

Bitcount COLRv1

Slides from the TYPETR Bitcount presentation at the Aypl conference 2025 in Copenhagen.

For now the movies in this presentation can be downloaded from <https://we.tl/t-NopRCuSgG> These are large files, generated by Python script (not running in the browser). Let's see what we do with these animations.

<https://atypi.org/presentation/bitcount-ink-history-usage-variable-and-colrv1/>



Disclaimer

No AI was used for the creation of Bitcount, this presentation or any of the visuals.

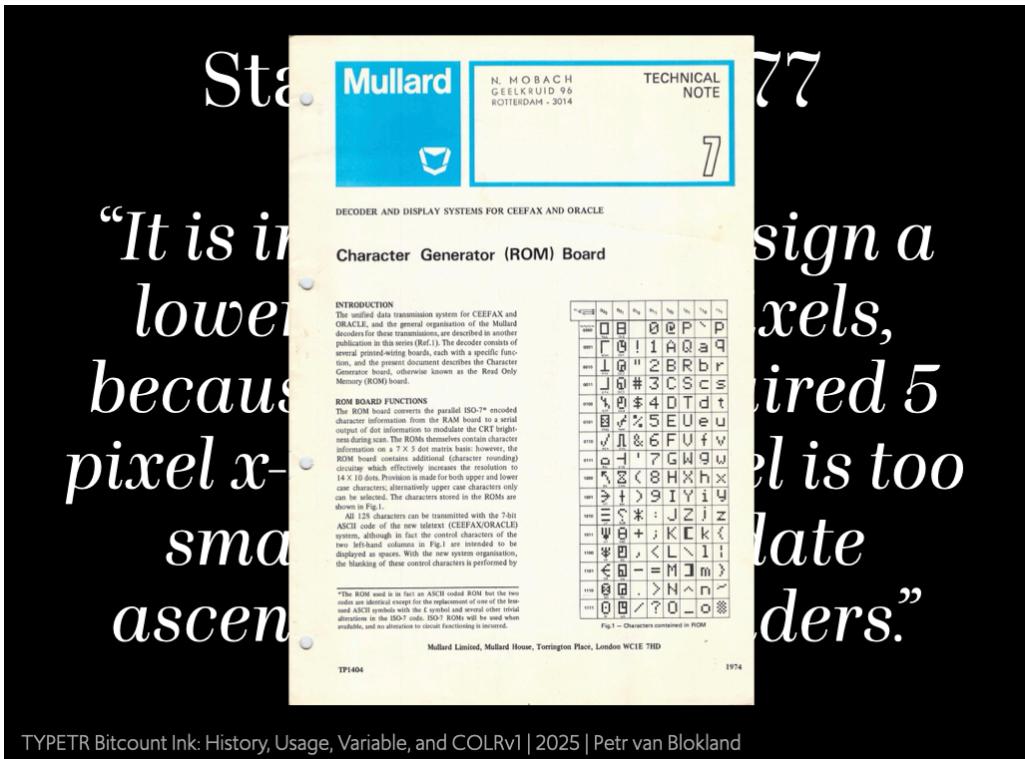
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Statement in 1977

“It is impossible to design a real lowercase for 5x7 pixels, because with the required 5 pixel x-height, one pixel is too small to accommodate ascenders & descenders.”

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Bitcount (then called “fiveseven”) started from the misunderstanding in 1977 that 5x7 pixels was not enough to accommodate all glyphs for a lower case. If the x-height is 5 pixels, then the one remaining pixel for ascenders and descenders is too small.



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In those days pixel displays supported capitals and some basic characters of 6 pixels high. The 2 pixels for ascenders and descender in the lower case as solved by shifting the baseline and adjusting the x-height.

anisation of the Mullard , are described in another . The decoder consists of ach with a specific funct describes the Character town as the Read Only

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Here a sample sheet from a company the made chips with pixel type hardwired in the chips.

MATRIX LETTERS

Oppervlakkige letters en contrast (het verschil tussen dik en dun) zijn een van de meest algemene contrastieve grondvormen van het schrift. In werkplaatsleidende zijn de verklaringen van het contrast een complicatie van de lettervorm. De verschillende letters zijn niet vlakker tegenstaan dan uit hoe je het best kijkt. Aan deze "vorm" danken wij de onderbare tekst op de achtergrond. Een voorbeeld is dat de werkstof de sterk bewoedde moeilijkheden van een grove matrix nog verder in.

Jelle Bouma heeft een interessante oplossing voor de mogelijkheden van een 1×7 matrix veel beter benut kunnen worden als het contrast nu lang mogelijk in het lettertype behouden blijft.

