

LaTeX source file for: LaTeX Typesetting Features Used in Linguistics

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1 \documentclass [11pt]{ article}
2 \usepackage [german, francais , spanish , latin , english] {babel}
3 \usepackage {amsmath}
4 \usepackage {semantic}
5 \usepackage {color}
6 \usepackage [table]{xcolor}
7 \usepackage {fullpage}
8 \usepackage {hyperref}
9 \usepackage {url}
10 \usepackage{graphicx}
11 \usepackage {qtree}
12 \usepackage {covington}
13 \usepackage{gb4e}
14 \usepackage{tipa}
15 \usepackage {pbox}
16 \usepackage {tree-dvips}
17 \usepackage {avm}
18 \usepackage [Verbose]{parallel}
19
20
21 \title {LaTeX Typesetting Features Used in Linguistics}
22 \author {Jake Warde \ \ Warde Publishers , Inc.}
23 \begin {document}
24 \maketitle
25 \begin {abstract}
26 The following sections are excerpts from linguistics papers and texts.
27 The excerpts were selected to show a variety of typesetting
28 requirements in the field of linguistics as they can be implemented
29 using Latex. Each section lists the key typesetting features
30 demonstrated and the Latex packages used to create them. The
31 footnotes provide bibliographic references or internet linking to
32 the source for the linguistic example.
33 \end {abstract}
34
35 \section{Numbered Linguistic Examples}
36
37 \begin {exe}
38 \ex\label {here} John is a polyglot.
39 \ex By way of contrast , however, consider the following examples:
40 \begin{xlist}
41 \ex[*]{He is a polyglot , aren't they?}
42 \ex[*]{Come here , isn't Bill?}
43 \ex[*]{Himself saw John.\footnote {Akmajian, A. and Heny F.; An
44 Introduction to the Principles of Transformational Syntax: MIT
45 Press 1980" p.1}}
46 \end {xlist}
47 \end {exe}
48
49 \section {Glosses}
50 \subsection{Glosses with word-by-word alignment}
51 \begin{exe}
52 \ex
53 \gll Wenn jemand in die W"uste zieht... \ \
54 If someone in the desert draws... \ \
55 \trans 'if one retreats to the desert and ... '\footnote{\url {ftp://ftp
56 .dante.de/tex-archive/macros/latex/contrib/gb4e/gb4e-doc.pdf} } \ \
57 \ex
58 \gll ni- c- chihui -lia in no- piltzin ce calli\ \
59 I it make for to-the my son a house\ \
60 \glt 'I made my son a house.' \footnote{\url {http://en.wikipedia.org/
61 wiki/Interlinear-gloss} }
62 \end{exe}
63
64 \subsection{Glosses with morepheme-by-morpheme correspondence and
65 grammatical categories}
66 \begin {exe}
67 \ex
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57 \gll Gila abur-u-n ferma hami alu g na amuq -da- .\\
now the-OBL-GEN farm forever behind stay-FUT-NEG\\
59 \glt 'Now their farm will not stay behind forever.'
\ex
61 \gll Musa a-li-ni-andik-ia barua\\
Musa SBJ.CL.1-PST-OBJ.1.SG-send-APPL letter\\
63 \glt Musa sent me a letter \footnote
{Examples 5 and 6: The Leipzig Glossing Rules \url {http://www.eva.mpg.
de/lingua/resources/glossing-rules.php} }
65 \end {exe}

67 \paragraph {Latex Package:}The examples in Sections 1 and 2 were created
using \emph {gb4e}.

69 \section {Phrase Structure Rules and Trees}
\subsection{Phrase Structure Rules}
71 \paragraph {}The English sentence in example (7) is ambiguous:
\begin {exe}
73 \ex Mary saw the dragon in the cave.\footnote{\url{http://www.ling.ohio-
state.edu/~scott/teaching/2008/autumn/201/handouts/psg.pdf} }
\paragraph {}In one reading, the speaker is in the cave (call it reading
A), while under the second reading the dragon is in the cave but
the speaker is not (reading B).
75 Phrase structure grammars can capture ambiguity by assigning more
than one structure to a given string. The phrase structure rules in (8)
would license the sentence in (7).

