# Entrée de texte

## Master Informatique

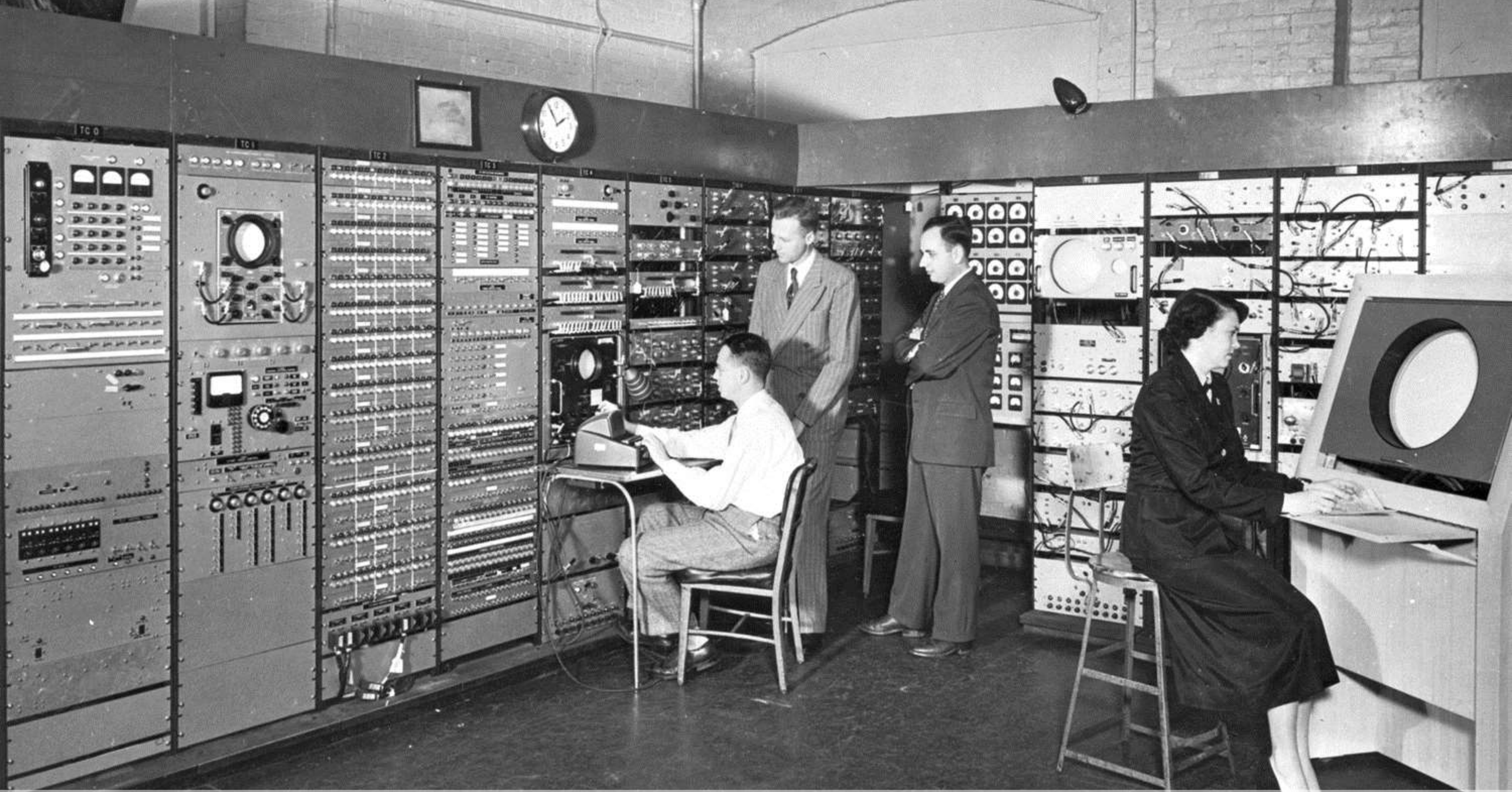
Université de Lille

Thomas Pietrzak

# Historique

Samuel Ward Francis, 1857

E. Remington and Sons, Sholes & Glidden, 1873



Whirlwind (1951)

# What is TELETYPE®?

A Teletype Printer is a communications device — with a keyboard similar to a typewriter — that enables you to send and receive printed messages. With it, written word can be sent instantaneously by wire . . . within the office or plant . . . or clear across the country; to a single destination . . . or to any number at the same time.

In today's business world, in fact, Teletype equipment is often more than a communications instrument. It is a basic element in production control systems . . . its ability to transmit and reproduce text and punched tape is harnessed to office automation . . . it provides a "conveyor system" for channeling complex raw data to a computing center thousands of miles away.

Whether leased through your telephone company or other communication companies—or purchased outright from us—the versatile line of Teletype equipment can be tailored to almost any conceivable demand. For further information, contact your telephone company or other communications company, or send for our free booklet, "The ABC's of Teletype Equipment," Teletype Corporation, Dept. F7, 4100 Fullerton Ave., Chicago 39, Illinois.

*1957 Golden Anniversary Year*

TELETYPE®

TELETYPE CORPORATION

SUBSIDIARY OF

*Western Electric Company*

INCORPORATED

Whirlwind (1951)


APPLE
COMPUTER
ESC
CTRL
SHIFT
RETURN
REPEAT
RUB OUT
LINE FEED
HERE IS
PAPER ADV
BREAK
TAPE
TAPE

Apple 1 (1976)


| Dec | Hx | Oct | Char | Dec | Hx | Oct | Html | Chr | Dec | Hx | Oct | Html | Chr | Dec | Hx | Oct | Html | Chr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 000 | NUL (null) | 32 | 20 | 040 |   | Space | 64 | 40 | 100 | @ | @ | 96 | 60 | 140 | ` | ` |
| 1 | 1 | 001 | SOH (start of heading) | 33 | 21 | 041 | ! | ! | 65 | 41 | 101 | A | A | 97 | 61 | 141 | a | a |
| 2 | 2 | 002 | STX (start of text) | 34 | 22 | 042 | " | " | 66 | 42 | 102 | B | B | 98 | 62 | 142 | b | b |
| 3 | 3 | 003 | ETX (end of text) | 35 | 23 | 043 | # | # | 67 | 43 | 103 | C | C | 99 | 63 | 143 | c | c |
| 4 | 4 | 004 | EOT (end of transmission) | 36 | 24 | 044 | $ | $ | 68 | 44 | 104 | D | D | 100 | 64 | 144 | d | d |
| 5 | 5 | 005 | ENQ (enquiry) | 37 | 25 | 045 | % | % | 69 | 45 | 105 | E | E | 101 | 65 | 145 | e | e |
| 6 | 6 | 006 | ACK (acknowledge) | 38 | 26 | 046 | & | & | 70 | 46 | 106 | F | F | 102 | 66 | 146 | f | f |
| 7 | 7 | 007 | BEL (bell) | 39 | 27 | 047 | ' | ' | 71 | 47 | 107 | G | G | 103 | 67 | 147 | g | g |
| 8 | 8 | 010 | BS (backspace) | 40 | 28 | 050 | ( | ( | 72 | 48 | 110 | H | H | 104 | 68 | 150 | h | h |
| 9 | 9 | 011 | TAB (horizontal tab) | 41 | 29 | 051 | ) | ) | 73 | 49 | 111 | I | I | 105 | 69 | 151 | i | i |
| 10 | A | 012 | LF (NL line feed, new line) | 42 | 2A | 052 | * | * | 74 | 4A | 112 | J | J | 106 | 6A | 152 | j | j |
| 11 | B | 013 | VT (vertical tab) | 43 | 2B | 053 | + | + | 75 | 4B | 113 | K | K | 107 | 6B | 153 | k | k |
| 12 | C | 014 | FF (NP form feed, new page) | 44 | 2C | 054 | , | , | 76 | 4C | 114 | L | L | 108 | 6C | 154 | l | l |
| 13 | D | 015 | CR (carriage return) | 45 | 2D | 055 | - | - | 77 | 4D | 115 | M | M | 109 | 6D | 155 | m | m |
| 14 | E | 016 | SO (shift out) | 46 | 2E | 056 | . | . | 78 | 4E | 116 | N | N | 110 | 6E | 156 | n | n |
| 15 | F | 017 | SI (shift in) | 47 | 2F | 057 | / | / | 79 | 4F | 117 | O | O | 111 | 6F | 157 | o | o |
| 16 | 10 | 020 | DLE (data link escape) | 48 | 30 | 060 | 0 | 0 | 80 | 50 | 120 | P | P | 112 | 70 | 160 | p | p |
| 17 | 11 | 021 | DC1 (device control 1) | 49 | 31 | 061 | 1 | 1 | 81 | 51 | 121 | Q | Q | 113 | 71 | 161 | q | q |
| 18 | 12 | 022 | DC2 (device control 2) | 50 | 32 | 062 | 2 | 2 | 82 | 52 | 122 | R | R | 114 | 72 | 162 | r | r |
| 19 | 13 | 023 | DC3 (device control 3) | 51 | 33 | 063 | 3 | 3 | 83 | 53 | 123 | S | S | 115 | 73 | 163 | s | s |
| 20 | 14 | 024 | DC4 (device control 4) | 52 | 34 | 064 | 4 | 4 | 84 | 54 | 124 | T | T | 116 | 74 | 164 | t | t |
| 21 | 15 | 025 | NAK (negative acknowledge) | 53 | 35 | 065 | 5 | 5 | 85 | 55 | 125 | U | U | 117 | 75 | 165 | u | u |
| 22 | 16 | 026 | SYN (synchronous idle) | 54 | 36 | 066 | 6 | 6 | 86 | 56 | 126 | V | V | 118 | 76 | 166 | v | v |
| 23 | 17 | 027 | ETB (end of trans. block) | 55 | 37 | 067 | 7 | 7 | 87 | 57 | 127 | W | W | 119 | 77 | 167 | w | w |
| 24 | 18 | 030 | CAN (cancel) | 56 | 38 | 070 | 8 | 8 | 88 | 58 | 130 | X | X | 120 | 78 | 170 | x | x |
| 25 | 19 | 031 | EM (end of medium) | 57 | 39 | 071 | 9 | 9 | 89 | 59 | 131 | Y | Y | 121 | 79 | 171 | y | y |
| 26 | 1A | 032 | SUB (substitute) | 58 | 3A | 072 | : | : | 90 | 5A | 132 | Z | Z | 122 | 7A | 172 | z | z |
| 27 | 1B | 033 | ESC (escape) | 59 | 3B | 073 | ; | ; | 91 | 5B | 133 | [ | [ | 123 | 7B | 173 | { | { |
| 28 | 1C | 034 | FS (file separator) | 60 | 3C | 074 | < | < | 92 | 5C | 134 | \ | \ | 124 | 7C | 174 | | | \| |
| 29 | 1D | 035 | GS (group separator) | 61 | 3D | 075 | = | = | 93 | 5D | 135 | ] | ] | 125 | 7D | 175 | } | } |
| 30 | 1E | 036 | RS (record separator) | 62 | 3E | 076 | > | > | 94 | 5E | 136 | ^ | ^ | 126 | 7E | 176 | ~ | ~ |
| 31 | 1F | 037 | US (unit separator) | 63 | 3F | 077 | ? | ? | 95 | 5F | 137 | _ | _ | 127 | 7F | 177 | &#127; | DEL |

Source: www.LookupTables.com

Apple 1 (1976)


| Dec | Hx | Oct | Char | Dec | Hx | Oct | Html | Chr | Dec | Hx | Oct | Html | Chr | Dec | Hx | Oct | Html | Chr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 000 | NUL (null) | 32 | 20 | 040 |   | Space | 64 | 40 | 100 | @ | @ | 96 | 60 | 140 | ` | ` |
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| 13 | D | 015 | CR (carriage return) | 45 | 2D | 055 | - | - | 77 | 4D | 115 | M | M | 109 | 6D | 155 | m | m |
| 14 | E | 016 | SO (shift out) | 46 | 2E | 056 | . | . | 78 | 4E | 116 | N | N | 110 | 6E | 156 | n | n |
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| 23 | 17 | 027 | ETB (end of trans. block) | 55 | 37 | 067 | 7 | 7 | 87 | 57 | 127 | W | W | 119 | 77 | 167 | w | w |
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| 31 | 1F | 037 | US (unit separator) | 63 | 3F | 077 | ? | ? | 95 | 5F | 137 | _ | _ | 127 | 7F | 177 | &#127; | DEL |

