

# Every Author as First Author\*

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## Abstract

We propose a new standard for writing author names on papers and in bibliographies, which places *every author as a first author* — *superimposed*. This approach enables authors to write papers as true equals, without any advantage given to whoever’s name happens to come first alphabetically (for example). We develop the technology for implementing this standard in L<sup>A</sup>T<sub>E</sub>X, B<sub>I</sub>B<sub>T</sub>E<sub>X</sub>, and HTML; show several examples; and discuss further advantages.

## 1. Introduction

**The problem.** Authorship order makes for fraught debates in academia. Perhaps the most common standard is to list authors in decreasing order by significance of contribution. But this quantity is usually difficult to measure, and can lead to uncomfortable conversations, arguments, or even feuds. For example, are an advisor’s leadership and high-level ideas more or less important than a student’s technical solutions? Is one author’s technical work more or less important than another author’s writing of the paper? Even if the answer to these questions are clear to you (and equal among all authors), authors’ contributions are rarely so clearcut. And what if the contributions are roughly equal?

In some disciplines, the order has additional codified meanings. For example, many natural sciences use the last author position to indicate the research supervisor (principal investigator) whose lab housed the work. But what if multiple people serve that role, as research becomes increasingly collaborative?

**Existing solutions.** Some disciplines — such as economics, mathematics, and theoretical computer science — discourage the idea of determining authorship order by defaulting to an algorithmically determined order: alphabetically increasing by surname. In particular, the alphabetical standard is a central tenet of *supercolaborative* research (Demaine 2018), where researchers brainstorm to solve problems as equals, and everyone decides for themselves

\* Full source code of this paper is available at <https://github.com/edemaine/author-stack-paper>

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DOI: [http://dx.doi.org/10.1145/\(to come\)](http://dx.doi.org/10.1145/(to come))

whether they contributed enough to be an author. The motivation is that it is difficult to compare contributions when brainstorming, as failed ideas are often as important as successful ideas, and ideas are often as important as technical work. Agreeing to alphabetical authorship ahead of time guarantees that everyone will be recognized for their contributions, without ever having to argue about who contributed what.

The alphabetical approach avoids any uncomfortable conversations and arguments, and works well when contributions are roughly equal or difficult to compare. But in practice, we have occasionally seen authors who feel slighted by being listed late despite having contributed significantly more than others (e.g., having led the research and/or paper).

Other disciplines offer footnotes to clarify authorship order. For example, multiple authors can be marked “joint first author” to indicate equal contributions, or multiple authors can be marked as having “jointly supervised” the work. In these cases, the authors in the same category are normally listed alphabetically. When all authors contributed roughly equally, many papers include a footnote explaining that authorship order is alphabetical (especially in publication venues where this is not the standard). *Nature* encourages including author contribution statements which specify each author’s exact contribution to the work.

**Bias.** A fundamental limitation to *any* approach that lists the authors in a fixed order arises when citing papers with several authors. In the body of a paper (as opposed to the bibliography), it is most common to write “X et al. [#]” when referring to a paper [#] whose first author’s surname is X. In author–year styles such as APA, this is even built into the citation itself, e.g., (X et al., 2023). As a result, author X gets their name effectively promoted with every citation, which is inconsistent with multiple or all authors being equal.

In our own writing, we try to avoid this practice, and instead write all authors’ surnames whenever citing a paper, e.g., “X, Y, and Z [#]”. But this workaround becomes impractical for references with over a dozen authors, such as some of our papers (Hartshorn 2020; Bellamy 2020) or some papers in astronomy (Cassenger 2006) and biology (Siviswaran 2001).

Beyond listing authors when citing papers, other biases arise from alphabetical ordering specifically. Bibliography styles where papers are sorted alphabetically (such as ACM’s) cluster together papers with the same first author, further promoting people who have alphabetically early surnames so are more likely to be first. And of course fields whose standard is not alphabetical ordering unfairly judge authorship order of papers that do.