Jelle Bouma heeft een ander probleem uit de tegenovergestelde richting. Bij een diagonale aansluiting van beeldvlakken geef het beeldscherm zelf geen de duidelijkheid die de lettervorm moet hebben.

Jelle Bouma gebruikt die dunne diagonalen voor de dunne gedachten in zijn curieuze achtet. (Volledigheid van de gedachten is een belangrijke aspect van de naam van een constructie, een letter die niet haaks op de regel staat, noemt hij "scheef" of "schaar".)

**the quick brown fox
jumps over the lazy
dog and some of the
134702658 wild cats
petr van blokland
The Quick Brown Fox
Jumps Over The Lazy
Dog And Another Cat
#\$%& {*} [+]{-}{<}{>}{@}{<};
Petr van Blokland. !**

Petr van Blokland
Den Haag, eerste jaar

nh nh nh mw
mij mij
ap ap
00 00 00 99

Een contrastloos uitgangspunt leidt tot onaanvaardbare misvormingen.

Op de grens van het mogelijke blijkt dat het contrast een fundamenteel aspect is van het schrift.

**dots schrijven ontstaat op
natuurlijke wijze
de drie-dimensionale
op de dag
vergroot de leesbaarheid**

**punten leu
re letter o**

Petr van Blokland
Den Haag, eerste jaar
gefotografeerd van het beeldscherm

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An article in the Lecturis "efi" publication from 1983 shows what happens if "contrast" is the last characteristic to be abandoned. Even ascenders and descenders of 1 pixel high are still readable in 2-pixel wide stems.

nh nh nh mw
mij mij
ap ap
00 00 00 99

Een contrastloos uitgangspunt leidt tot onaanvaardbare misvormingen.

Op de grens van het mogelijke blijkt dat het contrast een fundamenteel aspect is van het schrift.

**"Absence of contrast
leads to unacceptable
distortions."**

**"On the edge of what is possible,
contrast shows as a fundamental
aspect of writing."**

nh nh
nij
ap
00 00

Een contrastloos uitgangspunt leidt tot onaanvaardbare misvormingen.

“Absence of contrast leads to unacceptable distortions.”

nh nh
ind
ap
00 00

Op de grens van het mogelijke blijkt dat het contrast een fundamenteel aspect is van het schrift.

“On the edge of what is possible, contrast shows as a fundamental aspect of writing.”

nh nh
nij
ap
00 00

Een contrastloos uitgangspunt leidt tot onaanvaardbare misvormingen.

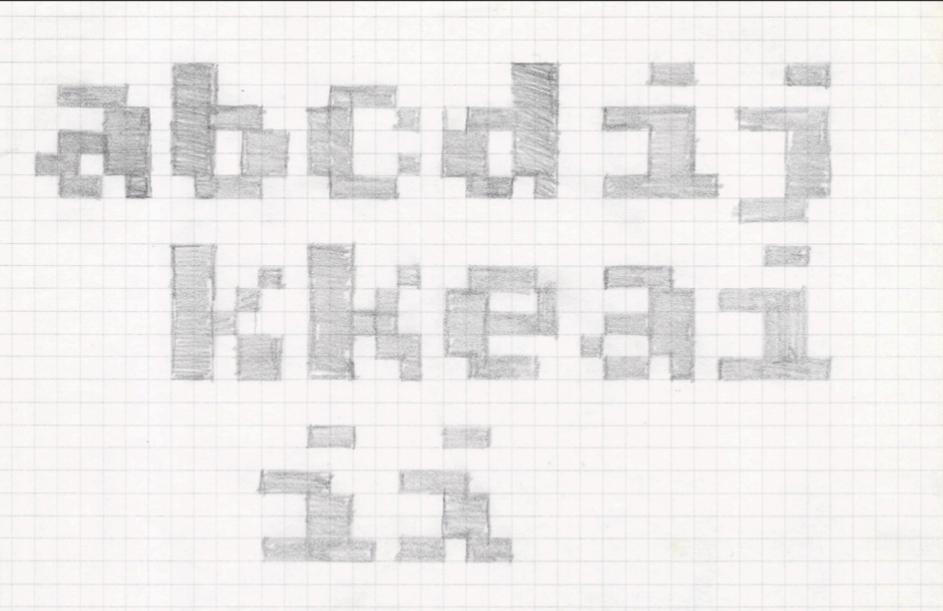
“Absence of contrast leads to unacceptable distortions.”

nh nh
ind
ap
00 00

Op de grens van het mogelijke blijkt dat het contrast een fundamenteel aspect is van het schrift.