Source: www.LookupTables.com

Apple 1 (1976)

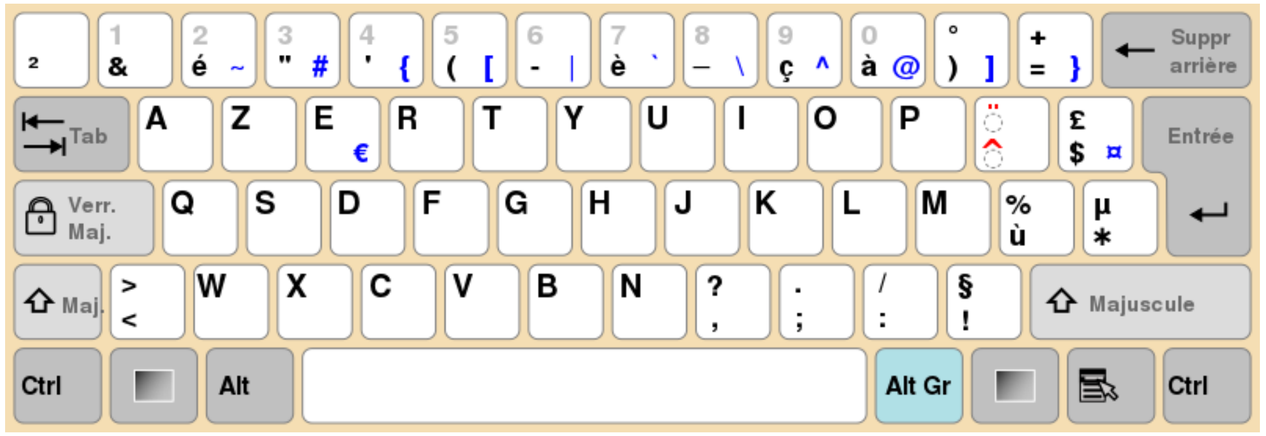
# Téléphone

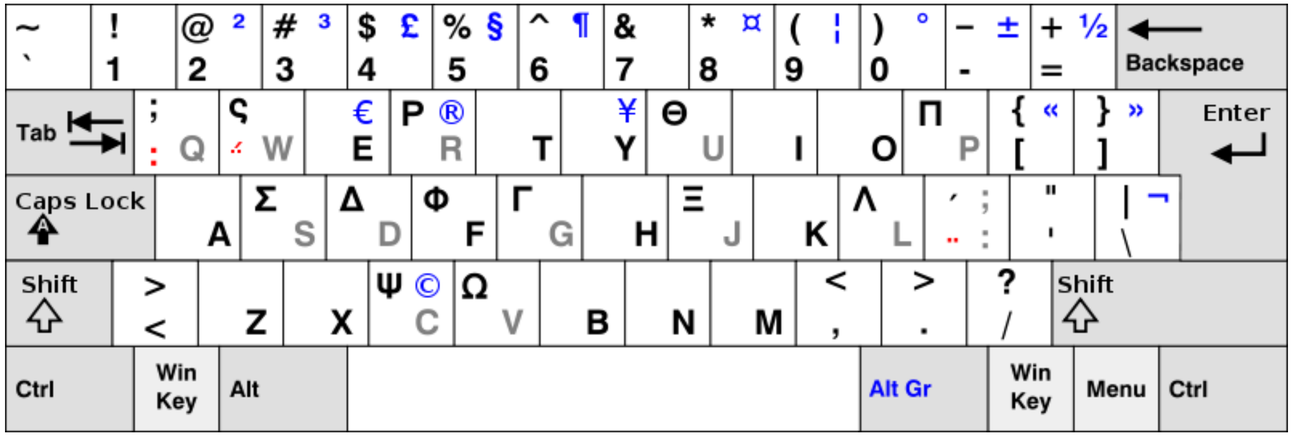

GHI 4
DEF 3
JKL 5
ABC 2
MNO 6
PRS 7
TUV 8
WXY 9
OQ 0
#
*
EMERGENCY CALLS
FOR
FIRE
POLICE
AMBULANCE
DIAL
999


ENQY
G.P.O. 01-920 8148
INTERNAL 8148
1
ABC 2
DEF 3
GHI 4
JKL 5
MN 6
PRS 7
TUV 8
WXY 9
OQ 0
OPERATOR ring 05
ENQUIRIES ring 06
EMERGENCY ring 00


NOKIA
C
1 oo
2 abc
3 def
4 ghi
5 jkl
6 mno
7 pqrs
8 tuv
9 wxyz
* +
0
# ⇧

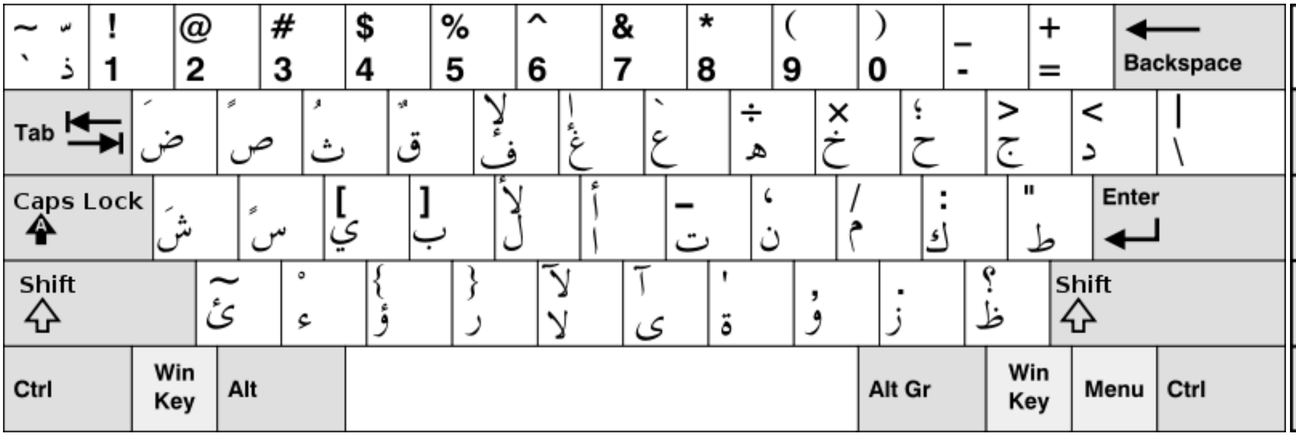
# Agencements

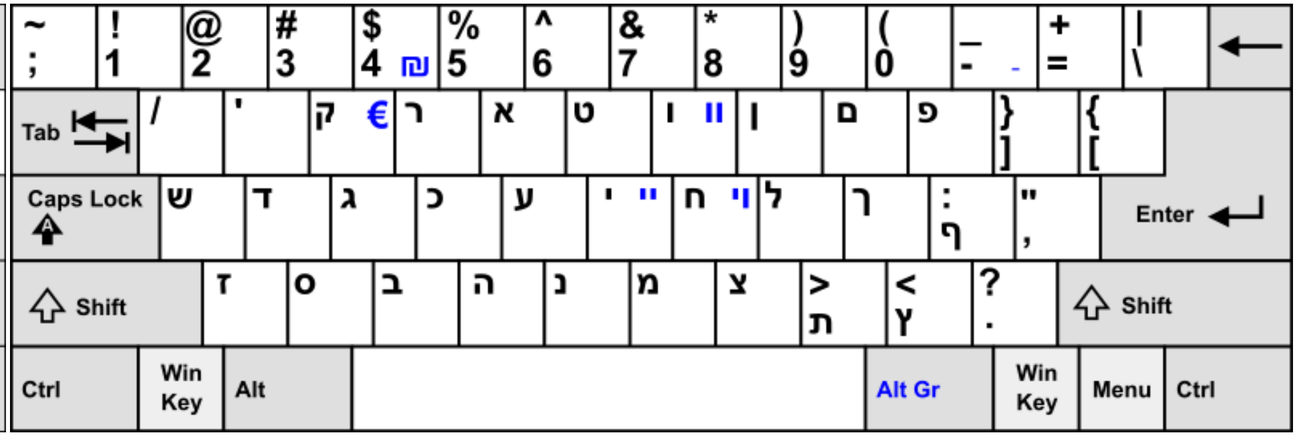

Suppr arrière
Tab
Entrée
Verr. Maj.
Maj.
Majuscule
Ctrl
Alt
Alt Gr
Ctrl


Backspace
Tab
Enter
Caps Lock
Shift
Shift
Ctrl
Win Key
Alt
Alt Gr
Win Key
Menu
Ctrl


Tab
Enter
Caps Lock
Shift
Shift
Ctrl
Win Key
Alt
Alt
Win Key
Menu
Ctrl

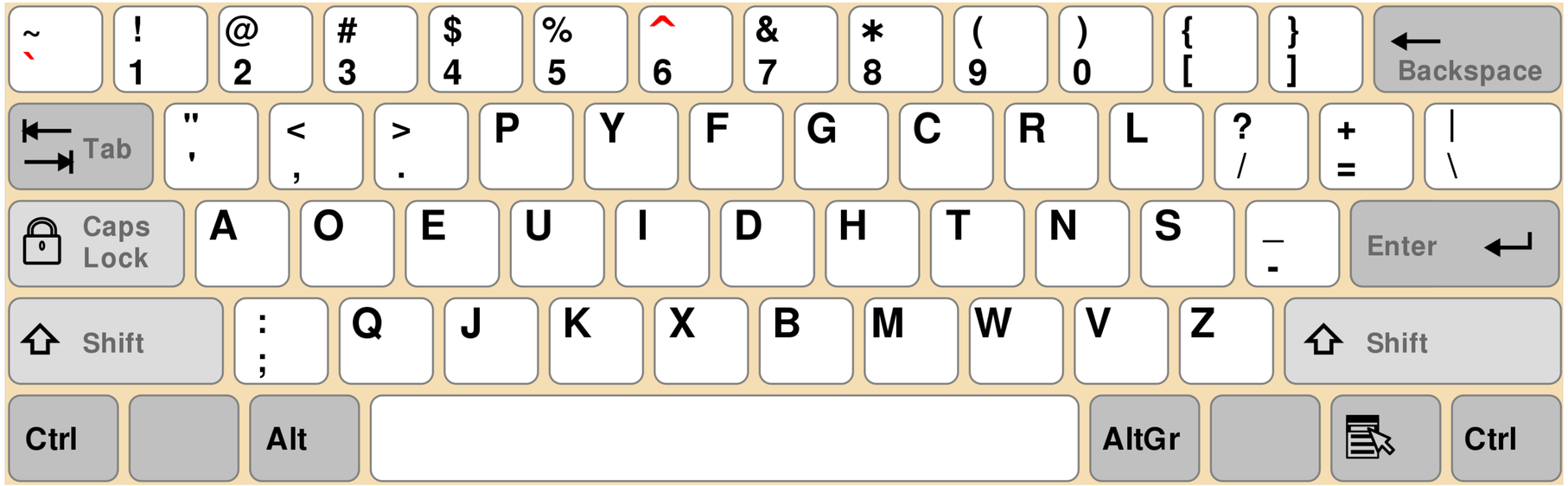

Back Space
Tab
Enter
Caps Lock
英数
Shift
Shift
Ctrl
Win Key
Alt
無変換
変換
カタカナ ひらがな
Alt
Win Key
Menu
Ctrl


Backspace
Tab
Enter
Caps Lock
Shift
Shift
Ctrl
Win Key
Alt
Alt Gr
Win Key
Menu
Ctrl