These effects are collectively referred to as *alphabetical discrimination* (Weber 2018). Several studies have explored this phenomenon, and find evidence that people with alphabetically earlier surnames are more likely to succeed academically. The present au-

thors have sometimes uncomfortably wondered whether they have benefited in this way, with surnames starting with “D”.

To compensate for alphabetical discrimination, several specific papers have explored alternate mechanisms for deciding authorship order, as documented in a footnote. These mechanisms include competition via 25-game croquet series (Massell 1974), 2-day backgammon contest (Gladley 1977), tennis match (Griffithson 1978), basketball free throws (Rastarits 1991), arm wrestling (Blenningham 1995), brownie bake-off (Young 1992), a game of chicken (Richterstein 1983), or rock paper scissors (Wright 2004); by coin toss (Billard 1992), dice roll (Barritt 2011), the outcome of famous cricket games (Kohra 2010), currency exchange rate fluctuation (Mitchell-Olds 2003), or dog treat consumption order (Murray 2019); or by authors’ height (Woodward 2005), fertility (Bibcock 1992), proximity to tenure (Gillespie 1998), reverse alphabetical order (Bosboom, Demaine, Lynch 2006), or degree of belief in the paper’s thesis (Chalmers 1998). Others have proposed games such as Russian roulette (“publish and perish”) (Purvis 2016). See the excellent surveys (Duffy 2016; Deville 2014; Obscura 2014) and their comments.

## 2. Solution

Our proposed solution is a new standard for listing the authors of a paper: instead of any ordered list, write all author names on top of each other. For example, instead of “Erik Demaine and Martin Demaine” (alphabetical), we write ~~Erik Demaine~~. In this way, we achieve the true ideal of an unordered set of equal authors, where every author comes first.

In settings where authors did not contribute roughly equally, we can generalize to writing each group of equal authors as an overlapping stack of names. For example, when we want to distinguish multiple first authors, multiple “middle” authors, and multiple supervising authors, we can write three distinct groups of authors, where each group is overlapping.

Our vision is that each set of names (as we often associate with each paper) becomes recognizable as its own image. Readers can then recognize repetitions of the same paper without necessarily reading the individual names. For example, compare two of our papers with overlapping but differing sets of 13–15 authors (which came from a common supercollaborative open problem session so share many names): ~~Blumenthal et al. (2020)~~ vs. ~~Bosboom et al. (2020)~~. Each author stack has a distinct shape. If we now repeat one — ~~Blumenthal et al. (2020)~~ — you should be able to recognize which it is.

### 2.1 Revealing the Names

Of course, we want to give authors (equal) credit for their papers, not remove all credit. We have implemented two ways to reveal the actual names present in an overlapping stack, when viewing a PDF file on a computer.

First, hovering over the stacked names should pop up a tooltip with the authors listed in their original order, as shown in Figure 1. This feature works on many desktop PDF viewers (e.g., Acrobat, Evince, Firefox, VSCode), but notably not Chrome<sup>1</sup>, Edge, Safari, or MacOS Preview. It also does not work on mobile devices we tested (probably because they lack a natural notion of “hovering”). Because tooltips and links are both types of PDF annotations, they would conflict with each other if used together, so we had to remove hyperlinks from names; the years remain clickable links to the bibliography.

Second, copying and pasting the author stack (together with any surrounding text) into another document should reveal the authors in their original order, using PDF’s accessibility feature.

<sup>1</sup>See <https://bugs.chromium.org/p/chromium/issues/detail?id=1122489>

particular, the alphabetical standard is a central tenet of *supercollaborative* research (Demaine 2018), where researchers brainstorm to solve problems as equal ~~Bosboom, Demaine, Demaine, Lynch~~ for themselves whether they contributed enough to be an author. The motivation

~~Blumenthal et al. (4)~~. Running supercollaborative open problem sessions. Manuscript, 2018. URL: <https://supercollaboration.org/>.  
~~Bosboom, E. D. Demaine, M. L. Demaine, J. Lynch~~  
~~Blumenthal et al. (15)~~. Edge matching with inequalities, triangles, unknown

**Figure 1.** Hovering over a name stack reveals the authors in their original order, as they would normally be written in the citation (top) or bibliography (bottom). Screenshots from VSCode’s LaTeX Workshop Extension’s internal PDF viewer (Yu), which is based on PDF.js.

