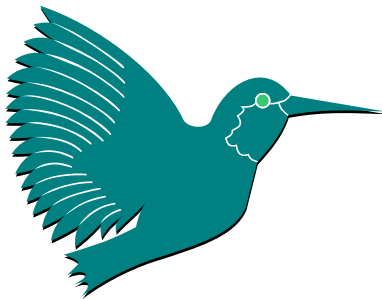
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# Stay tuned



TUG-Online, August 2021  
Frank Mittelbach,  $\text{\LaTeX}$  Project