Tab
Enter
Caps Lock
Shift
Shift
Ctrl
Win Key
Alt
Alt Gr
Win Key
Menu
Ctrl

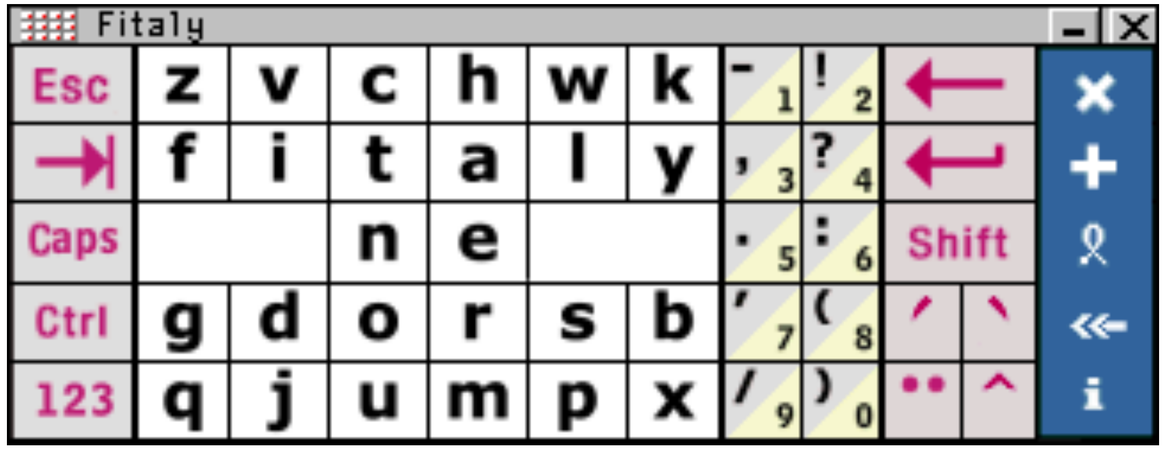
# DVORAK

## 1932


~ `
! 1
@ 2
# 3
$ 4
% 5
^ 6
& 7
* 8
( 9
) 0
{ [
} ]
Backspace
Tab
" '
< ,
> .
P
Y
F
G
C
R
L
? /
+ =
| \
Caps Lock
A
O
E
U
I
D
H
T
N
S
_ -
Enter
Shift
: ;
Q
J
K
X
B
M
W
V
Z
Shift
Ctrl
Alt
AltGr
Ctrl

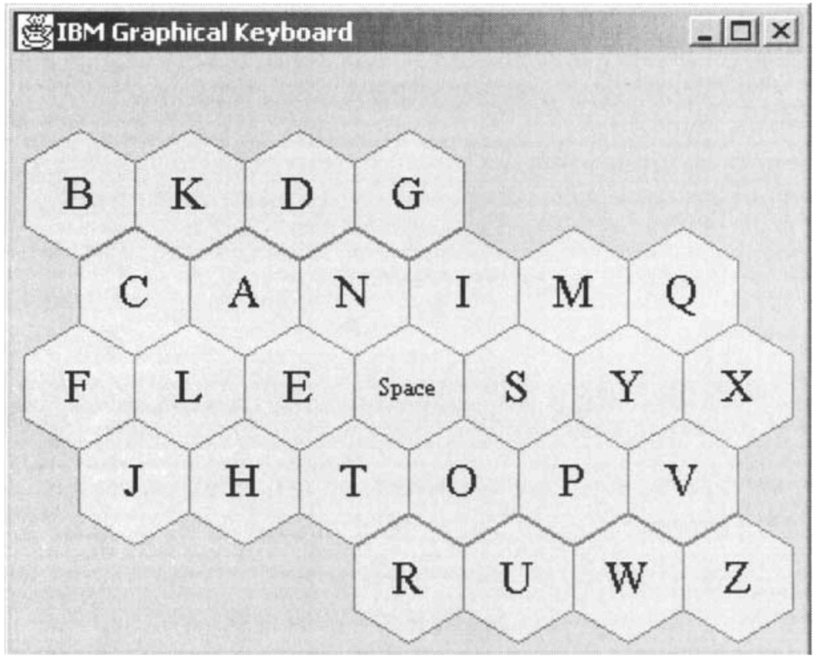
# Fitaly

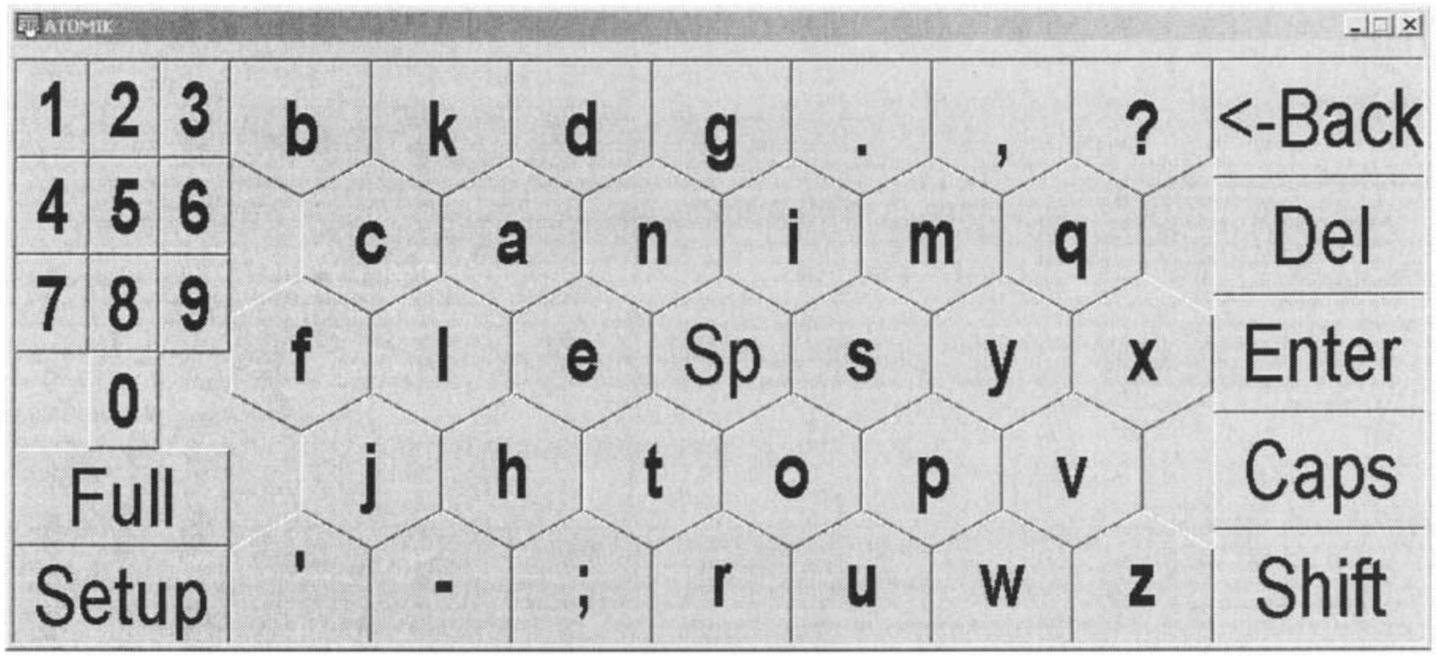
1996


Fitaly
Esc
z v c h w k
f i t a l y
Caps
n e
Ctrl
g d o r s b
123
q j u m p x
Shift

# Atomik

## Zhai, Hunter, Smith (IBM, 2002)



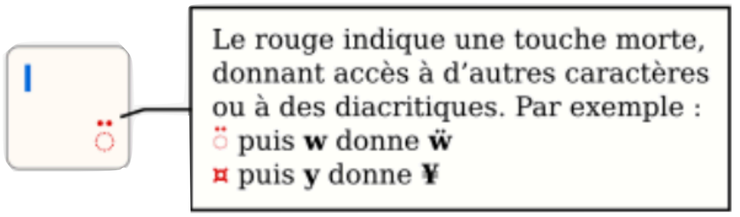



# BÉPO

## 2003


fine insécable
insécable
espace
Ctrl
Sys
Alt
AltGr
Sys
Menu
Ctrl


+Maj
+Maj+AltGr
Accès direct
+AltGr


Le rouge indique une touche morte, donnant accès à d'autres caractères ou à des diacritiques. Par exemple :
¨ puis w donne ẅ
¤ puis y donne ¥

# Claviers physiques

# IBM PC Model F XT

**1981**

# IBM PC Model M

**1986**

# Datahand

## 1990

# Maltron

## 1994

# Microsoft Natural Keyboard

**1994**

# T9

## Tegic (1998)


### Sans T9

| 6 | 2 | 7 | 7 | 7 | 7 | 8 | 3 | 3 | 7 | 7 | 7 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| m | a | p | q | r | s | t | d | e | p | q | r |

### Avec T9

| 6 | 2 | 7 | 8 | 3 | 7 |
|---|---|---|---|---|---|
| m | a | p | t | d | p |
| n | b | q | u | e | q |
| o | c | r | v | f | r |
| | | s | | | s |

# Orbitouch

## 2002

# Frogpad

**2002**

# Projection keyboard

## Canesta, 2002

# Optimus

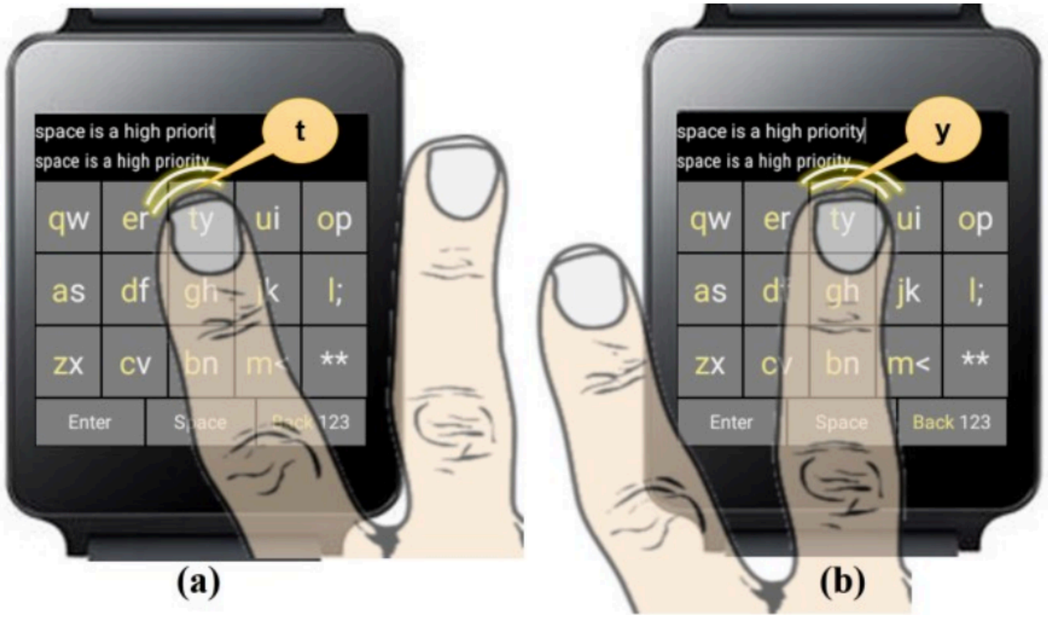
## 2007

# 1line keyboard

## Li, Guy, Yatani, Truong (2011)

# DualKey

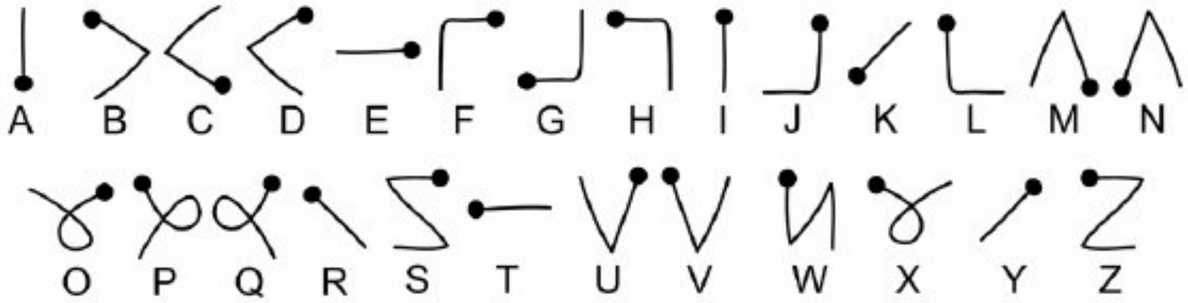
## Gupta, Balakrishnan (2016)



# Claviers gestuels

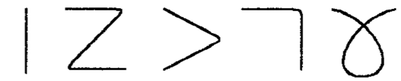
# Unistroke

## Goldberg, Richardson (1993)



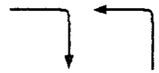

**The Unistroke Alphabet**

The alphabet of unistrokes is based on these five strokes.