“On the edge of what is possible, contrast shows as a fundamental aspect of writing.”

Sketching contrast in 1977



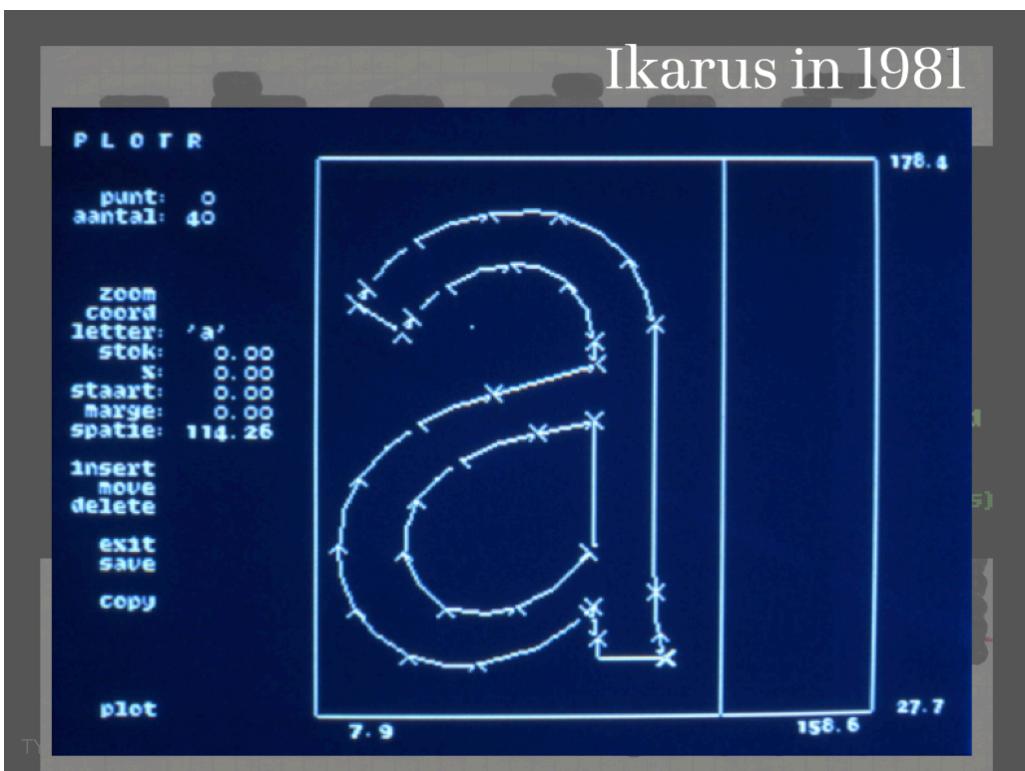
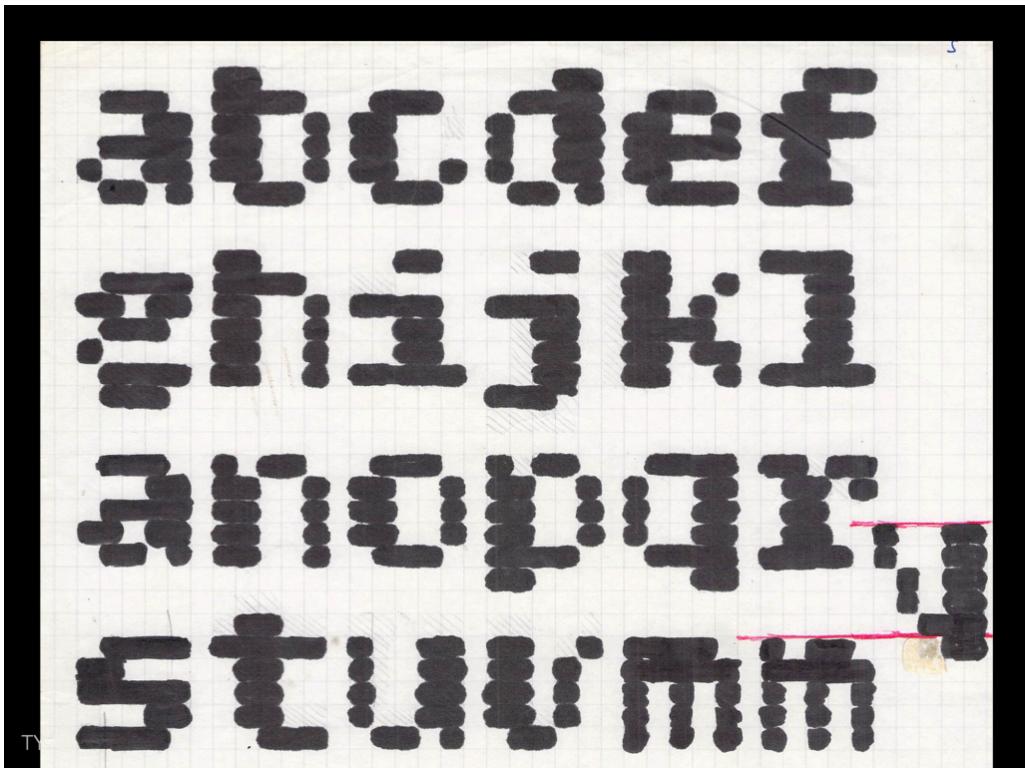
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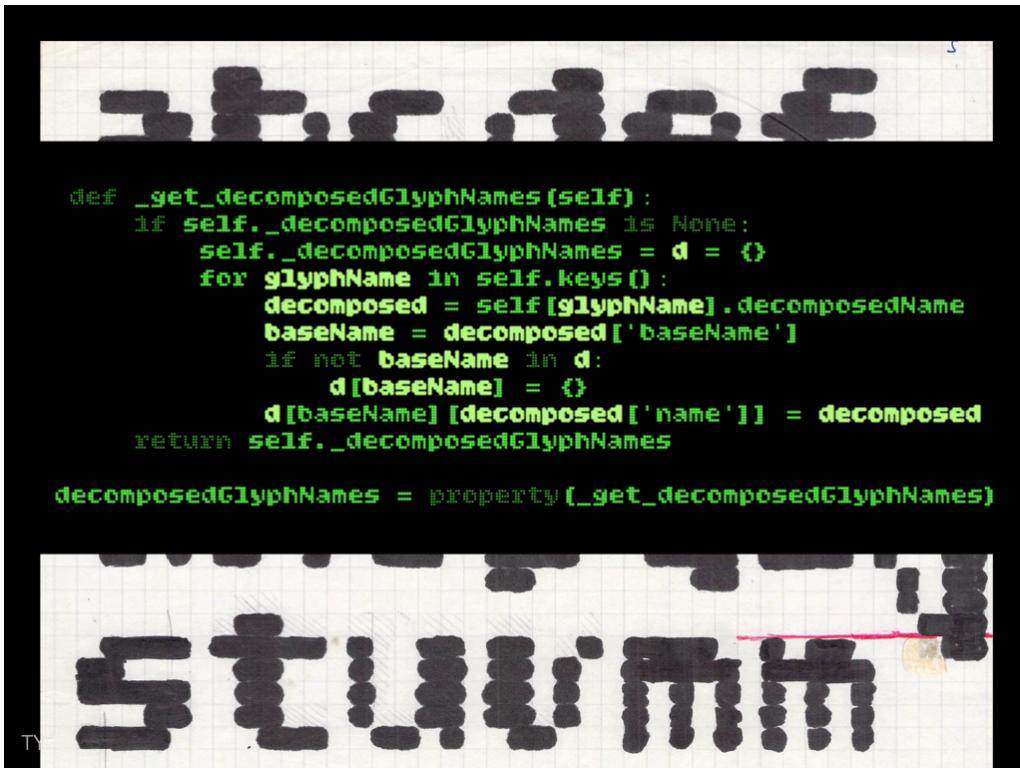
Keeping the contrast in small pixel sizes makes it easier to express the typical shape of specific letters.

