Index

ABLEDATA, 24
acceleration, 11, 19–20
adaptive system
  adaptive model, 28
  evaluating, 61
  predictive strategy, 11–12
  see also DM; Predict; Reactive Keyboard
amplification, 11, 19–20
analytical framework, 18–20, 23
ANTIC (Anticipatory TIC), 25, 26i, 33–5; see also TIC
anticipatory communication, see predictive text generation
Apple Macintosh, see RK-Pointer
automatic model, 22, 38; see also communication model
binary tree, 121–2, 123; see also DM
Brown corpus, 42, 46, 99
buttons B, 19
calculator, self-programming, 62–4
Calgary University, Canada, 47
California School of Medicine, Los Angeles, 40
canonical model, 21; see also communication model
CDC (Communication and Device Control), 41–2, 45
Cintex, 43
cognitive/physical tradeoff, 82
combination model, 23; see also communication model
combined system, 41–2, 43, 49; see also CDC; Cintex; PACA; Predict; Reactive Keyboard
communication aid, 4, 12–17
  components of, 12–16, 13f
  computer based, 24
  communication disability, 8–10
  residual function, 29–30
  see also rate of expression
communication mode, 3
communication model, 21–3, 29
construction and consultation, 22
communication rate, see rate of expression
compact array, 120, 122–3
compact hashing, 124
correlogrammed predictions, see menu item
context, 12, 26
  multiple, 95
  variable-length matching, 37, 69, 91
visual, 76, 80
  word prefix, 39
  for word recognition, see word discrimination,
visual cues to
  cost C, 18
CUT_PRIME program, 156
dabbrev-expand, 44
def users, 29, 45; see also Efficient Keyboard
design rules, see human factors guidelines
dialog determination, see human factors guidelines
direct selection, 14, 15; see also selection algorithm
display control, 85; see also metadialog
display space, 31
DM (Dynamic Matrix), 33i, 36–8, 45
documentation, see RK-PC; RK-UNIX
dual-computer approach, 16f
Dundee University, Scotland, 40
edit and control functions, 96
Efficient Keyboard, 47, 64
electronic keyboard, see keyboard emulator
EMACS, 44
encoding, 14, 15; see also selection algorithm
error control, 86; see also metadialog
error correction, 50
experimental evaluation, 55–61
  experimental bias, 61
  hypotheses and results, 57–8, 59
  pilot experiment, 55–6
  post hoc studies, 58–9
  subject groups, 57i, 58
  user feedback and suggestions, 59–61
  see also Predict
explicit model, 21–2; see also communication model
external model manipulation, 86
eye movement, see human-mediated prediction
Fitts’ law, see human factors guidelines
floating space, 35
fluency equation, 18–19
forgetting, 38, 97, 98
Freeboard, 46
frequency count, 97–8, 119
frequency vs. recency, 50
grammatical correctness of predictions, 79, 88; see also syntax
Handikey, 43
Handiword, 43
Hardy, Thomas, 4–6
HELP program, 155–6
Helpware, 44
human factors guidelines, 17, 45–6
dialog determination, 32, 45
Fitts’ law, 19, 79
“know the user,” 29, 45
seven plus or minus two, 78, 88
visual discontinuity, 31, 45
human-mediated prediction, 3, 25
human performance model, see menu selection, model of
IBM PC, see RK-PC
initial character prediction, see menu item, initial characters
input device, 12, 13–14; see also Maltron keyboard interactive communication modes, 3–4
ISP/I (Intelligent Speech Prosthesis), 39t, 39–41, 45
item length, see menu item
k-tuple elements, 47, 89, 94, 96; see also length-k model
KBDCHECK program, 151
keyboard emulator, 16–17, 23
King’s College, London, 40
language anticipation, see predictive text generation
language usage studies, see word frequency studies
length-k model, 47–9, 64; see also k-tuple elements; model, order k
length L, 18
letter anticipator, 32–9; see also ANTIC; MCCS
linear scan, see selection algorithm
linked list, see model
long-term memory (LTM), see memory
MAC (Mac-Apple Communicator), 39t, 39–41, 45
Maltron keyboard, 8f, 74f
mapped tables, see model
Markov models, see length-k model
matrix scan, see selection algorithm
MCCS (Micro-computer Communication and Control System), 26, 33t, 35–6, 45
memory
long-term (LTM), 27, 28, 83, 94–5
short-term (STM), 27, 28
see also model
menu item, 79–81, 91–4
concatenated predictions, 12, 49, 92, 93, 115–17
example of generating, 91–3, 113–17
initial characters, 91–3, 92f, 115
item length, 76, 79–81
nonprinting characters, 81–2
sequence of, 81
menu selection, 47, 71, 76, 82, 87
model of, 82, 82!
see also RK-Button, example of use; RK-Pointer, example of use
menu size, 76, 78–9
message composition, 26–8, 27f
metadialog, 72f, 83–6, 84f
Mindreader, 44
MOD (Mouth-Operated Dynamic keyboard), 39t, 39–41, 45
model
binary tree, 21–2, 123
construction, 89–96, 108–13
content, see priming
control, 86, see also metadialog
elements, 89
example tree, 89–91
linked list, 121–2, 123
maintenance, 97–9
making predictions, 113–17
mapped tables, 119–21, 124
n-way tree, 121–2, 123
order k, 94, see also n-gram, recommended length
size of, 29, 94–5
special tokens, 96
storage comparison, 123
tree structure, 36f, 37, 90f, 99, 107–8, 119–23, see also node, data structure
updating, 38, 97, 117–19
see also communication model; length-k model;
memory, long term; menu selection, model of;
variable-length model
moving target effect, 81
n-gram, 25, 29
experimental results using, 26i, 35, 42i, 52–5
predictive power, 29
recommended length, 29
statistics, 46, 99
see also length-k model
n-way tree, see model
National Research Council of Canada, 40
natural language, redundancy in, 25
node, 122
components of, 108, 122
data structure, 91, 107f
size of, 123
storage, 120i, 122
type structure distinction, 122
see also model
nonvocal communication, see rate of expression
Northwestern University, Chicago, 26, 45
customer N, 19
one-handed keyboard, see Maltron keyboard
order, see model, order k; n-gram, recommended length
output device, 12, 13f, 14
PACA (Portable Anticipatory Communication Aid), 43, 45
PAl (Predictive Adaptive Lexicon), 39t, 39–41, 43
panic control, 86; see also metadialog
partial matching, see context, variable-length matching; variable-length model
physical load, 82
Predict, 47–65
accepting predictions, 47
comparison with Reactive Keyboard, 70–1
concatenated predictions, see menu item
confidence parameter c, 54
example of use, 49
key features, 48f, 64, 65t
lessons learned, 55
Index