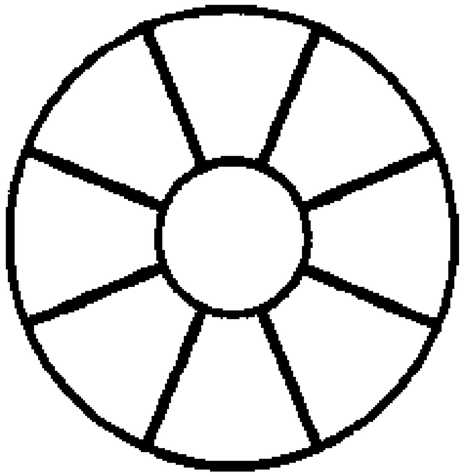
Each stroke comes in four different orientations.

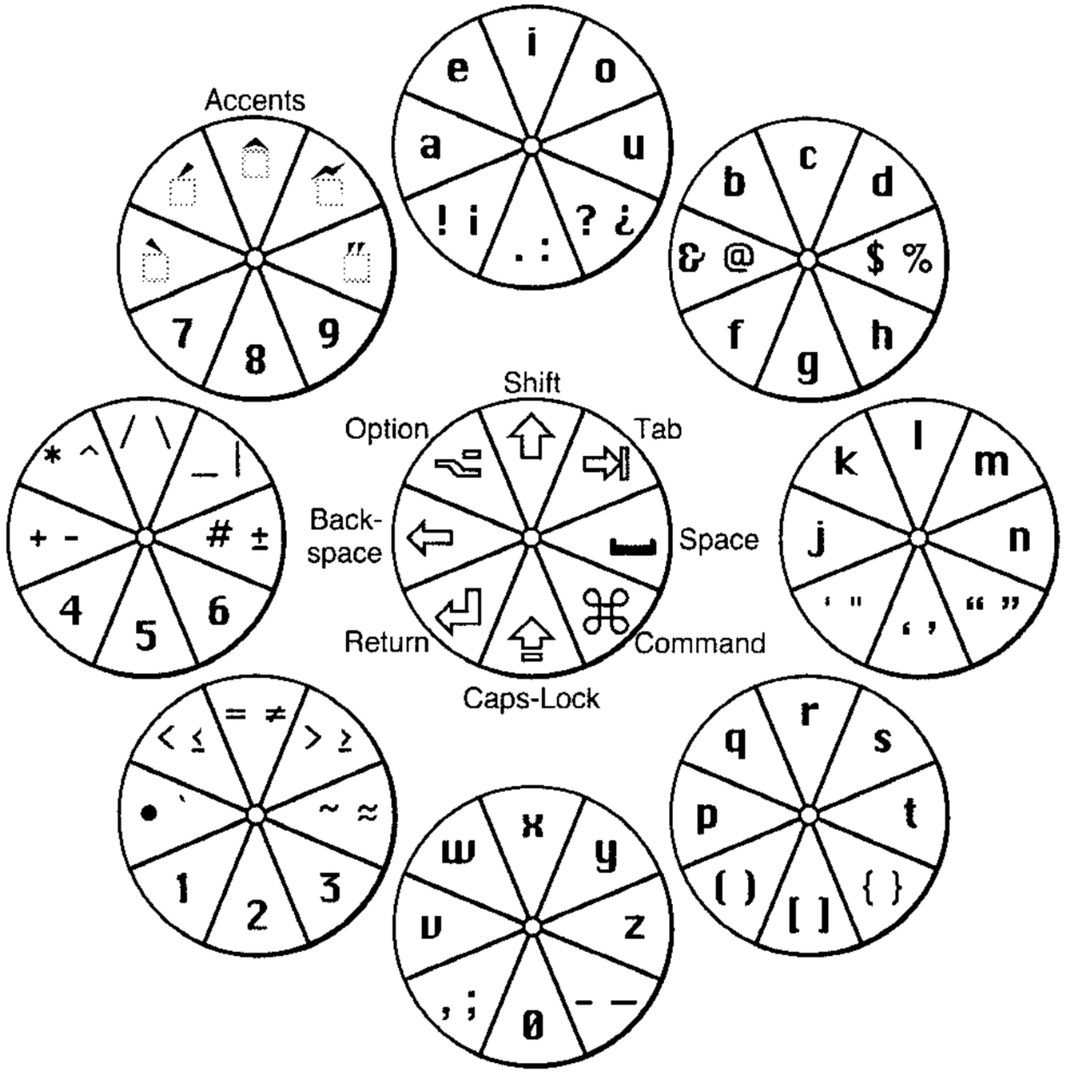
Furthermore, each stroke can be written in two directions.



# T-Cube

## Venolia, Neiberg (1994)





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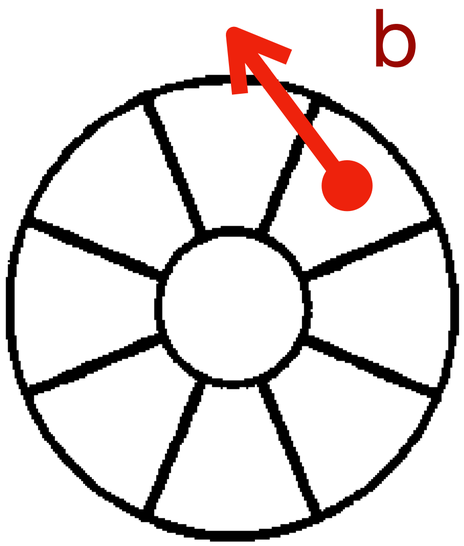
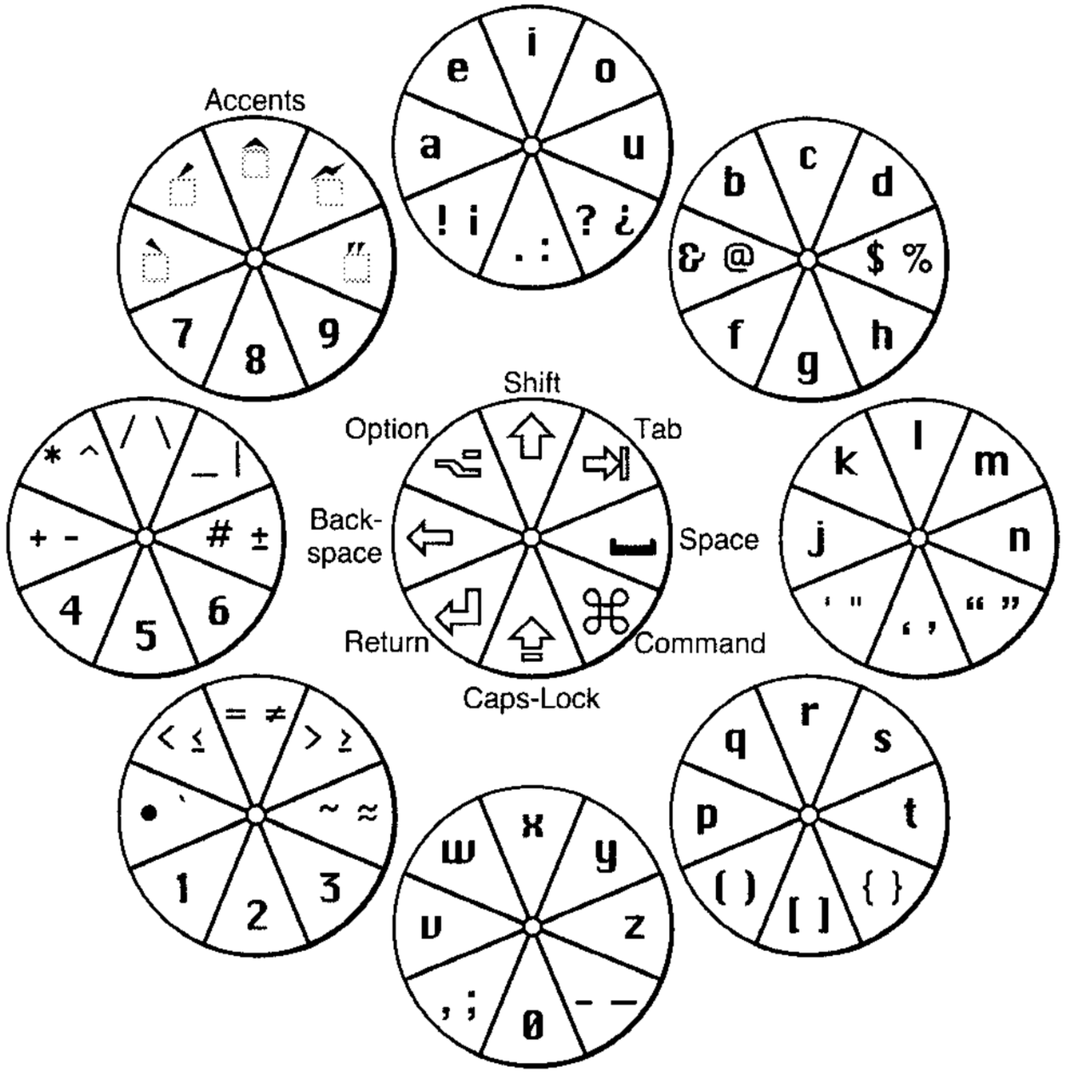
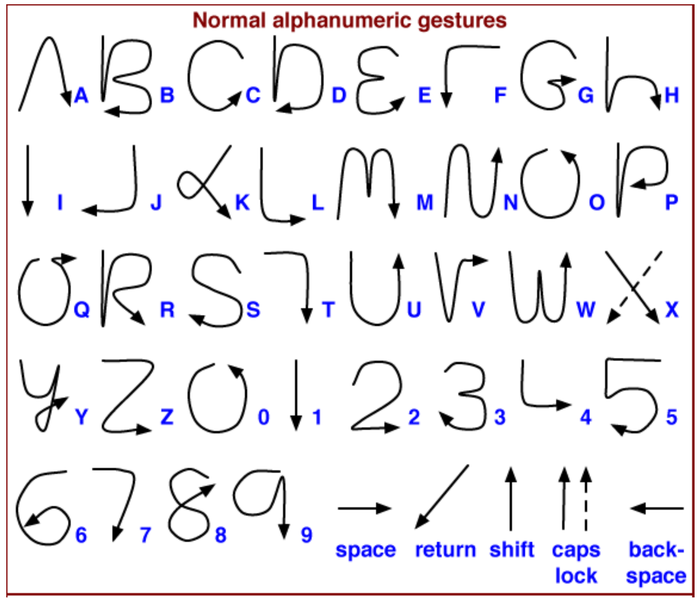
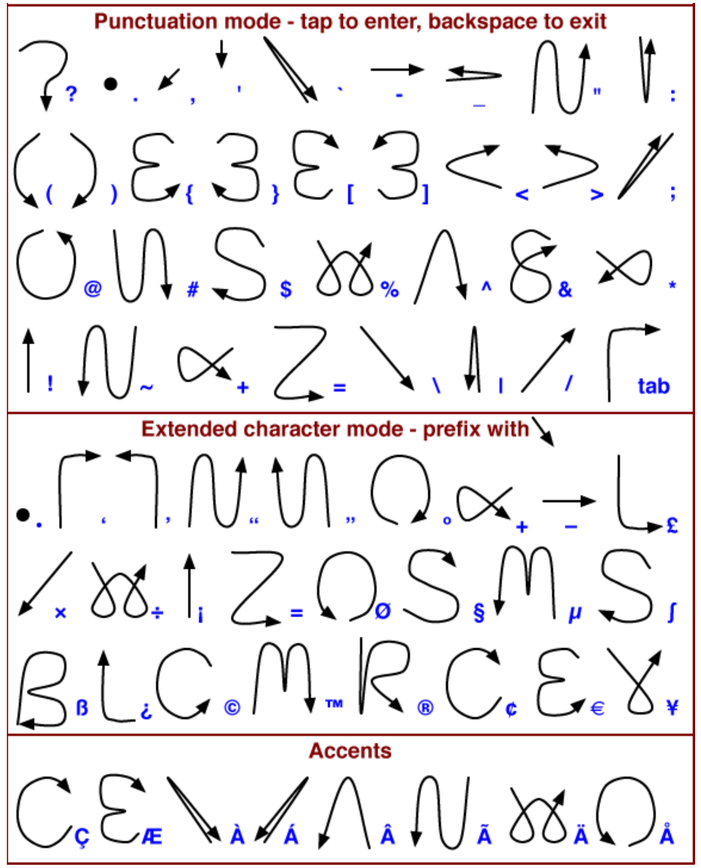