Solution in 1977

“Using contrast as the fundamental principle, it is possible to implement a full glyph set in only 5x7 monospaced pixels.”

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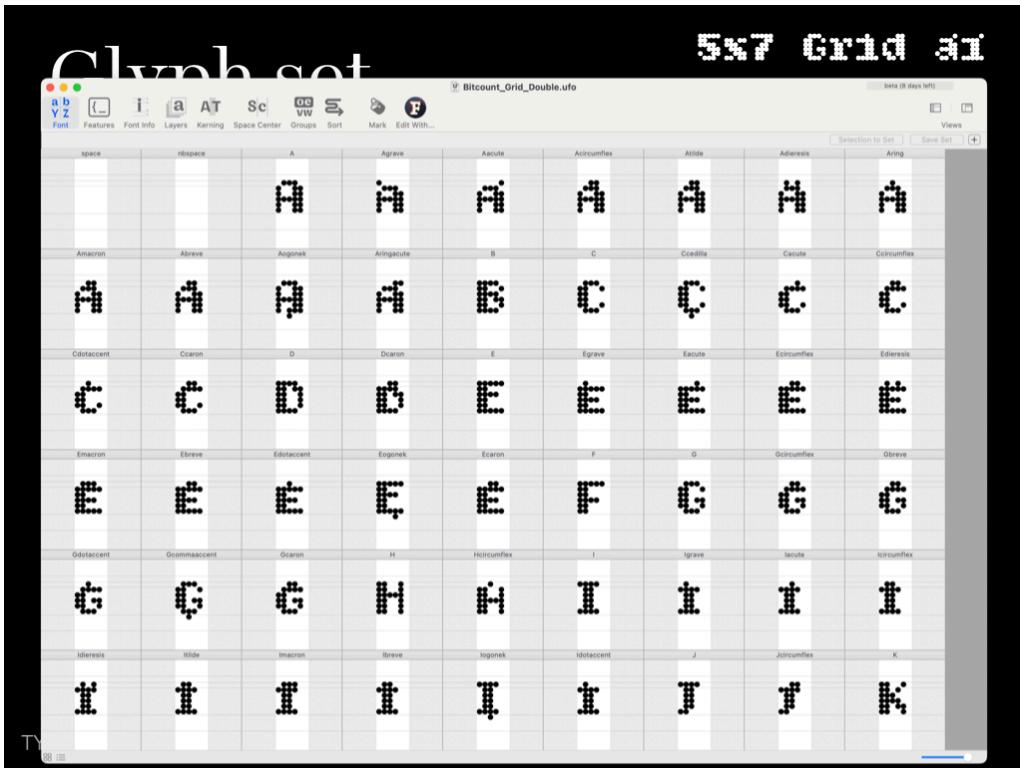


Here the 5x7 Bitcount is used in a programming environment.

Glyph set
 Pixel size & shapes
 Grid, Mono & Prop spacing
 OpenType features
 Color & layering
 Outlines
 Variable axes
 Sub-pixel coloring

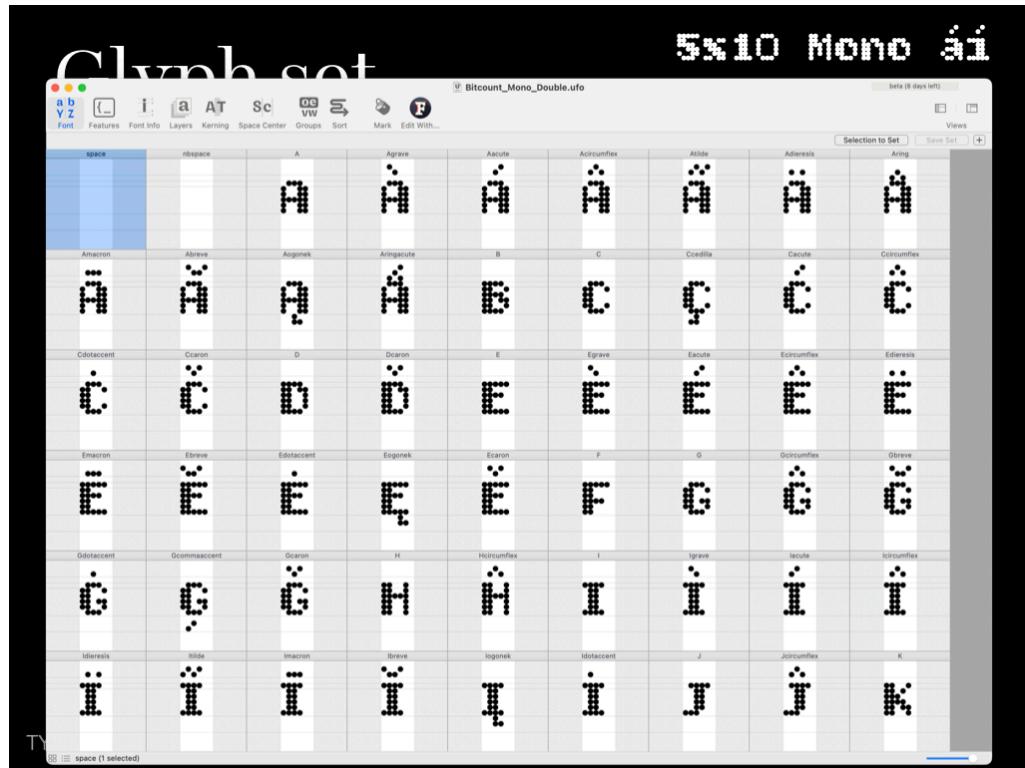
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Chapters from the ATypI 2025 Bitcount presentation.