performance with different kinds of text, 54–5
UNIX dialog, 50–2
word, string, and character mode, 49, 52–3
see also calculator, self-programming;
experimental evaluation
predictive association, index of, 100
predictive text generation, 25–32, 45
advantages and disadvantages, 30–2, 65t
concatenated predictions, see menu item
early systems, 25–6, 32–9
model of, 26–8
prediction rules, 27, 28f
recent systems, 43–5
syntactic and semantic, 46
vs. nonpredictive, 26–8
see also combined system; human-mediated
prediction; letter anticipator; menu item; model;
word completer
Predictive Typing, 46
priming, 75, 108–13
editing the log file, 86, 98–9
representative text, 95, 96
sources, 95–6, 119
special tokens, 96
see also model, construction
programming by example, see calculator,
self-programming.
prompting device, 12, 13f, 16, 31; see also
RK-Pointer, prediction window
pseudocode, 103–19
C definitions and variables, 103–8
constructing the model, 111–13
main program, 101–3
making predictions, 113–17
updating the model, 117–19
PSS robot learning system, 64
QUICKTIC, 35
rate of expression, 9–12, 17–20
aid specific, 17
effect on receiver’s impatience, 10
enhancing, 11–12
factors affecting, 14–15, 17
fluency/articulateness tradeoff, 11, 19
manual expression, 9, 9t
measurement units, 18
message production rate, 9t
minimum tolerable, 10
nonvocal, 9–10, 18t
normal conversational speech, 3, 23, 26t
performance model, 82, 82f, see also analytical
framework
Reactive Keyboard, 12, 69–126
availability, 126
comparison with Predict, 70–1
example of use, 4–6; see also RK-Button;
RK-Pointer
experience with, 7, 125
functionality and commands, 83–6, 84t
key features, 70, 70f, 125
potential users, 125
practical considerations, 95, 98
RK program, 101–24, 127–51, 157–72
system overview, 103f
system structure, 101–8
see also menu item; RK-Button; RK-Pointer
redundancy, see natural language, redundancy in
RK-Button, 71, 72–5, 87
example of use, 72–4, 82
functionality and commands, 72f, 73f, 82, 84t
see also Reactive Keyboard
RK-MAC, see RK-Pointer
RK-PC
documentation, 152–6
program description, 101–24
source code, 157–72
see also pseudocode; RK-Button
RK-Pointer, 71, 75–86
example of use, 75, 77–8
functionality and commands, 84t
prediction window, 76, 78
snapshots of the screen, 75f, 77f, 85f
text window, 75
see also Reactive Keyboard
RK-UNIX documentation, 127–151; see also
RK-Button
RKFREQ program, 150
row-column scan, see selection algorithm
scanning, 14, 15; see also selection algorithm
selection algorithm, 12, 13f, 14–15
floating space, 35
linear scan, 10f
matrix scan, 10f, 34
row-column scanning, 32
scan delay for matrix elements, 32–3, 34f
selection control, 83; see also metadialog
selection set, 11–12; see also number N
selection speed, see rate of expression
selection strategy, see menu selection
semantic information, 46
SETUP program, 147–50, 154–5
seven plus or minus two, see human factors guidelines
Shannon, C. E., 25
short-term memory (STM), see memory
single-handed keyboard, see Maltron keyboard
spelling error, forestalling, 30, 80
statistical redundancy, see natural language,
redundancy in
storage comparison, see model
surrogate keyboard, see keyboard emulator
syntax, 46; see also grammatical correctness of
predictions
system structure, 101–8, 103f
T-TAM (Trace Transparent Access Module), 23
Index

TENEX, 44
text compression, 97, 99
TIC (Tufts Interactive Communicator), 26, 32, 45
time 7, 18
“to be or not to be,” 89, 91, 108
tree structure, see model trie, 99
Tufts University, Boston, 26, 45
type and token lengths, 80
type/token ratio, 94, 99

user interface, 69–88; see also human factors guidelines
user model, see communication model; edit and control functions; menu selection, model of

variable-length model, 69, 89; see also context, variable-length matching; model, tree structure

visual characteristics of words, see word discrimination
visual cues to visual continuity, see human factors guidelines
visual keyboard, see keyboard emulator
visual vigilance, 31
vocabulary, see word frequency studies

word completer, 39–41, 43–5; see also Efficient Keyboard; Handikey; Handword; Helpware;
ISP/I; MAC; Mindreader; MOD; PAL; Words+ word discrimination, visual cues to, 80, 88
word frequency studies, 46, 99
Words+, 44

zero-frequency problem, 38, 93–4
table, 106