# Graffiti

## PalmOS (1996)

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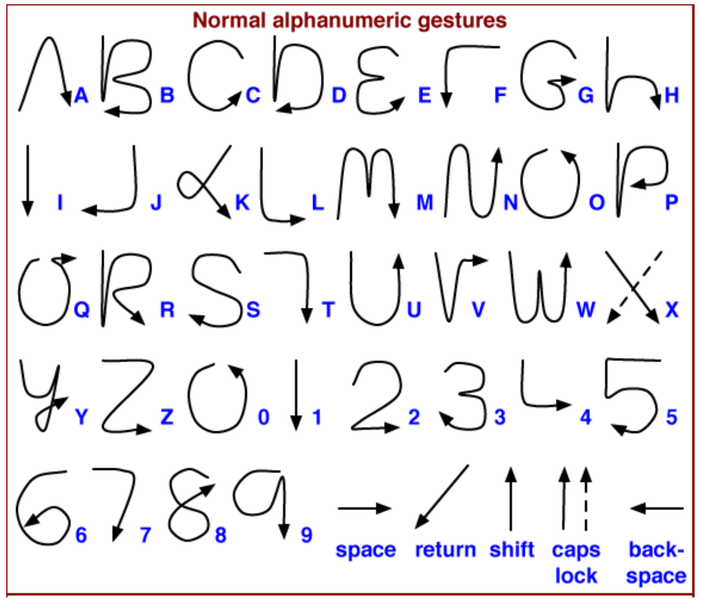
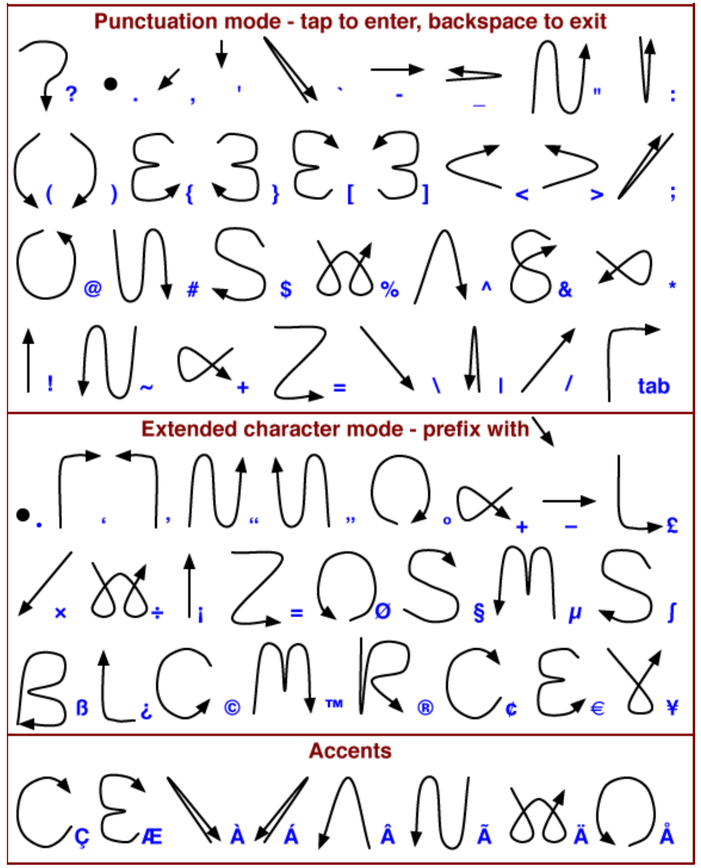


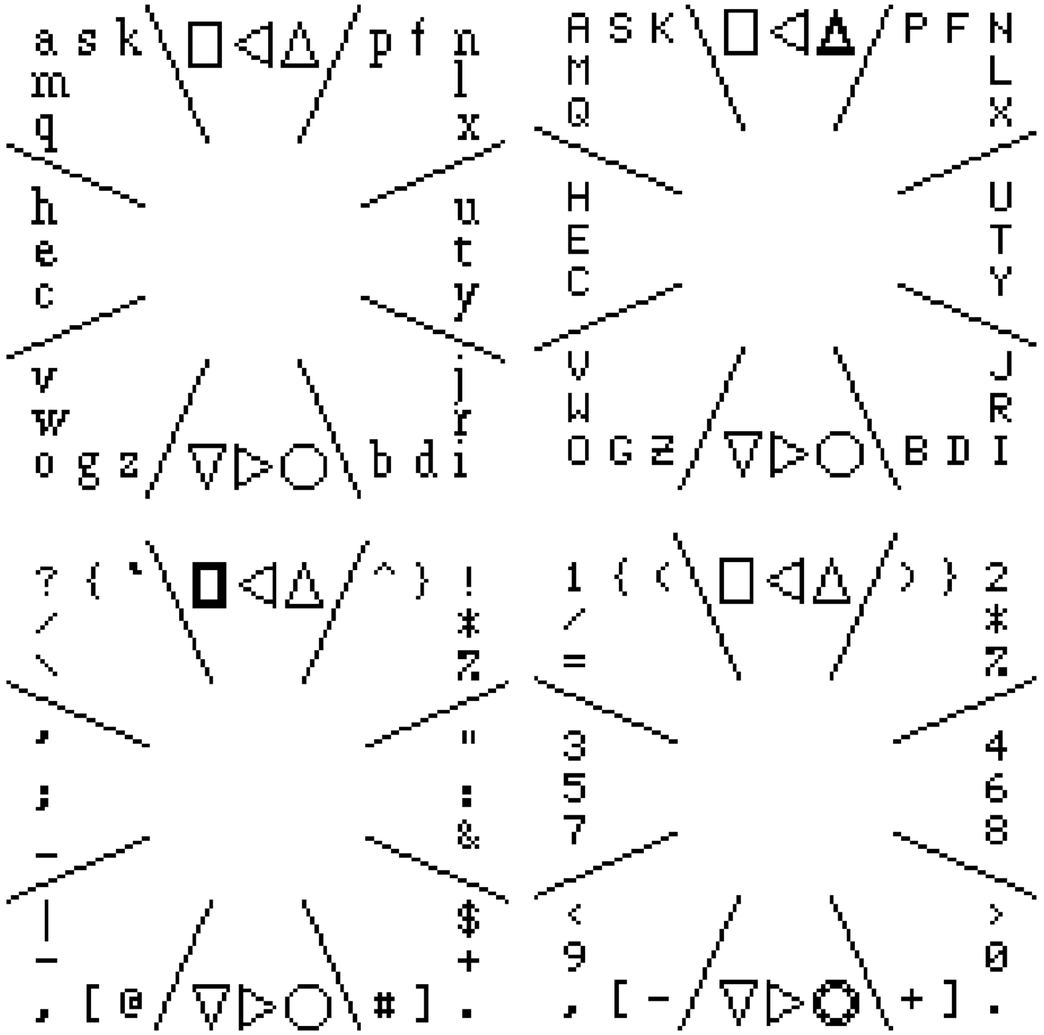





Lettres Chiffres

# Quikwriting

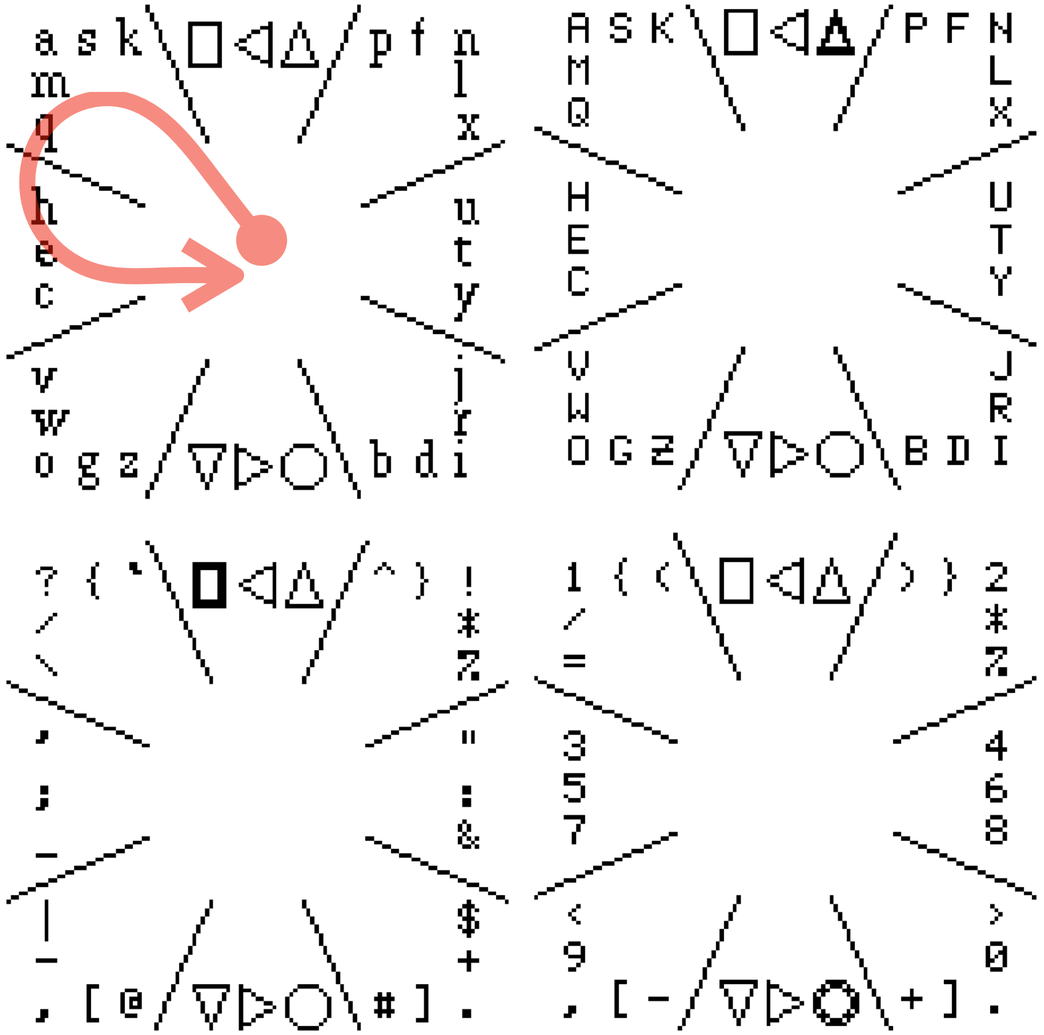
## Perlin (1998)