In order to expand the glyph to the full ascii range (including diacritics), contrast in stems still helps to visually separate the glyph from the diacritics. Not ideal, but still readable within the context of a text.





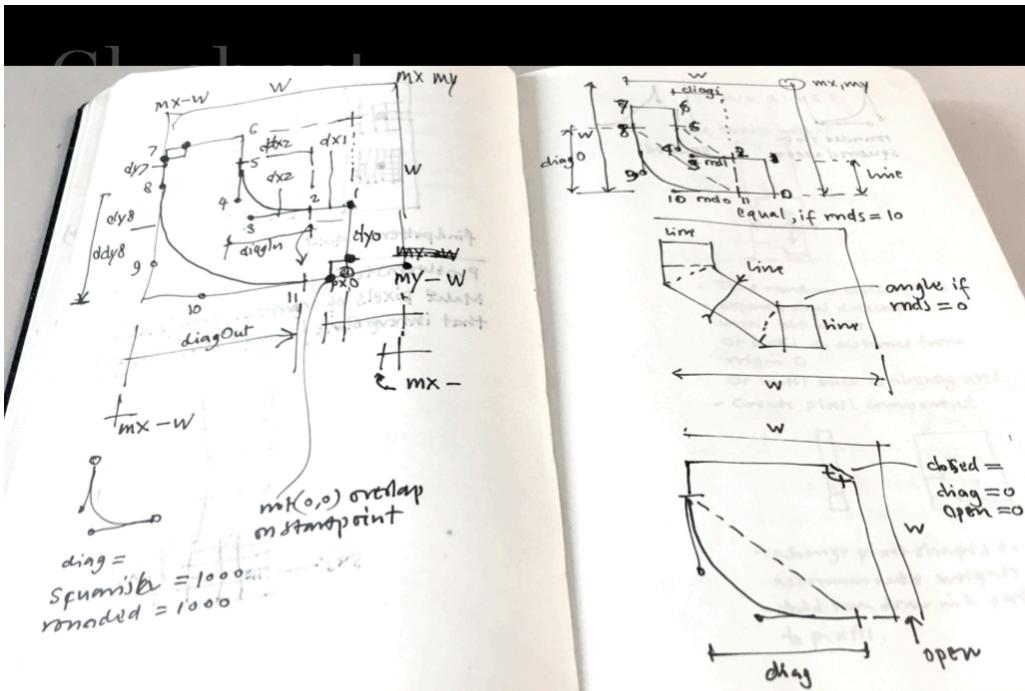
Once the grid is extended to 5x10 pixels, there is enough room for a full set of diacritics. Bitcount implements a large set.



Where the “Grid” (5x7) and “Mono” (5x10) variants mono-spaced on 6 pixels wide, the “Prop” implements proportional spacing for many glyphs that more condensed or wider spacing.

