The apa6 LaTeX class: Challenges encountered updating to new requirements

Brian D. Beitzel

Abstract

The apa6 LaTeX class implements the document-formatting requirements of the American Psychological Association's *Publication Manual* (6th Edition). The apa6 class is an update of the outdated (and no longer maintained) apa class. This article highlights the changes and new features introduced in apa6 and describes the major obstacles I encountered during the process. Additionally, test results are presented from comparing the leading bibliographic packages for APA style.

1 Background

Social scientists are well acquainted with "APA style" (the document-formatting specifications detailed in the American Psychological Association's *Publication Manual*). Nearly all journals in the social sciences require manuscripts to be submitted in compliance with APA's *Manual*. These specifications are revised periodically, sometimes radically altering the formatting requirements — as was the case with the most recent edition.

The apa6 class is an update of the older apa class, which is no longer being maintained. The apa class formats LaTeX documents in compliance with the 5th Edition of the *Manual*. With the changes introduced in the 6th Edition of the *Manual*, the apa class was no longer adequate to meet APA specifications. Most of the changes are very welcome; however, they require significant re-adjustment from years of old habits. Users of Microsoft Word must repeatedly consult their already well-worn copies of the *Manual* while they format each successive manuscript they write. Happily for the LaTeX user, the changes simply require switching from using the apa class to using the apa6 class; but the development process entailed more than adding a "6" to the class name! This article discusses the major changes from the apa class as I updated the code to conform to 6th-Edition standards.

Like apa, apa6 has three modes that generate a different visual result when the document is compiled: jou mode (the default), which has a two-column, printed-journal appearance; man mode, which follows APA's requirements for formatting manuscripts for publication; and doc mode, which has a standard LaTeX-document appearance. Although some of the 6th-Edition changes (e.g., format of section headings) apply equally to jou and doc modes, in this article

I will be discussing the much-more-detailed specifications from the *Manual* pertaining to man mode.

I will come clean here and now: I am a relatively new LaTeX user, having taught myself LaTeX and released apa6 within less than eight months. So you see, I still have a lot to learn.

2 Section headings

Probably the most sweeping change in the 6th Edition is how section headings are formatted. In the 5th and prior editions of the *Manual*, the formatting of any given heading level depended upon how many heading levels existed in the entire document. For example, in a document using five levels of headings (think of Roman-numeral outline levels) the top-level heading was formatted differently than the top-level heading in a document with only two heading levels. But the 6th Edition finally changed all that; the top-level heading is now centered, upper- and lower-cased, and boldfaced — regardless of how many heading levels the document contains. The other four heading levels have similarly specific requirements.

This change allows for simpler programming code to typeset section headings; but it also meant that I had to figure out how to format section headings using LaTeX. Fortunately, Nathaniel Smith had already done it quite well in the apa6e class, which is a limited implementation of APA style for double-spaced manuscripts. With his permission, I adopted his sectioning code and made only minimal changes.

2.1 Non-boldfaced headings

Although APA simplified the format of headings, the new requirements are still not entirely consistent: the Abstract, References, and Appendix top-level headings must *not* be boldfaced! So I had to figure out how to provide for these exceptions.

The Abstract title was rather easily taken care of by inserting \normalfont in the \maketitle definition. The Appendix titles were similarly dealt with in the \appendix definition.

The References heading was more of a challenge. Because apa6 allows for integration with three different bibliographic packages (biblatex, apacite, and natbib), the References heading needed to be compatible with all three. The biblatex package uses the command \defbibheading to specify the text for this heading; but to avoid compiling errors for documents not using biblatex, I had to check whether biblatex was loaded before issuing the \defbibheading command. I ended up using the etoolbox package's \AtEndPreamble hook to check whether the biblatex package had been loaded. Also, in man mode (but not jou or doc modes), the bibliography must begin

a new page, so there's another `\if` statement waiting to happen. Adding the `\normalfont` specification was a piece of cake after all that was figured out.

Similarly, `apacite` uses `\st@rtbibsection` to identify the References heading, and `natbib` uses `\bibsection`. Fortunately, defining these two commands does not throw an error if their respective packages are not loaded. The code to implement the non-boldface aspect of this heading for `apacite` and `natbib` was another gift from `apa6e`.