This makes it easy to quote portions of a paper, including any citations, with or without author stacks. This feature is currently supported by only a few PDF viewers, including Acrobat, Chrome, Edge, and Evince.

### 2.2 Opacity

To improve legibility, we write each name in semi-transparent ink (currently, 2/3 opacity). As a result, where multiple characters overlap, the ink appears darker, making the names more legible. Compare:

- ~~Erik Demaine~~ (opacity 1, no transparency)
- ~~Erik Demaine~~ (opacity 3/4)
- ~~Erik Demaine~~ (opacity 2/3)
- ~~Erik Demaine~~ (opacity 1/2)

In the future, we may consider using a different opacity depending on the number of authors. More extreme, we could use opacity to indicate the relative contribution of each author (when they are unequal), or different colors to represent different roles (such as supervisor). But for now we like the uniformity of every name appearing the same in all contexts.

### 2.3 Space Savings

An additional benefit of our solution is that long lists of names can be written in far less space, and roughly the same amount of space for each paper. For example, the 274 authors of the human genome project (~~International Human Genome Sequencing Consortium 2001~~) would normally take almost half a page to list:

J. C. Venter, M. D. Adams, E. W. Myers, P. W. Li, R. J. Mural, G. G. Sutton, H. O. Smith, M. Yandell, C. A. Evans, R. A. Holt, J. D. Gocayne, P. Amanatides, R. M. Ballew, D. H. Huson, J. R. Wortman, Q. Zhang, C. D. Kodira, X. H. Zheng, L. Chen, M. Skupski, G. Subramanian, P. D. Thomas, J. Zhang, G. L. G. Miklos, C. Nelson, S. Broder, A. G. Clark, J. Nadeau, V. A. McKusick, N. Zinder, A. J. Levine, R. J. Roberts, M. Simon, C. Slayman, M. Hunkapiller, R. Bolanos, A. Delcher, I. Dew, D. Fasulo, M. Flanigan, L. Florea, A. Halpern, S. Hanchhalli, S. Kravitz, S. Levy, C. Mobarry, K. Reinert, K. Remington, J. Abu-Threideh, E. Beasley, K. Biddick, V. Bonazzi, R. Brandon, M. Cargill, I. Chandramouliswaran, R. Charlab, K. Chaturvedi, Z. Deng, V. D. Francesco, P. Dunn, K. Eilbeck, C. Evangelista, A. E. Gabrielian, W. Gan, W. Ge, F. Gong, Z. Gu, P. Guan, T. J. Heiman, M. E. Higgins, R. R. Ji, Z. Ke, K. A. Ketchum, Z. Lai, Y. Lei, Z. Li, J. Li, Y. Liang, X. Lin, F. Lu, G. V. Merkulov, N. Milshina, H. M. Moore, A. K. Naik, V. A. Narayan, B. Neelam, D. Nusskern, D. B. Rusch, S. Salzberg, W. Shao, B. Shue, J. Sun, Z. Wang, A. Wang, X. Wang, J. Wang,