77 \ex
79 \begin {tabular} {1 l}
\psr {S}{NP~VP} & \\
81 \psr {NP} {Det N} & \psr {Det} {the} \\
\psr {NP} {NP PP} & \psr {N} {cave} \\
83 \psr {NP} {Pro} & \psr {N} {dragon} \\
\psr {VP} {V NP PP} & \psr {P} {in} \\
85 \psr {VP} {V NP} & \psr {NP} {Mary} \\
\psr {PP} {P NP} & \psr {V} {Mary} \\
87 \end {tabular}
\end {exe}

89 \paragraph {}Note that the grammar in [8] contains two rules with the
category
91 VP on the left. This means that there are two structures that this
grammar can categorize as being VP-type things. This is where the
ambiguity will be captured in the case of (7). The two phrase
structure possibilities are presented in section 3.2. \\

93 \paragraph {Latex Package:}The Phrase Structure Rules in Section 3.1
were created using \emph{covington}.

95 \subsection {Phrase Structure Trees}
\paragraph {} Two possible phrase structure trees for the sentence in
(7): The phrase structure tree on the left defines reading A. The
phrase structure tree on the right defines reading B.

97 \begin {exe}
99 \ex
\noindent
101 \resizebox {\linewidth} {!}
{\Tree [.S [.NP Mary ].NP [.VP [.V saw ] [.NP [.det the ] [.N dragon ] ]
[.PP [.P in ] [.NP [.det the ] [.N cave ] ] ] ] ] ]
103 \Tree [.S [.NP Mary ].NP [.VP [.V saw ] [.NP [.det the ] [.N dragon ]
[.PP [.P in ] [.NP [.det the ] [.N cave ] ] ] ] ] ]
}
105 \end {exe}

107 \vspace {5 mm}

109 \paragraph {Latex Package:}The example in Section 3.2 was created using

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\emph {qtree.}

111 \section {Attribute Value Matrices}
113 \subsection {Overview}
\paragraph {Attribute-Value Matrix (AVM)}
115 This description of AVMs is from Zhang and Fokkens.\footnote{\url{http
://www.coli.uni-saarland.de/courses/syntactic-theory-09/slides/tfs.
pdf}}

117 \parskip .1 in
Attribute-value matrix (AVM) notation is a description language to
119 describe sets of feature structures, with the following three building
blocks.
\begin {description}
121 \item [\$bullet\$] Type descriptions selects all objects of a particular
type
\item [\$bullet\$] Attribute-value pairs describe objects that have a
particular
123 property. The attribute must be appropriate for the particular type,
and the value can be any kind of description
125 \item [\$bullet\$] Tags to specify token identity

127 \vspace {0.5cm}

129 \avmfont{\sc}
\avmsortfont{\scriptsize\it}
131 \avmvalfont{\it}
\avmoptions{sorted}
133 \begin {avm}
\[{t1}
135 F1 & t2 \\\
F2 & \@1 & \[{t3} F4 & t \\\
137 F3 & \@1 \\\
\end {avm}
139 \vspace {0.5cm}

141 \item [\$bullet\$] Attribute-Value Matrix (AVM) is used to describe
feature structures
\item [\$bullet\$] The order of the rows is not important
143 \item [\$bullet\$] Each attribute can only take one value, hence the
following AVM is improper and does NOT describe any feature
structure

145 \begin {avm}
\[{ {person} Name & Sandy \\\
Age & 29 \\\
149 Age & 30 \\\
\end {avm}

151 \item [\$bullet\$] It is common practice to refer to AVMs as feature
structures,
153 although strictly speaking they are feature structure
descriptions
\end {description}

157 \subsection {Examples of AVMs}
In the simplified AVM for the word "walks" below, the verb's categorial
information is divided into features that describe it (HEAD) and
features that describe its arguments (VALENCE).\footnote{\url {http
://en.wikipedia.org/wiki/Head-driven_phrase_structure_grammar} }