3 Author note

With the 6th Edition, APA kindly moved the Author Note (which contains contact information and acknowledgments) to the title page of the manuscript. This information used to be near the end of the manuscript where nobody noticed it.

Implementing this change mostly meant modifying the `\maketitle` definition, but my biggest hurdle (aside from ensuring proper paragraph indentation, handled with `\indent`) was figuring out the vertical placement of the Author Note heading (non-boldfaced!) and its subsequent text. I finally happened on the `\vfill` command which suited the situation perfectly.

4 Figure captions

Another welcome change in the 6th Edition is the placement of figure captions. In previous editions, figure captions (but not table captions) had to be presented on a separate page from their figures. The 6th Edition specifies that the captions are to be placed underneath their corresponding figures.

So, I found the part of the `apa` code that generated the Figure Captions page and suppressed it. Then, I ended up using the `caption` package to format figure captions.

5 Float placement

An additional wrinkle brought about by the 6th Edition was a change in the sequence of pages in the manuscript. Specifically, appendices are now required to be placed *after* tables and figures. This gives rise to the perplexing situation of what to do with tables and figures that are eventually to be typeset within an appendix. Does one place these floats along with the other floats from the main part of the manuscript? Or in an additional float section that follows the appendices? Or within the appendices themselves? The *Manual* is completely silent on this issue.

An APA representative acknowledged the gap in an email to me, and said that it doesn't matter which of these three solutions is followed since the *Manual*

isn't clear on this point. So `apa6` places appendix floats within the body of the appendix. This isn't a simple matter, however, because it means that the floats from the main part of the manuscript are delayed until a float section toward the end of the manuscript, and appendix floats are displayed at the point where they are mentioned. In other words, not all floats can be processed in the same way.

To implement this differentiation, at the beginning of the `\appendix` definition I inserted the `\processdelayedfloats` command (from the endfloat package) to flush all delayed floats prior to the appendices. Then I modified the `\figure` and `\table` definitions to delay non-appendix floats and immediately output appendix floats.

6 Floats integrated with text

When reading through a manuscript, it is a hassle to run across a reference to a table or figure and not have that table or figure handy for inspection. Prior to the 6th Edition, one only needed to look at the very end of the manuscript. But the search became more complicated with the 6th Edition because appendices now follow the tables and figures. Consequently, if there are appendices attached to a manuscript, the reader must leaf backward through the appendices to find the desired table or figure. The difficulties associated with navigating back and forth in an electronic copy of a manuscript to find tables or figures are so obvious as to need no explanation.

The `floatsintext` option in `apa6` places all floats near the point where they are mentioned in the manuscript. Of course, such rearrangement of the manuscript violates APA guidelines and should not be used for submission to journals; but this feature can make one's own (or a colleague's) reading of drafts much more efficient.

Basically, the `floatsintext` option directs `apa6` to handle all floats using the `float` package. My implementation of this feature was significantly aided by a post which Guillaume Jourjon contributed to the *LATEX Community* Forum.

7 Reference masking

I did this one to myself. I was using the `apa` class to write a conference proposal and I thought how nice it would be to automagically suppress all the references to myself when submitting a paper for masked peer review.

So I chipped away at some code, did a lot of online searching and experimenting, and finally cobbled together something that seems to work. My solution was to write a series of new citation commands, which are redefinitions of the basic citation commands from

the three bibliographic packages that apa6 supports. The output of these commands replaces citations with text such as "*2 citations removed for masked review*" (in the case of two masked sources). This allows the user to specify which citations will be masked and which will not — without having to go back and edit the citation commands when the time comes to bare all.

I have yet to find a good explanation of some of the concepts operating in these functions that I wrote, but I have to say there is a sense of accomplishment in obtaining the outcome I was seeking.

8 User-selected font size

Another self-imposed difficulty was figuring out how to modify the font size of an apa6 document. I wanted to be able to provide the capability of specifying any of the standard font sizes (10pt, 11pt, 12pt) that LaTeX provides.