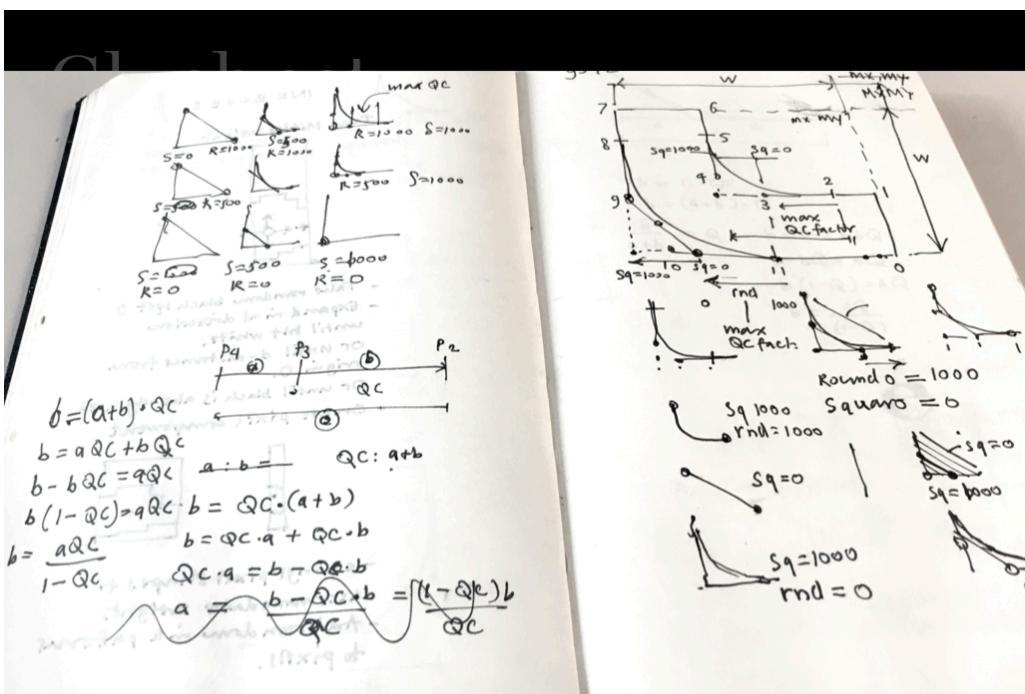


Later the Bitcount family was completed with a single-pixel stem weight. Of course this has some issues for the “Grid” variant, as described above, but for the “Mono” (5x10) variant there is enough room to separate the glyph shapes from the diacritics.