159 \vspace {0.5cm}

161 \begin {exe}
\ex
163 {\footnotesize\sf\begin {avm}

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165 \[ \emph {word} \]
167 PHON & \<'walks'\> \]
169 SYNSEM &
    \[ \emph {synsem} \]
171 CAT &
    \[ \emph {category} \]
173 HEAD & \emph {verb} \]
    VALENCE &
175 \[ SUBJ &
    \< \[ \emph {synsem} \]
177 CAT|HEAD & \emph {noun} \]
    CONT &
179 \[ \emph {ref-index} \]
    PER & 3rd \]
181 NUM & Sing \] \] \> \]
    COMP \<\>\] \]
183 CONT &
    \[ \emph {content} \]
185 WALKER & \@1 \]
    \] \] \]
187 \end {avm} }
    \end {exe}
189 \paragraph {Latex Pacakge:}The Attribute Value Matrix was created using
    the \emph {AVM} package.
191 \subsection {Drawing Connecting Lines on Trees and AVMS}
193 For simplicity and to help readers compare the Latex used to produce the
    lines , connecting lines are shown on the two examples shown in (9–
    left) and (10).
195 \begin {exe}
    \ex
197 \Tree [.S [\node{Mary}{Mary} ].NP [.VP [.V saw ] [.NP [.det the ] [.N
    dragon ] ] [.PP [.P \node{P}{in} ] [.NP [.det the ] [.N cave ] ] ]
    ] ]
    \nodebox{Mary}
    \nodebox{P}
199 \anodecurve [b1] {Mary} [b1] {P} {.5in}
201 \end {exe}
203 The tree graph in (11) corresponds to Reading A in (9) in which Mary is
    " in the cave."
205 \hspace {.10cm}
207
208 \begin {exe}
    \ex
209 {\footnotesize\sf\begin {avm}
211 \[ \emph {word} \]
213 PHON & \!{a}{\<'walks'\>} \]
215 SYNSEM &
    \[ \emph {synsem} \]
217 CAT &
    \[ \emph {category} \]
219 HEAD & \emph {verb} \]
    VALENCE &
221 \[ SUBJ &
    \< \[ \emph {synsem} \]
223 CAT|HEAD & \emph {noun} \]
    CONT &
225 \[ \emph {ref-index} \]
    PER & 3rd \]

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227         NUM & Sing \] \] \> \\\
          COMP \<\>\] \\\
229     CONT &
          \[emph {content} \\\
231         \!{b}{WALKER} & \@1 \]
          \] \] \]
233 \end {avm} }
\anodecurve [bl] {a} [bl] {b} {.5in}
235 \nodebox {a}
\nodebox {b}
237 \end {exe}

239 A more complex example of example of lines connecting nodes of phrase
      structure tree follows in (13).

241 \begin {exe}
\ex
243 \Tree
[ [ \node{subj1}subj-i ].NP
245 [ [ T+v_n+\node{V}V_j+Apl_k ].T
[ \node{io}{ } IO_l
247 [ \node{subj2}t_i [ \node{v1}t_n
[ \node{do}DO_m [ \node{io1}t_l
249 [ \node{apl1}t_k [ [ \node{V1}t_j ].V
\node{dol}t_m ].VP ].Apl\1
251 ].Apl\1 ].AplP ].{\it v}\1 ].{\it v}\1
].{\it v}P ].T\1 ].TP
253 \anodecurve [bl]{subj2}[bl]{subj1}{0.4in}
\anodecurve [bl]{dol}[bl]{do}{0.4in}
255 {\makedash{4pt}\anodecurve [t]{io1}[r]{io}{.5in}}
\anodecurve [bl]{V1}[bl]{apl1}{0.6in}
257 \anodecurve [bl]{apl1}[bl]{v1}{1in}
\anodecurve [bl]{v1}[bl]{V}{0.9in}
259 \end {exe}

261 \vspace {1cm}

263 \paragraph {Latex Package:} The connecting lines on the tree in (11) (\
      emph {qtree}) were set using the package \emph{tree-dvips}. The
      connecting line in the AVM shown in (12) was created from within
      the \emph{AVM} package using its own node location and line
      drawing capabilities. The example in (13) was created using \emph{
      tree-dvips}.

265 \section {Categorical Grammar Derivations}
267 \subsection {Overview}
\paragraph {Categorical Grammar (CG)}
269 The following introductory description of Categorical Grammar in Section
      5.1 is from Mark Stedman, Categorical Grammar.\footnote{\url{http
      ://conf.ling.cornell.edu/~timh/ling419-spring09/readings/Steedman99
      -EncCogSci.pdf}}
      Categorical Grammar (CG), together with its close cousin Dependency
      Grammar (which also originated in the 1950s, in work by Tesni‘ere)
      stems from an alternative approach to context-free grammar
      pioneered by Bar-Hillel 1953 and Lambek 1958, with earlier
      antecedents in Ajdukiewicz 1935 and still earlier work by Husserl
      and Russell in category theory and the theory of types. Categorical
      Grammars capture the same information by associating a functional
      type or category with all grammatical entities. For example, all
      transitive verbs are associated via the lexicon with a category
      that can be written as follows: likes := (SnNP)=NP

271 \begin {exe}
273 \ex
\begin {tabular} {l l}
275 \psr {S}{NP^VP} & \\\
\psr {VP}{TV NP} & \\\
\end {tabular}

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277 \psr {TV}{[likes, sees, ...]} \\
\end {tabular}
279 \end {exe}

281 The notation here is the ‘‘result leftmost’’ notation according to which
= and n represent functions from into ,
where the slash determines that the argument is respectively
to the right (=) or to the left (n) of the functor. Thus the
transitive verb (3) is a functor over NPs to its right yielding
predicates, or functors over NPs to the left, which in turn yield S
.