# Quikwriting

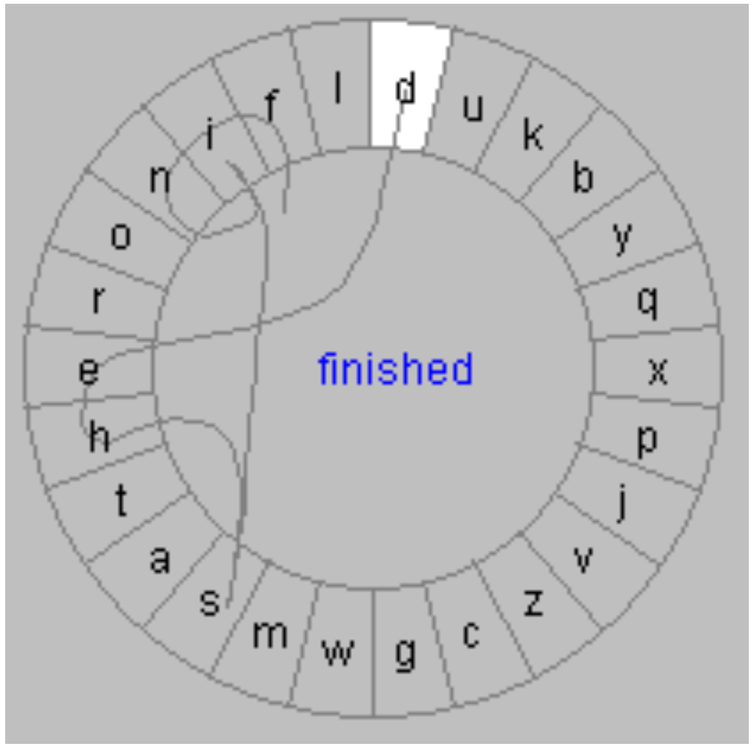
## Perlin (1998)