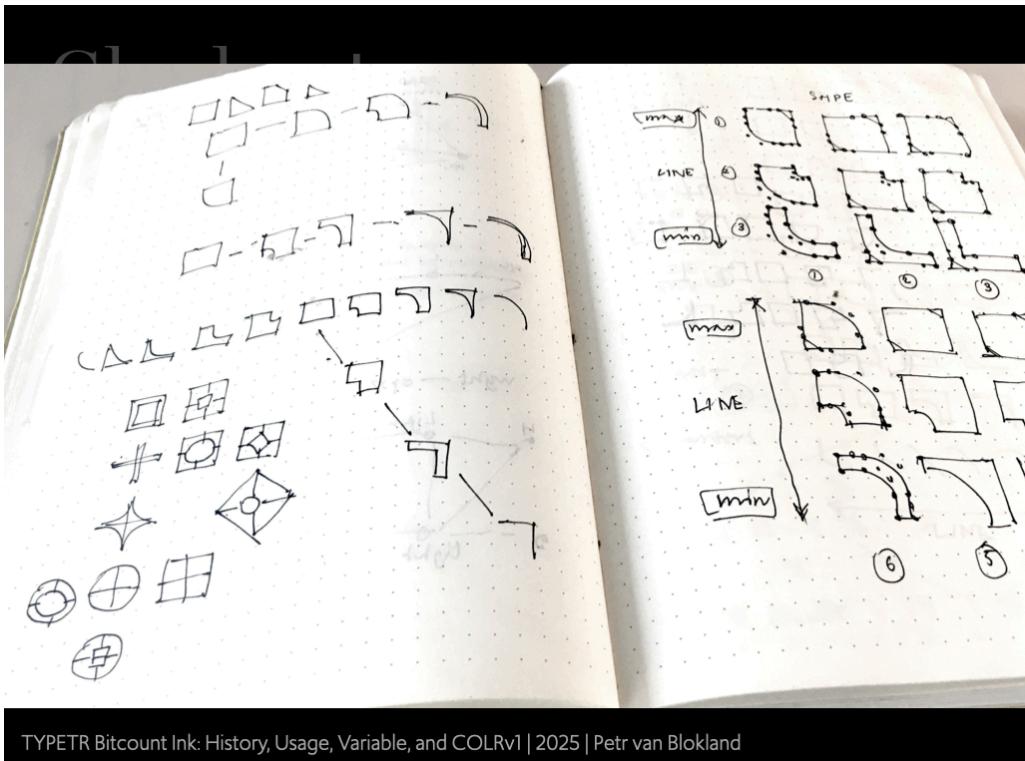


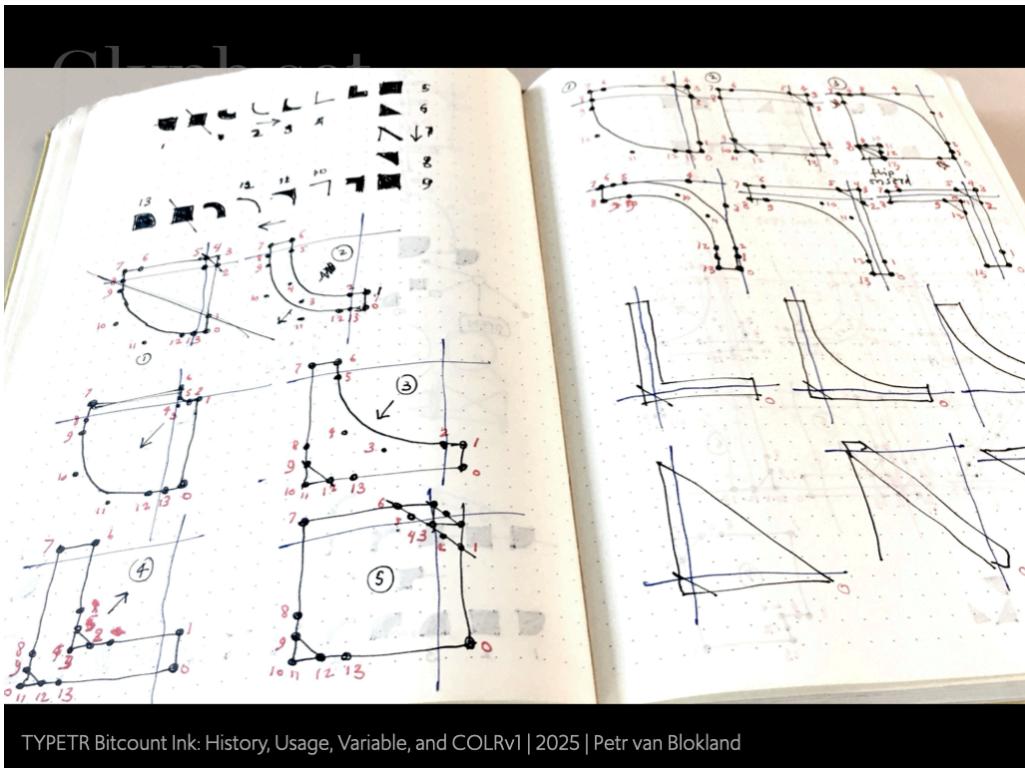
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Many sketches were made to construct the shape of pixels. The aim to design the behavior of the inside and outside curves independently. This