M. Wei, R. Wides, C. Xiao, C. Yan, A. Yao, J. Ye, M. Zhan, W. Zhang, H. Zhang, Q. Zhao, L. Zheng, F. Zhong, W. Zhong, S. Zhu, S. Zhao, D. Gilbert, S. Baumhueter, G. Spier, C. Carter, A. Cravchik, T. Woodage, F. Ali, H. An, A. Awe, D. Baldwin, H. Baden, M. Barnstead, I. Barrow, K. Beeson, D. Busam, A. Carver, A. Center, M. L. Cheng, L. Curry, S. Danaher, L. Davenport, R. Desilets, S. Dietz, K. Dodson, L. Doup, S. Ferreira, N. Garg, A. Gluecksmann, B. Hart, J. Haynes, C. Haynes, C. Heiner, S. Hladun, D. Hostin, J. Houck, T. Howland, C. Ibegwam, J. Johnson, F. Kalush, L. Kline, S. Koduru, A. Love, F. Mann, D. May, S. McCawley, T. McIntosh, I. McMullen, M. Moy, L. Moy, B. Murphy, K. Nelson, C. Pfannkoch, E. Pratts, V. Puri, H. Qureshi, M. Reardon, R. Rodriguez, Y. H. Rogers, D. Romblad, B. Ruhfel, R. Scott, C. Sitter, M. Smallwood, E. Stewart, R. Strong, E. Suh, R. Thomas, N. N. Tint, S. Tse, C. Vech, G. Wang, J. Wetter, S. Williams, M. Williams, S. Windsor, E. Winn-Deen, K. Wolfe, J. Zaveri, K. Zaveri, J. F. Abril, R. Guigo, M. J. Campbell, K. V. Sjolander, B. Karlak, A. Kejariwal, H. Mi, B. Lazareva, T. Hatton, A. Narechania, K. Diemer, A. Muruganujan, N. Guo, S. Sato, V. Bafna, S. Istrail, R. Lippert, R. Schwartz, B. Walenz, S. Yooseph, D. Allen, A. Basu, J. Baxendale, L. Blick, M. Caminha, J. Carnes-Stine, P. Caulk, Y. H. Chiang, M. Coyne, C. Dahlke, A. D. Mays, M. Dombroski, M. Donnelly, D. Ely, S. Esparham, C. Fosler, H. Gire, S. Glanowski, K. Glasser, A. Glodek, M. Gorokhov, K. Graham, B. Gropman, M. Harris, J. Heil, S. Henderson, J. Hoover, D. Jennings, C. Jordan, J. Jordan, J. Kasha, L. Kagan, C. Kraft, A. Levitsky, M. Lewis, X. Liu, J. Lopez, D. Ma, W. Majoros, J. McDaniel, S. Murphy, M. Newman, T. Nguyen, N. Nguyen, M. Nodell, S. Pan, J. Peck, M. Peterson, W. Rowe, R. Sanders, J. Scott, M. Simpson, T. Smith, A. Sprague, T. Stockwell, R. Turner, E. Venter, M. Wang, M. Wen, D. Wu, M. Wu, A. Xia, A. Zandieh, and X. Zhu.

As a result, many papers that cite this paper do not list the entire author list even in the bibliography, instead writing “J. C. Venter et al.” Our approach makes it easy to give the full author list (Makridakiswaran 2001), giving credit to all authors, but without allocating that paper a disproportionate amount of space in the bibliography. Thus we help achieve fairness between cited papers, not just between authors on each paper.

The space-savings property is also helpful for conferences and journals with a hard limit on the number of pages including the bibliography. Such limits are common among printed publications. For such publications, the space savings also translates to a cost savings for the publisher, and a reduction in trees needed to make paper — a helpful step toward resolving the climate crisis.

### 3. Technology

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

We implemented L<sup>A</sup>T<sub>E</sub>X macros for easily superimposing author names into an “overlay stack”. A user can build such a stack from a semicolon-separated list of names like so:

```
\namestack{Erik Demaine; Martin Demaine}
→ MakridDemaine
```

Listing 2 below shows the source code for this macro. The main idea is to render each name (into a T<sub>E</sub>X horizontal box), and stack them vertically (in a T<sub>E</sub>X vertical box) with a negative one-line vertical space in between consecutive names. The example above effectively becomes:

```
1 \vbox{%
2   \hbox{Erik Demaine}%
3   \vskip-\baselineskip
4   \hbox{Martin Demaine}%
5 }%
```

This main content gets wrapped in three additional components:

1. `\textopacity{0.666}{...}` (implemented via `pgf.sty`) to make each name semi-transparent at opacity 2/3. The opacity can also be overridden via an optional argument, as in `\namestack[0.9]{...}`.
2. `\pdffootip` (from `pdfcomment.sty`) to add tooltips to the stack, with the original list of names.
3. `\BeginAccSupp{...ActualText=...}... \EndAccSupp{}` (from `accsupp.sty`) to override copy/paste behavior for the stack.