283 In pure context-free CG, categories can combine via two general
function application rules, which in the present notation are
written as in (14), to yield derivations, written as in (15), in
which underlines indexed with right and left arrows indicate the
application of the two rules.

285 \begin {exe}
\ex\label {here} \emph {Functional application}
287 \begin{xlist}
\ex $X/Y \hspace {.15cm} Y \rightarrow X$
289 \ex $Y \hspace {.15cm} X \backslash Y \rightarrow X$
\end {xlist}
291 \end {exe}

293 \vspace {.15cm}

295 \begin {exe}
\ex
297 \noindent
\inference
299 { \inference
{ \inference{Dexter}{NP}
301 { \inference{likes}{(S \backslash N)/NP}
\inference{Warren}{NP} }
303 } {S \backslash NP}
[$>$]
305 }
{S}
307 [$<$]
\end {exe}

309 \paragraph {Latex Package:} The Categorical Grammar example in 15 was
created using the \emph{ Semantic} package with the \emph {
inference} command.

311 \section {Examples Using the International Phonetic Alphabet}
313 \subsection {Simple English Phonetic Transcriptions}

315 \begin{tabular}{|c|c|}
\hline
317 \multicolumn{2}{|c|}{Sample Phonetics Transcriptions \footnote{
Transcriptions performed using this conversion tool: http://project-
modelino.com/english-phonetic-transcription-converter.php?}} \\
\hline
319 phonetics & \textipa{/f@”nEtIks/} \\ \hline
linguistics & \textipa{/l gw st ks /} \\ \hline
321 computation & \textipa{/k mpj te n /} \\ \hline
\end{tabular}

323 \subsection {International Phonetic Alphabet-Consonants (Pulmonic)}

325 \resizebox {6.5 in} {!} {
327 \begin{tabular}{|l|l|l|l|l|l|l|l|l|l|}
\hline
& Bilabial & Labiodental & Dental & Alveolar & Postalveolar
& Retroflex & Palatal & Velar & Uvular & Pharyngeal & Glottal \\ \hline
329 \hline Plosive & \cellcolor{blue!25}p \hspace {.10 cm} b & & & \

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cellcolor{blue!25} t \hspace {.10 cm} d & & \textipa {\:t} \
hspace {.10 cm} \textipa {\:d} & c \hspace {.10 cm} \
textbardotlessj & \cellcolor{blue!25} k \hspace {.10 cm} g & q \
hspace {.10 cm} \textipa {\:G} & & \textipa {P} \\
\hline Nasal & \cellcolor{blue!25} \textipa {m} & \textipa {M} & & \
cellcolor{blue!25} n & & \textipa {\:n} & \textit{tailn} & \cellcolor{
blue!25} \textipa {N} & \textipa {\:N} & & \\
331 \hline Trill & \textipa {\:B} & & & \cellcolor{blue!25} r & & & &
& \textipa {\:R} & & \\
\hline Trap or Flap & & & & \cellcolor{blue!25} \textipa {R} & & \
textipa {\:r} & & & & \\
333 \hline Fricative & \textipa {F} \hspace {.10 cm} \textipa {B} & \
cellcolor{blue!25} f \hspace {.10 cm} v & \cellcolor{blue!25} \
textipa {T} \hspace {.10 cm} \textipa {D} & \cellcolor{blue!25} s z
& \cellcolor{blue!25} \textipa {S Z} & \textipa {\:s} \textipa
{\:z} & \cellcolor{blue!25} \c{c} J & x \textipa {G} & \textipa
{X} \textipa {K} & \textit{rh} \textipa {Q} & \textcolor {blue!25} {h}
\textipa {H} \\
\hline Lateral Fricative & & & & \cellcolor{blue!25} \textit{beltl} \
textit{yoghlig} & & & & & \\
335 \hline Approximant & & \textipa {V} & & \cellcolor{blue!25} \textipa
{*r} & & \textipa {\:R} & j & \textit{turnmrleg} & & & \\
\hline Lateral Approximant & & & & \cellcolor{blue!25} l & & \
textipa {:l} & & \textipa {L} & & \textipa {\:L} & & & \\
337 \hline
\end{tabular}
339 }
341 \hspace {.25cm}
343 \noindent \parbox {7in} {Note: The symbols for the sounds of English are
color-coded blue in the tables in Sections 5.2 and 5.3.}
345
\subsection {The Consonants of English by Place and Manner of
Articulation}
347
\resizebox {6.5 in} {!} {
349 \begin{tabular} {|c|c|c|c|c|c|c|c|c|c|c| \hline
\multicolumn{10}{|c|}{PLACE OF ARTICULATION} \\
351 \hline \multicolumn{2}{|c|}{Labial} & \multicolumn{2}{|c|}{Labial} & \
multicolumn{3}{|c|}{Dental} & \multicolumn{2}{|c|}{Palatovelar} &
Glottal \\
\hline & Bilabial & Labiodental & Interdental & Alveolar & Alveo-
palatal & Palatal & Velar & \\
353 \hline Stop & voiceless & \cellcolor{blue!25}p & & & \cellcolor{blue
!25} t & & & \cellcolor{blue!25} k & \\
\hline Stop & voiced & \cellcolor{blue!25}b & & & \cellcolor{blue!25}
d & & & \cellcolor{blue!25} g & \\
355 \hline Fricatives & voiceless & & \cellcolor{blue!25}f & \cellcolor{
blue!25} \textipa {T} & \cellcolor{blue!25} s & \cellcolor{blue!25}
\textipa {S} & & & \cellcolor{blue!25} h \\
\hline Fricatives & voiced & & \cellcolor{blue!25}v & \cellcolor{blue
!25} \textipa {D} & \cellcolor{blue!25} z & \cellcolor{blue!25} \
textipa {Z} & & & \\
357 \hline Affricants & voiceless & & & & \cellcolor{blue!25} \c{c} &
& & & \\
\hline Affricants & voiced & & & & \cellcolor{blue!25} j & & &
& \\
359 \hline Nasals & & \cellcolor{blue!25}m & & & n & & & \cellcolor{
blue!25} \textipa {N} & \\
\hline Liquids & lateral & & & \cellcolor{blue!25} l & & & & & \\
361 \hline Liquids & retroflex & & & \cellcolor{blue!25} r & & \
cellcolor{blue!25} y & \cellcolor{blue!25} w & \\
\hline Semivowels & & & & & & & & & \\
363 \hline
\end{tabular}