After several unsuccessful attempts, I gave up. Then I tried again and gave up. But it kept nagging at me. Ultimately I solved it by defining a command \apaSix@ptsize{} to hold the selected font size, and a comparison command, \apaSix@noptsize{} that was always empty. Then, with the appropriate \DeclareOption commands to capture the 10pt, 11pt, and 12pt options, I used \ifx as follows for the man mode:

```
\ifx\apaSix@ptsize\apaSix@noptsize
  \LoadClass[12pt]{article}
\else
  \LoadClass[\apaSix@ptsize]{article}
\fi
```

This provides a default font size of 12pt, which can be overridden by the user if desired. Code similar to the above establishes 10pt as the default for jou mode and 11pt for doc mode.

9 Watermark

As I began to use my development version of apa6, new features kept creeping up on me and begged to be implemented. One of these was prominently displaying that a document was a draft version. Consequently, apa6 can now automatically load the draftwatermark package to display a "DRAFT" watermark on either the first page or on all pages of a document. This watermark can be customized with different text or font size (using the options documented with the draftwatermark package).

An unexpected situation arose, however; via the feedback of a faithful user of apa6, I discovered that when the lmodern package is not loaded, the watermark is very small. The draftwatermark documentation makes no indication of this, so I'm mentioning it here for others who may have seen similar odd renderings of this watermark package.

10 Conversion to Word

The major disadvantage of using LaTeX in the social sciences is that almost no one else does. Our journals purportedly don't accept LaTeX files (much less provide formatting classes), and they don't typically list PDF files as acceptable formats for manuscripts being submitted for review. This sparse usage of LaTeX provides challenges for (a) collaboration and (b) submission of manuscripts for publication.

This situation brings us to the need to have a way of converting a LaTeX document to a more commonly used word-processing format. I have encountered recommendations for both htlatex and tth. I have tried both and (probably because of my naivete) have been utterly unsuccessful at obtaining anything close to the PDF output produced by apa6.

Having seen a sentence online claiming that Chikrii Softlab's TeX2Word software (`http://www.chikrii.com/products/tex2word/`) was customizable in how it translated the TeX code into a Microsoft Word document, I gave it a try. Essentially, TeX2Word uses a proprietary TeX engine (thus not requiring a TeX installation) with a limited command set that closely resembles TeX. After several lengthy interchanges with their technical support, the result is an apa6.ptex file, included with apa6, that comes very close to replicating the PDF output of apa6. The title page, abstract page, section headings, figure and table captions, and bold and italic text are all formatted with very little need for modification (running heads are an exception). Floats must be moved from their default points within the document to their appropriate places after the reference list. The most notable exception at present is a near-total lack of bibliographic support.

11 Using apa6 with bibliography packages

Three major bibliography packages are compatible with apa6: apacite, natbib, and biblatex. I tested each of these packages against the requirements of the 6th Edition of the *Manual*. This section compares the output of these packages, highlighting inaccuracies of which authors should be aware. For details on how to use each of these packages with the apa6 class, please refer to the apa6 documentation.

11.1 Citation tests

The test cases for bibliography formatting come from the file bibliography.bib, which is included in the "samples" subfolder of the apa6 installation. There are several situations to examine in order to see how

Table 1: Citation test results

Test	Expected	apacite[a]	apacite-natbib[b]	biblatex-bibtex[c]	biblatex-biber[d]
1	Herbst-Damm and Kulik (2005)	pass	pass	pass	pass
2	(Herbst-Damm & Kulik, 2005)	pass	pass	pass	pass
3	(Haybron, 2008; Mayer, 2008a)	*fail*	pass	pass	pass
4a	Lassen, Steele, and Sailor (2006)	pass	pass	pass	pass
4b	Lassen et al. (2006)	pass	pass	pass	pass
5	Gilbert et al. (2004)	pass	pass	pass	pass
6a	Mayer (2008a)	pass	pass	pass	pass
6b	Mayer (2008b)	pass	pass	pass	pass
7	Mayer (in press-a, in press-b)	pass	pass	pass	pass
8	(Mayer, 2008a, 2008b)	pass	pass	pass	pass
9a	J. R. Levin and O'Donnell (2000)	pass	pass	*fail*	pass
9b	M. E. Levin and Levin (1990)	pass	pass	*fail*	*fail*
10a	(Borst, Kosslyn, et al., 2011)	pass	pass	*fail*	pass
10b	(Borst, Kievit, et al., 2011)	pass	pass	*fail*	pass
10c	(Borst, Thompson, & Kosslyn, 2011)	pass	pass	*fail*	pass
11	Franklin and Adams (2010)	pass	pass	pass	pass
12	De Waal and Grosser (2009)	*fail*	pass	pass	pass

well we are complying with APA requirements. The following tests are not intended to be comprehensive tests of APA citation style; rather, they cover some of the more rigorous APA-style challenges for bibliographic citation software. The number of each test corresponds to a line in Table 1 (which also summarizes the results).