Listing 3 shows additional code necessary to support name/year bibliographies via `natbib.sty`. Specifically, we automatically wrap the “name” portion of a citation in `\namestack` (so it should be written as a semicolon-separated list). We also need to disable hyperlinks on the name portion of each citation, to avoid covering the tooltip with another PDF annotation.

#### 3.2 BIB<sub>T</sub>E<sub>X</sub>

We modified the `abbrvnat.bst` BIB<sub>T</sub>E<sub>X</sub> bibliography style requested by this proceedings to work with `\namestack`; refer to Listing 4 for the code. First, we automatically wrap author/editor names within each bibliography entry with `\namestack{...}`. We also append the number of names in a parenthetical; this helps the reader know how many names are in each stack, which we find particularly helpful in the context of this paper for getting the feel for the newly introduced stacks. Second, we output `natbib.sty`-compatible labels with semicolons between all author names (instead of just the first author name followed by “et al.”), so that the code in Listing 3 constructs the appropriate author stack.

#### 3.3 HTML

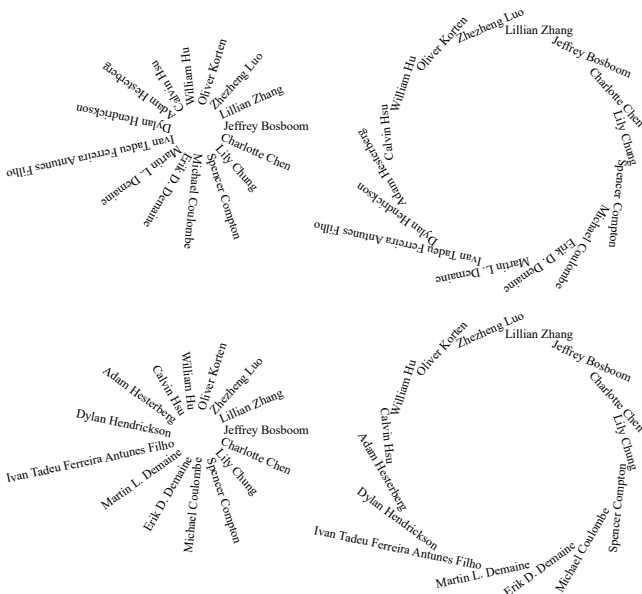
We also give a proof-of-concept that the same style of rendering is possible in HTML. Figure 2 shows a rendering of the HTML code in Listing 1. CSS Grid makes implementing an overlapping stack quite easy: by placing each name in the same grid cell, the cell automatically grows to the maximum size of all names.

See ~~Makrid~~Demaine (2023)

**Figure 2.** Rendering of HTML in Listing 1. Screenshot from Google Chrome 111 on Windows 11.

**Listing 1.** HTML source code illustrating a name stack

```
1 <style>
2 .stack { display: inline-grid; }
3 .stack > .name {
4   grid-row: 1; grid-column: 1;
5   opacity: 0.666; /*new stacking context*/
6 }
7 </style>
8
9 See
10 <span class="stack">
11   <span class="name">Erik Demaine</span>
12   <span class="name">Martin Demaine</span>
13 </span>
14 (2023)
```



**Figure 3.** Circular arrangements of the authors of [G. F. G. G. G. \(2020\)](#). Drawn in Inkscape using Circular Align and Distribute, onto a circle of radius 50 (left) or 200 (right); followed by 90° rotation (left); and rotating 180° to make names upright (bottom).