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365 }
367 \paragraph {Latex Package:} The Tables displaying IPA Characters were
      created using the \emph{TIPA} package.
369 \section {Selected Language Excerpts}
      \subsection {German}
371 \begin{otherlanguage*}{german}
373 \paragraph {} \hspace {0pt}
      Und ebenso mu\ss\ man die Gnadenhilfen selbst unterscheiden. Etwas
      anderes ist eine Hilfe, ohne die etwas nicht geschieht, und etwas
      anderes eine Hilfe, durch die etwas geschieht.
375 \end{otherlanguage*}
377 Dem ersten Menschen, der in dem Gute, worin er gerecht erschaffen war,
      die F\”ahigkeit empfangen hatte, nicht zu s\”undigen, nicht zu
      sterben und vom Guten selbst nicht ab\–zufallen, ist demnach die
      Gnade der Beharrlichkeit verliehen worden, nicht jene, wo\–durch
      seine Beharrlichkeit bewirkt worden w\”are, sondern jene, ohne die
      er nicht imstande gewesen w\”are, mit seinem freien Willen
      auszuhalten. Jetzt aber wird den Heiligen, die durch die Gnade
      Gottes f\”ur das Reich Gottes vorher\–bestimmt sind, nicht eine
      solche Gnade der Beharrlichkeit gegeben, sondern eine derartige, da
      \ss\ ihnen die Beharrlichkeit selbst geschenkt wird; daher sind sie
      ohne dieses Gnadengeschenk nicht nur unf\”ahig zur Beharrlichkeit,
      sondern sind auch durch dieses Geschenk Nurbeharrende.\
      selectlanguage{english} \footnote{St. Augustine; De corr. et gratia
      XII, 34, ALG VII, 214f.}
379 \subsection {French}
381 \begin{otherlanguage*}{francais}
      \paragraph {} \hspace {0pt}
383 Les fleurs ont souvent des r\’ecompenses de nectar, de p\’etrole ou de
      pollen pour des visiteurs, et il est \’a l’avantage de la fleur si
      l’animal que prend la r\’ecompense est susceptible de transf\’erer
      son pollen entre les fleurs de m\^emes esp\’eces.
      \end{otherlanguage*}\footnote{http://www.reed.edu/cis/help/latex/
      language.html}
385 \subsection {Spanish}
387 \begin{otherlanguage*}{spanish}
      \paragraph {} \hspace {0pt}
389 Las flores tienen a menudo recompensas del n\’ectar, del aceite o del
      polen por visitantes, y es a la ventaja de la flor si el animal que
      toma la recompensa es probable transferir su polen entre las
      flores de la misma especie.
      \end{otherlanguage*}\footnote{http://www.reed.edu/cis/help/latex/
      language.html}
391 \hspace {2cm}
393 \end {document}

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