m



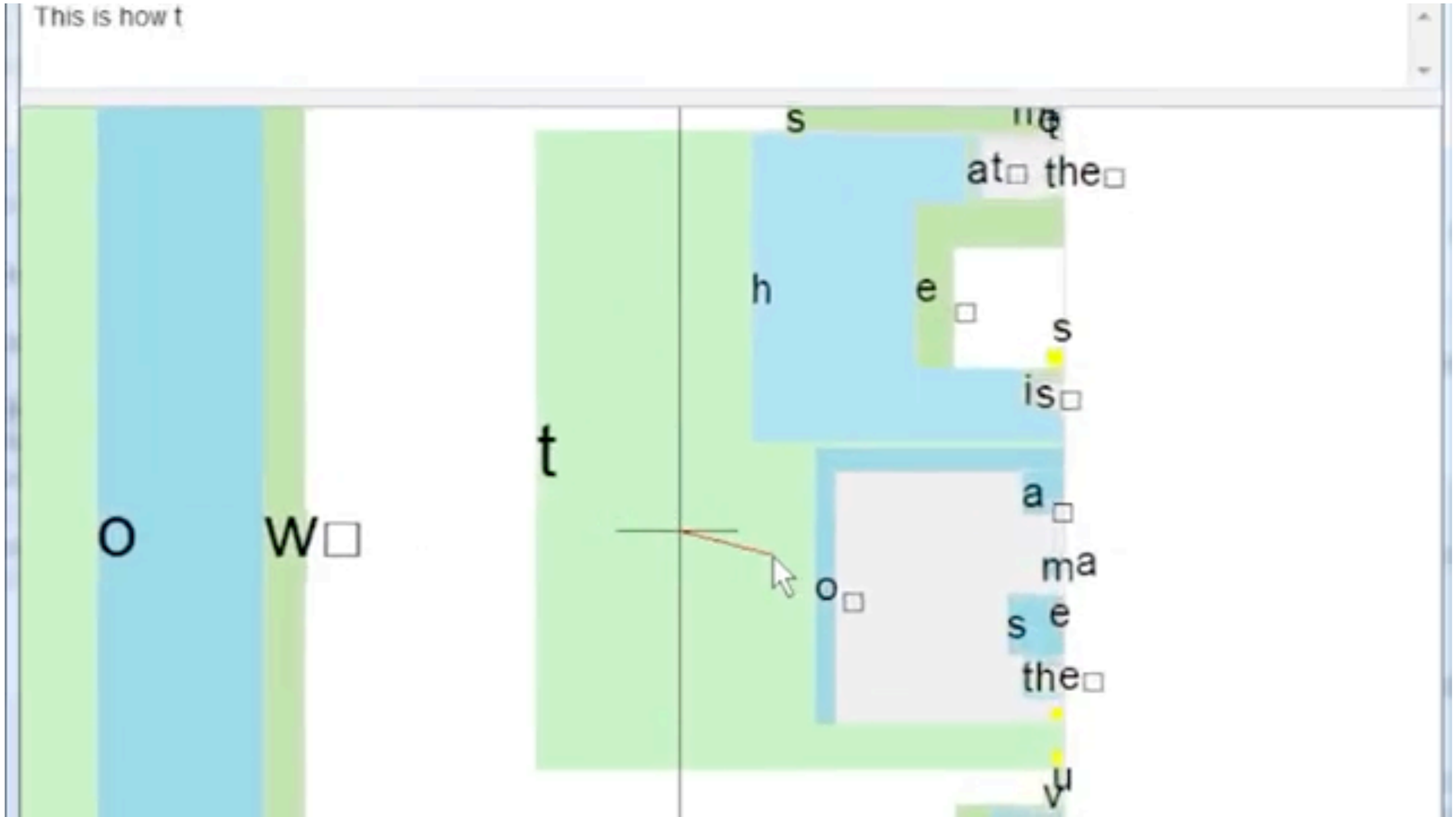
# Cirrin

## Mankoff, Abowd (1998)



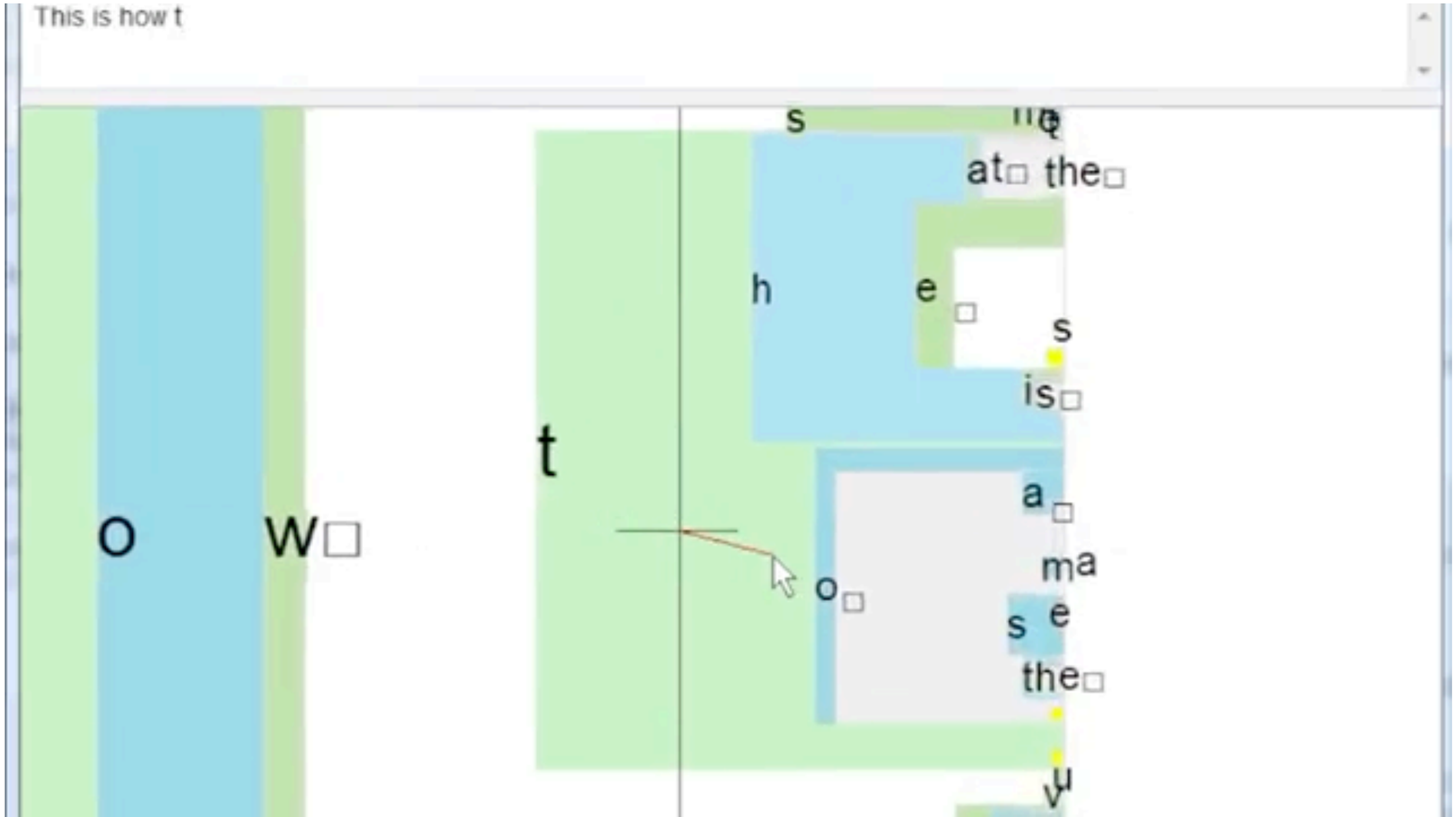
# Dasher

## Ward, Blackwell, MacKay (2000)



# Dasher

## Ward, Blackwell, MacKay (2000)



# Edgewrite

## Wobbrock, Myers (2003)

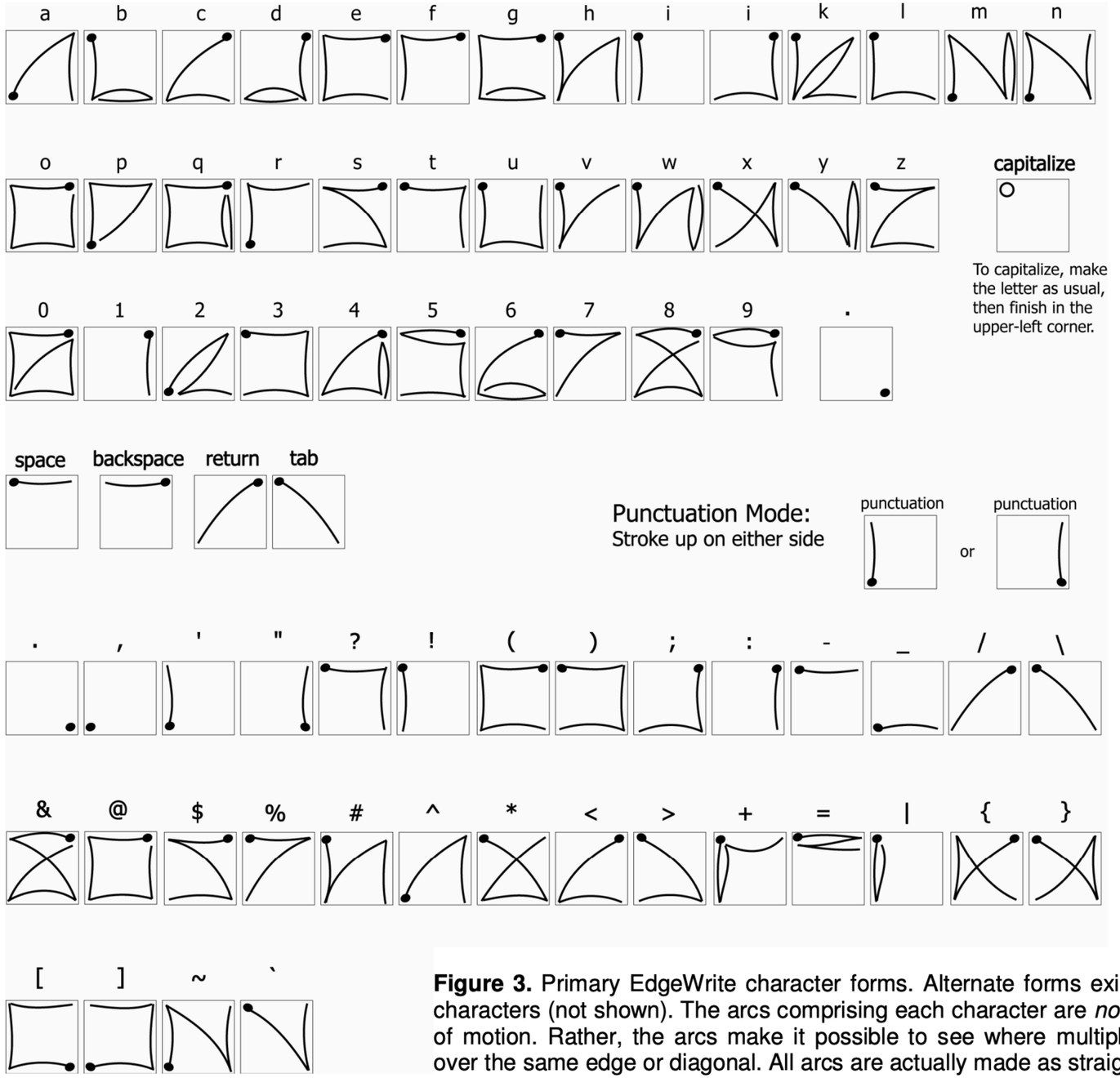
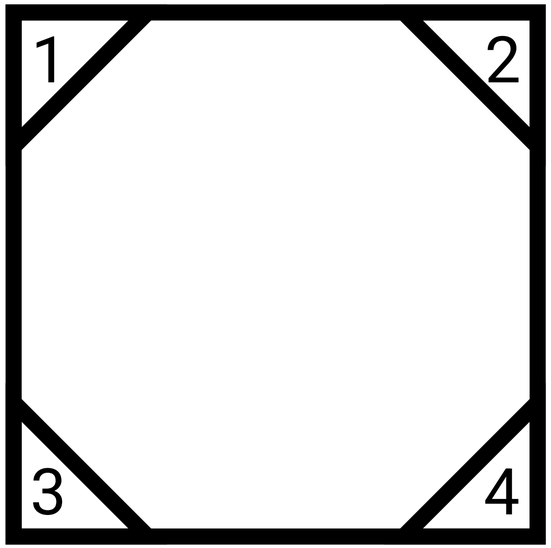



**Figure 3.** Primary EdgeWrite character forms. Alternate forms exist for nearly all characters (not shown). The arcs comprising each character are *not* the literal path of motion. Rather, the arcs make it possible to see where multiple strokes pass over the same edge or diagonal. All arcs are actually made as straight lines.

# Edgewrite

## Wobbrock, Myers (2003)




a : 3 2 4

b : 1 3 4 3

...

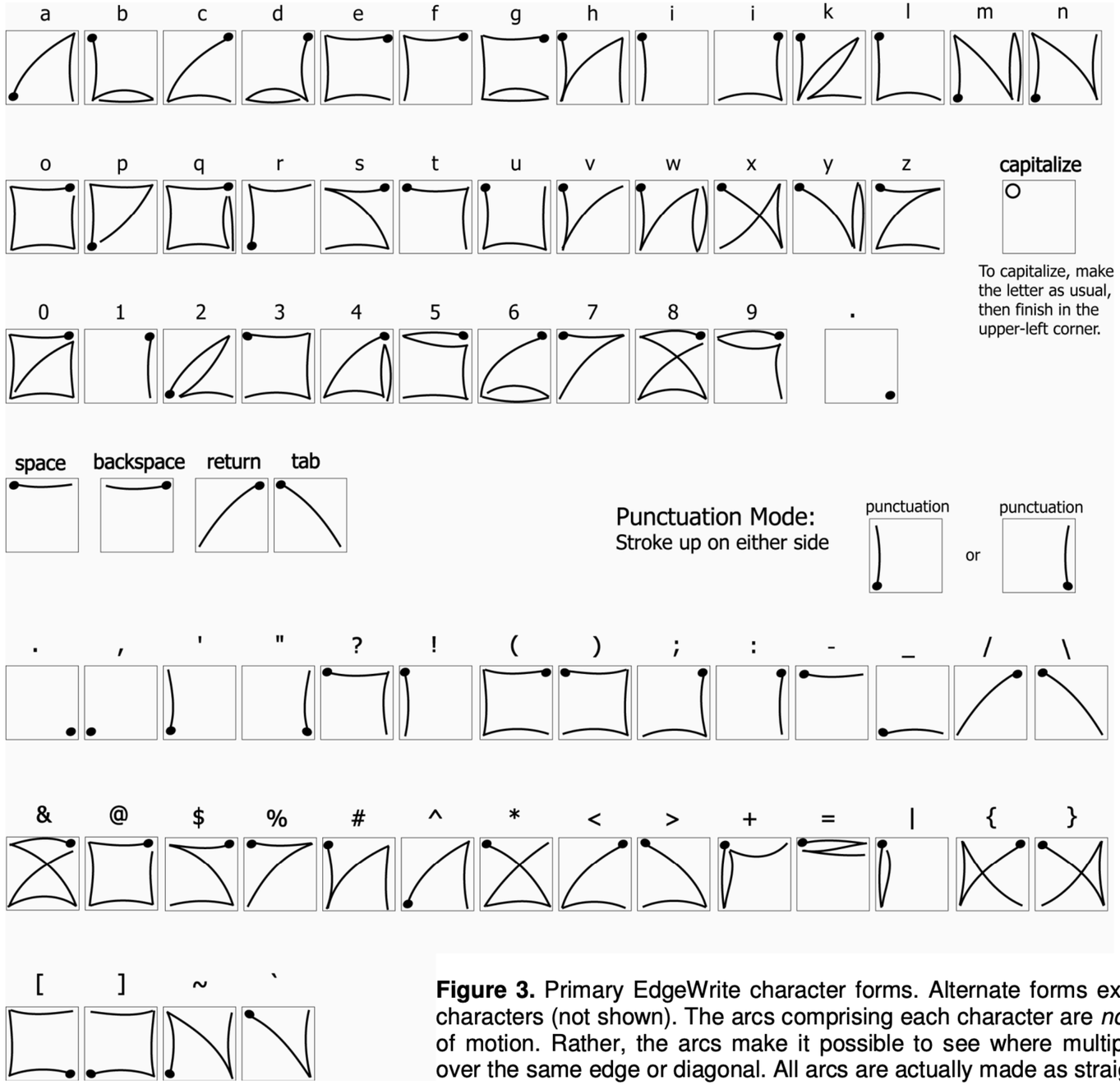
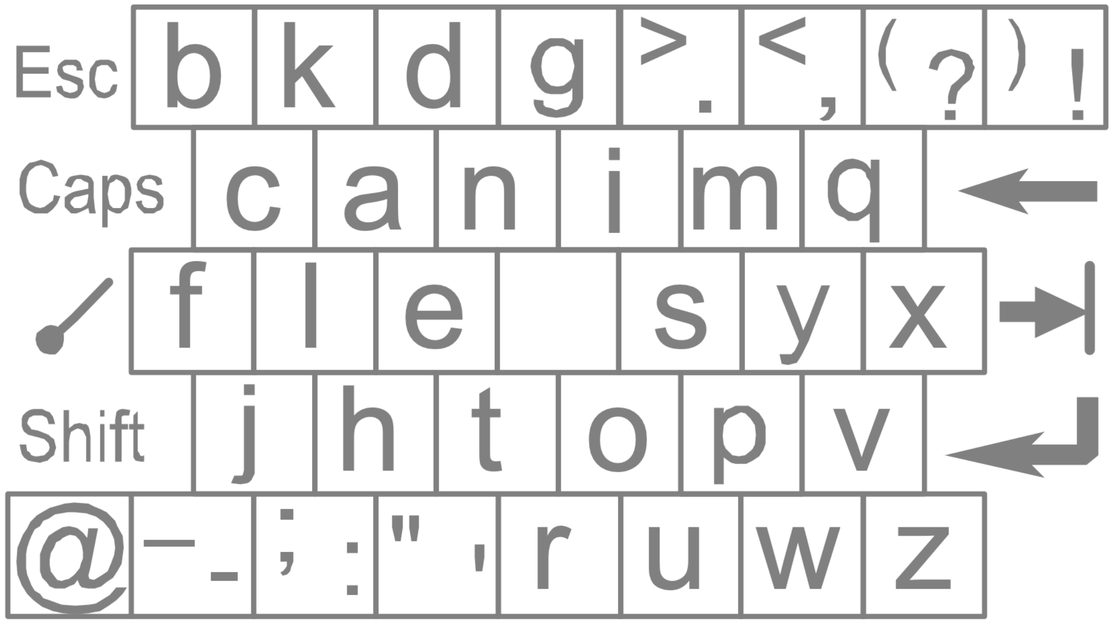



**Figure 3.** Primary EdgeWrite character forms. Alternate forms exist for nearly all characters (not shown). The arcs comprising each character are *not* the literal path of motion. Rather, the arcs make it possible to see where multiple strokes pass over the same edge or diagonal. All arcs are actually made as straight lines.

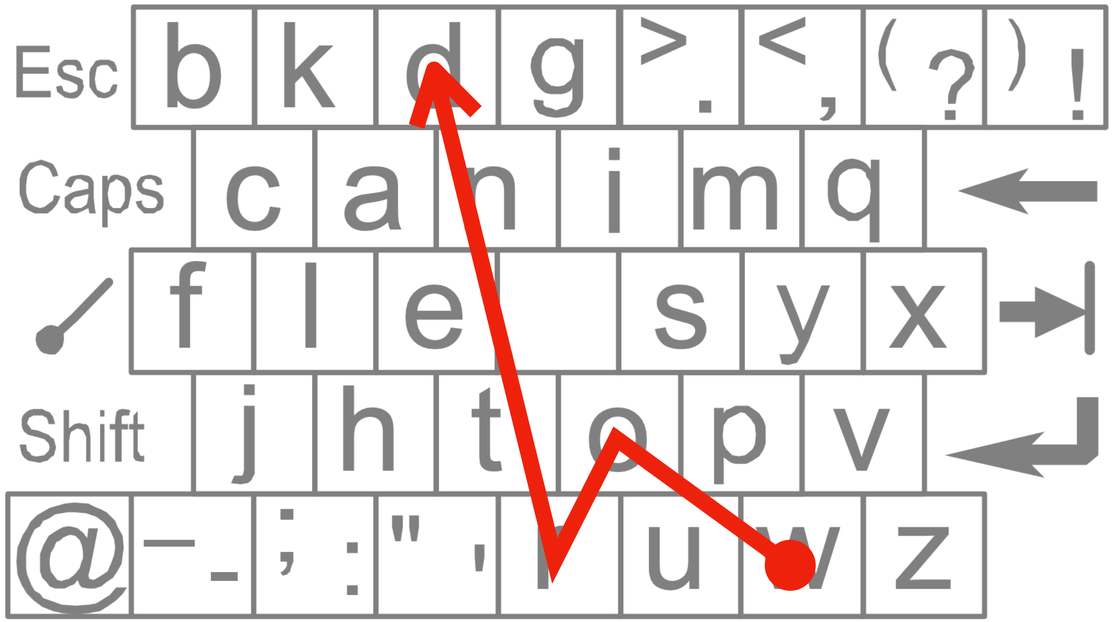
# Shark

## Zhai, Kristensson (2003)



# Shark

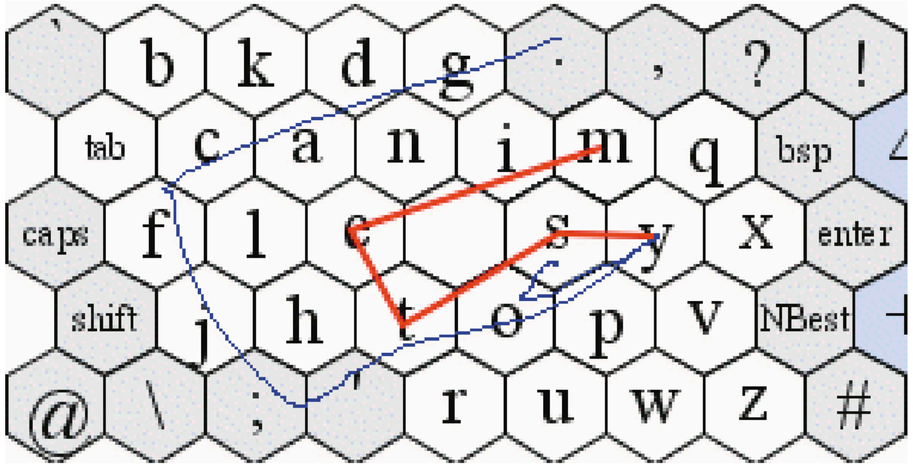
## Zhai, Kristensson (2003)