### 4. Future Work

One limitation of our new standard for listing names is that longer surnames gain some bias. For example, “Olds” (the second half of “Mitchell-Olds”) is clearly visible in [Mitchell-Olds \(2003\)](#). Will this lead to longer and longer academic surnames in the future? Arguably, longer names already receive some bias without our system, as they take up more relative space in the bibliography. Yet in practice so far, most surnames seem to have a similar length. The readability of a suffix of a surname also does not seem to advantage the actual name much.

A final issue is that overlapping name stacks are not easy to read. It may be possible to write names in a way that has no first name but still makes all names clearly readable. For example, a circle has no beginning or end, so arranging the names in a circular pattern avoids arranging any author “first”. [Figure 3](#) shows some initial experiments in this direction. Related, traditional *round-robin* documents ([Wikipedia 2022](#)) are signed by authors in a circle to prevent identification of a ringleader (such as mutineer sailors). It remains unsolved how to fit such circular arrangements in with the rest of a text document, which feels inherently sequential. Circular arrangements also seem difficult to apply to small numbers of authors such as 2.

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Listing 2.  $\text{\LaTeX}$  source code for `\namestack`

```

1 %% \namestack for making overlay/superposed stacks of names/text
2
3 \usepackage[final]{pdfcomment} % for tooltips
4 \usepackage{accsupp}           % for accessibility
5 \usepackage{pgf}               % for transparency
6
7 % Usage: \textopacity{opacity}{text}
8 % transparency.sty doesn't blend well in Acrobat, so we use PGF;
9 % see https://tex.stackexchange.com/a/681324/245104
10 \newcommand\textopacity[2]{%
11   \begin{pgfpicture}%
12     \pgfsetfillopacity{#1}%
13     \pgfpathmoveto{\pgfpointorigin}%
14     \pgftext[base]{#2}%
15   \end{pgfpicture}%
16 }
17
18 % Usage: \textstack{opacity}{item1; item2; ...}
19 % Or: \textstack[sep]{opacity}{item1 sep item2 sep ...}
20 % Expands to \vbox{\hbox{item1}\vskip-\baselineskip\hbox{item2}...},
21 % plus a PDF tooltip, copy/paste override, and specified opacity.
22 % Loop iteration based on https://tex.stackexchange.com/a/159177/245104
23 \makeatletter
24 \newcommand\textstack[3][;]{%
25   % Append separator (#1) and \@eol to end of input:
26   \def\textstack@append##1{\expandafter\textstack@step##1#1\@eol}%
27   % Split into first component (##1) up to separator (#1), and rest (##2):
28   \def\textstack@step##1#1##2\@eol{%
29     % Build \hbox for this component (##1) with specified opacity (##2)
30     \hbox{\textopacity{##2}{\ignorespaces ##1\unskip}}%
31     \ifx\@eol##2\@eol\else
32       % More steps: unwind vertical space and continue
33       \vskip-\baselineskip
34       \textstack@step##2\@eol
35     \fi}%
36   % Tooltip with full author list (##3)
37   \pdftooltip{%
38     % Override copy/paste text with full author list (##3)
39     \BeginAccSupp[method=pdfstringdef,unicode,ActualText={##3}]%
40     % Wrap stack in \vbox
41     \vbox{\textstack@append{##3}}%
42     \EndAccSupp{}%
43   }{##3}%
44 }
45 \makeatother
46
47 % Usage: \namestack{name1; name2; ...}
48 % Or: \namestack[opacity]{name1; name2; ...}
49 % Like \textstack but with optional opacity defaulting to 2/3
50 \newcommand\namestack[2][0.666]{\textstack{#1}{#2}}