1. *Joining multiple author names outside parentheses.* With a multiple-author source and when all authors are required to be listed (as opposed to the situations in Tests #4 and #5 below), the word "and" must be written out prior to the last author's name if the authors are named outside parentheses.

2. *Joining multiple author names within parentheses.* In the same situation as above, but when the authors' names are cited *inside* parentheses, the symbol "&" must be used in place of the word "and".

3. *Order citations alphabetically.* When multiple sources are cited within parentheses, they must be sorted in the same order in which they appear in the reference list at the end of the manuscript. For this test, citations were purposely entered in reverse alphabetical order.

4. *Truncating 3–5 author names.* When there are 3–5 authors, all authors' names are listed for the first citation; subsequent citations list only the first author's name followed by "et al."

5. *Truncating six or more author names.* When there are more than six authors, only the first author should ever be listed, followed by "et al.".

6. *Same author(s), same year.* When different articles have the identical author(s) in the same year, the year must be followed by "a", "b", etc.

7. *Same author(s), in press.* When different in-press articles have identical author(s), the year must be given as "in press-a", "in press-b", etc.

8. *Same author(s), different articles.* When citing two or more articles by the same author(s) within parentheses, the author name(s) need not be repeated.

9. *Different first authors, same last name.* When two first authors have the same last name, their initials must be given to clarify which one is being cited.

10. *Multiple authors, same year.* When two or more articles have a subset of the same authors in the same order, all citations must give as many author names as necessary to make the citation unique. Note that the "al." in "et al." is plural and therefore must replace at least two names.

11. *Suppress name suffixes.* The suffix of author names (e.g., "Jr.") should not be included when citing their work in the body of the text.

12. *Capitalizing initial lower-case names.* If the first word in a sentence is an author name that begins

Brian D. Beitzel

with a lower-case letter (e.g., "de Waal"), the name should nonetheless be capitalized.

11.2 Results of citation tests

The results of these citation tests are shown in Table 1. First, it should be noted that most of these packages handle basic citations very well. Only one of them passed all 12 tests, but two others did very well. Additionally, not all failures in Table 1 are equally egregious; for example, the single biblatex-biber failure (Test #9b) will never cause confusion as to which source is being cited.

Before we look at the results, I wish to applaud the developers of apacite and biblatex-apa for responding to my initial citation test results and modifying their packages to better comply with 6th Edition requirements. There are now many fewer failed tests in this series than there were when I first ran these tests with then-current versions of these packages only a few months ago.

The results for each package are summarized next. No reviewer or journal editor will ever remark on "the amazing accuracy of your citations"; but comments to the opposite effect may be encountered. Unfortunately, we therefore need to focus on the non-compliance here rather than what each package does right.

11.2.1 apacite

The apacite package was loaded using the apacite option when loading the apa6 class, like this:
`\documentclass[jou,apacite]{apa6}`

There were two apacite errors: (a) in Test #3, the references were not sorted alphabetically within the parentheses; and (b) in Test #12, the prefix "De" could not be capitalized because apacite does not provide any capitalization command.

To overcome the failures of Test #3, one must manually sequence the parenthetical citations; this is entirely feasible but does require a certain level of alertness on the part of the author. There is no cure for the failure of Test #12 without adding on the natbib package (see next section).

11.2.2 apacite-natbib

Both the apacite package and the natbib package were loaded implicitly using the natbib option when calling the apa6 class:
`\documentclass[jou,natbib]{apa6}`

There were no apacite-natbib errors, thanks to some clever programming by the apacite developer, Erik Meijer. The natbib package does not contain a bibliographic style; therefore, apacite is required when using natbib with apa6. The apacite package

contains directives that load natbib and appropriately modify natbib commands to conform to 6th Edition requirements. The apa6 user simply needs to specify the natbib option to load and configure both of these packages properly.