**Word**

# Shark²

## Zhai, Kristensson (2004)



# Claviers gestuels courants

**Swype**

(2009)

**Microsoft SwiftKey**

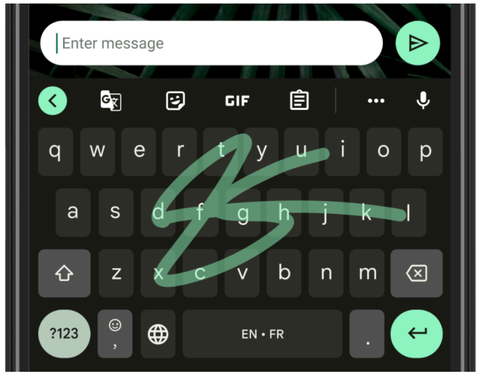
(2010)


**Apple QuickType**

(2014)

**Google Gboard**

(2016)



# Évaluation

# Méthodologie

## Saisie de phrases

- Fréquence des lettres
- Avec/Sans correction d’erreurs
- Plusieurs sessions

## Métriques

- WPM : mots par minute
- KSPC : key stroke per character

# Ensemble de phrases (anglais)

## MacKenzie & Soukoreff (2003)

### Exemples

- video camera with a zoom lens
- have a good weekend
- what a monkey sees a monkey will do
- that is very unfortunate
- the back yard of our house
- I can see the rings on Saturn
- this is a very good idea

### Attention…

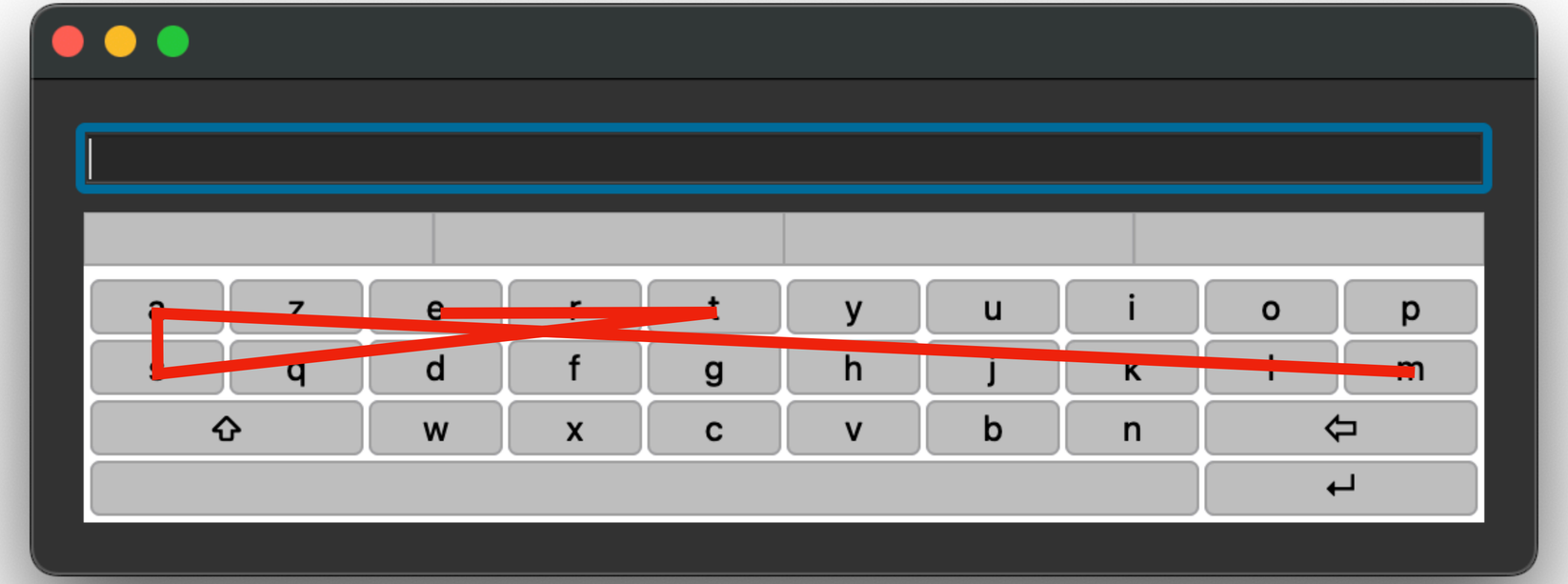
- you are a capitalist pig
- the gun discharged by accident
- a much higher risk of getting cancer
- a tumor is OK provided it is benign
- where did you get such a silly idea
- only an idiot would lie in court
- do not drink too much

# TP clavier gestuel

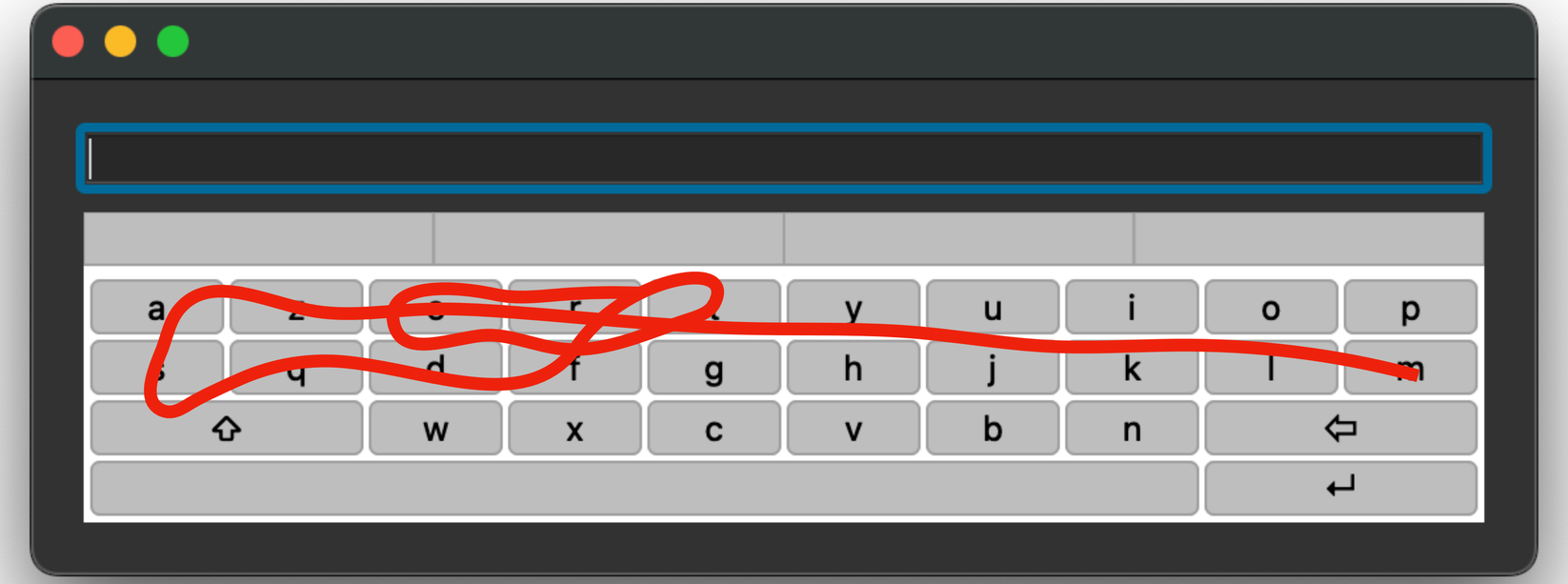

a z e r t y u i o p
s q d f g h j k l m
w x c v b n


a z e r t y u i o p
s q d f g h j k l m
w x c v b n

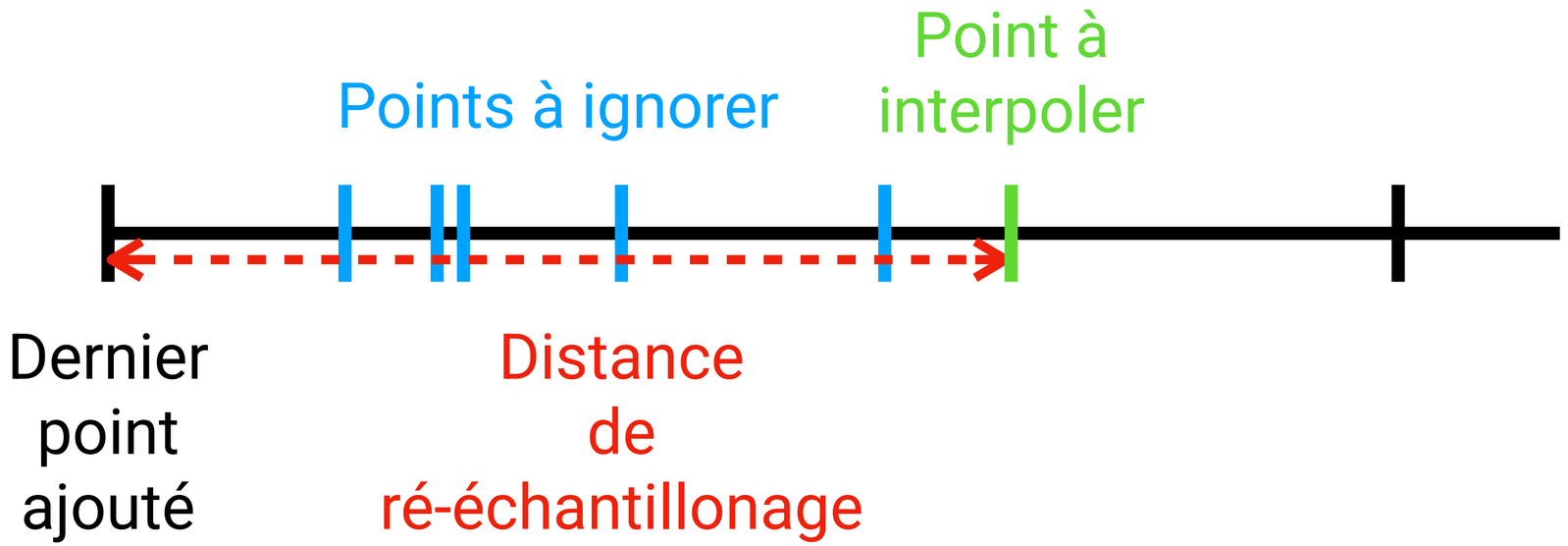
# Template pour chaque mot



# Tracé à comparer



# Ré-échantillonage



# Dynamic Time Warping (DTW)

```
int DTWDistance(s: array [1..n], t: array [1..m]) {
    DTW := array [0..n, 0..m]

    for i := 0 to n
        for j := 0 to m
            DTW[i, j] := infinity
    DTW[0, 0] := 0

    for i := 1 to n
        for j := 1 to m
            cost := d(s[i], t[j])
            DTW[i, j] := cost + minimum(DTW[i-1, j  ],    // insertion
                                        DTW[i  , j-1],    // deletion
                                        DTW[i-1, j-1])    // match

    return DTW[n, m]
}
```