```

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---

**Listing 3.** L<sup>A</sup>T<sub>E</sub>X code providing additional support for natbib.sty

```
1 %% \namestack support for natbib.sty
2 \makeatletter
3
4 % When formatting the name part of a citation, wrap in \namestack
5 \def\NAT@nmfmt#1{%
6   \xdef\textstack@expand{#1}%
7   \expandafter\namestack\textstack@expand
8 }
9
10 % Remove links from names so that tooltips are visible.
11 % Code from https://tex.stackexchange.com/a/27311/2451040
12 \usepackage{etoolbox}
13
14 % Patch case where name and year are separated by aysep
15 \patchcmd{\NAT@citex}
16   {\@citea\NAT@hyper@{%
17     \NAT@nmfmt{\NAT@nm}%
18     \hyper@natlinkbreak{\NAT@aysep\NAT@spacechar}{\@citeb\@extra@b@citeb}%
19     \NAT@date}}
20   {\@citea\NAT@nmfmt{\NAT@nm}%
21     \NAT@aysep\NAT@spacechar\NAT@hyper@{\NAT@date}}}{-}{-}
22
23 % Patch case where name and year are separated by opening bracket
24 \patchcmd{\NAT@citex}
25   {\@citea\NAT@hyper@{%
26     \NAT@nmfmt{\NAT@nm}%
27     \hyper@natlinkbreak{\NAT@spacechar\NAT@@open\if*#1*\else#1\NAT@spacechar\fi}%
28     {\@citeb\@extra@b@citeb}%
29     \NAT@date}}
30   {\@citea\NAT@nmfmt{\NAT@nm}%
31     \NAT@spacechar\NAT@@open\if*#1*\else#1\NAT@spacechar\fi\NAT@hyper@{\NAT@date}}
32   {}{}
33
34 \makeatother
```

**Listing 4.** Excerpts from BIB<sub>T</sub><sub>E</sub>X style file, including all changed functions from abbrvnat.bst

```

1  %% File: 'stack-abbrvnat.bst'
2  %% A modification of 'abbrv.bst' for use
3  %% with natbib package, further modified
4  %% for stacking names with \namestack
5
6  % Wrap top of stack in \namestack{...}
7  FUNCTION {namestack}
8  { "\namestack{" swap$ * "}" *
9  }
10
11 % Format list of names (author or editor)
12 % on top of stack for inclusion in bibitem
13 FUNCTION {format.names}
14 { 's :=
15   #1 'nameptr :=
16   s num.names$ 'numnames :=
17   numnames 'namesleft :=
18   { namesleft #0 > }
19   { s nameptr "{f.~}{vv~}{ll}{, jj}"
20     format.name$ 't :=
21     nameptr #1 >
22     { namesleft #1 >
23       { ";" * t * }
24       { t "others" =
25         { " et~al." * }
26         { ";" * t * }
27         if$
28       }
29       if$
30     }
31     't
32     if$
33     nameptr #1 + 'nameptr :=
34     namesleft #1 - 'namesleft :=
35   }
36   while$
37   namestack
38   % Append parenthetical number of names
39   " (" * numnames int.to.str$ * ")" *
40 }
41
42 % Format list of names (author or editor)
43 % on top of stack for inclusion in
44 % natbib.sty label (just last names)
45 FUNCTION {format.full.names}
46 { 's :=
47   #1 'nameptr :=
48   s num.names$ 'numnames :=
49   numnames 'namesleft :=
50   { namesleft #0 > }
51   { s nameptr
52     "{vv }{ll}" format.name$ 't :=
53     nameptr #1 >
54     { ";" * t * }
55     't
56     if$
57     nameptr #1 + 'nameptr :=
58     namesleft #1 - 'namesleft :=
59   }
60   while$
61 }
62
63 % Omitted because not changed: make.full.names
64 % calls format.full.names with author or editor
65
66 % Compute label for sorting purposes (not used
67 % for actual output because it can overflow)
68 FUNCTION {calc.label}
69 {
70   make.full.names
71   "(" *
72   year *
73   ")" *
74   'label :=
75 }
76
77 % Output natbib.sty label, without storing in
78 % a variable so won't overflow with many names
79 FUNCTION {write.label}
80 {
81   make.full.names write$
82   "(" write$
83   year write$
84   ")" write$
85 }
86
87 FUNCTION {output.bibitem}
88 { newline$
89   "\bibitem[" write$
90   write.label
91   "]" write$
92   cite$ write$
93   "]" write$
94   newline$
95   ""
96   before.all 'output.state :=
97 }

```