11.2.3 biblatex with bibtex

The biblatex package was loaded with the following options specified:
`\usepackage[style=apa,sortcites=true,`
`           sorting=nyt]{biblatex}`

There were five biblatex (with bibtex) errors: (a) in Test #9a, the first author's initials were not given; this is a serious error, explicitly violating APA requirements because another author has the same surname; (b) in Test #9b, the same problem was encountered; (c–e) in Tests #10a, #10b, and #10c, the references were identified as "(Borst et al., 2011a)," "(Borst et al., 2011b)," and "(Borst et al., 2011c)." Although the Test #10 results do not cause confusion in identifying the intended source, this format does not conform to APA requirements.

11.2.4 biblatex with biber

The biblatex package was loaded with the following options specified:
`\usepackage[style=apa,sortcites=true,`
`          sorting=nyt,backend=biber]{biblatex}`

There was only one minor biblatex (with biber) error: In Test #9b, the second author's initials were given (only first authors' initials are required when there are multiple authors with the same surname).

11.3 Conclusions from citation tests

For APA-style citations, the apacite-natbib and the biblatex-biber solutions are clearly the most competent; the only error was relatively minor and would never cause confusion as to which source is being cited (biblatex-bibtex).

Time for a personal admission: For several months after learning about biber I was daunted by using it because for some reason I thought that once I converted to biber I was more or less committing myself to it for life. However, that is not so; to use biber, there are no changes required in the `.bib` file (although some advantages can be gained from a few label changes). All it takes is including the `backend=biber` option when loading the biblatex package. It could hardly be simpler!

11.4 Reference tests

The in-text citations are only part of the battle; formatting the reference list correctly is the other critical test for a bibliography package. I checked

the reference list output from each package against 6th Edition requirements and found no errors that could not have been predicted by the results of the citation tests already described.

11.4.1 apacite

The apacite package produced a perfect reference list for my sample sources.

11.4.2 apacite-natbib

The apacite-natbib solution also had no errors in the reference list.

11.4.3 biblatex with bibtex

Strangely, biblatex (with bibtex) erred in sorting two of the references: Borst, Kosslyn, et al., 2011 was listed prior to Borst, Kievit, et al., 2011. I don't have a clue as to why this would be; I even tried switching the BibTeX keys but the sorting remained unchanged.

Additionally there is the problem of the three Borst references having "a", "b", and "c" (respectively) appended to their publication dates. This is not necessary because the author lists for these three references are unique.

11.4.4 biblatex with biber

The biblatex-biber solution also produced a perfect reference list.

11.4.5 Attention to the details

To conclude, let's show off a 6th Edition formatting requirement that all four of these bibliography solutions can now do. D. Gilbert and eight other individuals published an article in 2004. Check out the reference below and you will see that the first six

authors are listed, followed by an ellipsis, followed by the final author. This way of handling more than six authors in the reference list is a new stipulation in the 6th Edition.

> Gilbert, D., McClernon, J., Rabinovich, N., Sugai, C., Plath, L., Asgaard, G., ... Botros, N. (2004). Effects of quitting smoking on EEG activation and attention last for more than 31 days and are more severe with stress, dependence, DRD2 A1 allele, and depressive traits. *Nicotine & Tobacco Research, 6*(2), 249–267. doi:10.1080/14622200410001676305

11.5 EndNote results

For comparison with a leading commercial bibliographic manager, I also subjected the latest version of EndNote (X5.0.1) to each of these tests. EndNote failed citation tests #10c (substituting "et al." in place of only one author name, the same error as biblatex) and #12 (with no capitalization available for a lower-case name, the same flaw as apacite). There were no errors on the reference list.

12 Conclusion

Although I didn't know exactly what I was getting myself into when I began tinkering with the apa code, I'm glad I tackled this project. I've learned a lot, and with the help of others in the TeX community, apa6 can be even better in the future.

⬦ Brian D. Beitzel
  129 Fitzelle
  SUNY Oneonta
  Oneonta, NY 13820   USA
  brian (at) edpsych dot net
  http://www.edpsych.net/brian/