way circles, squares, diamonds, star and outlines can be generated from the same point structure. This resulted in a "Shape" axis that works as a sequential catalogue of pixel shapes.

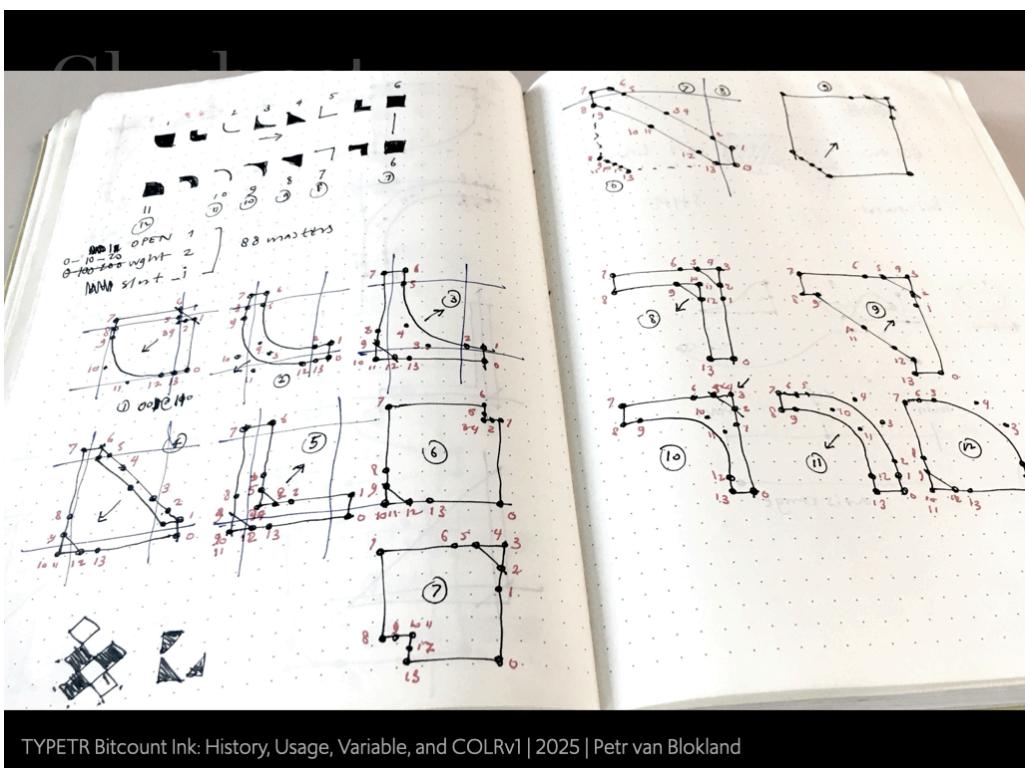


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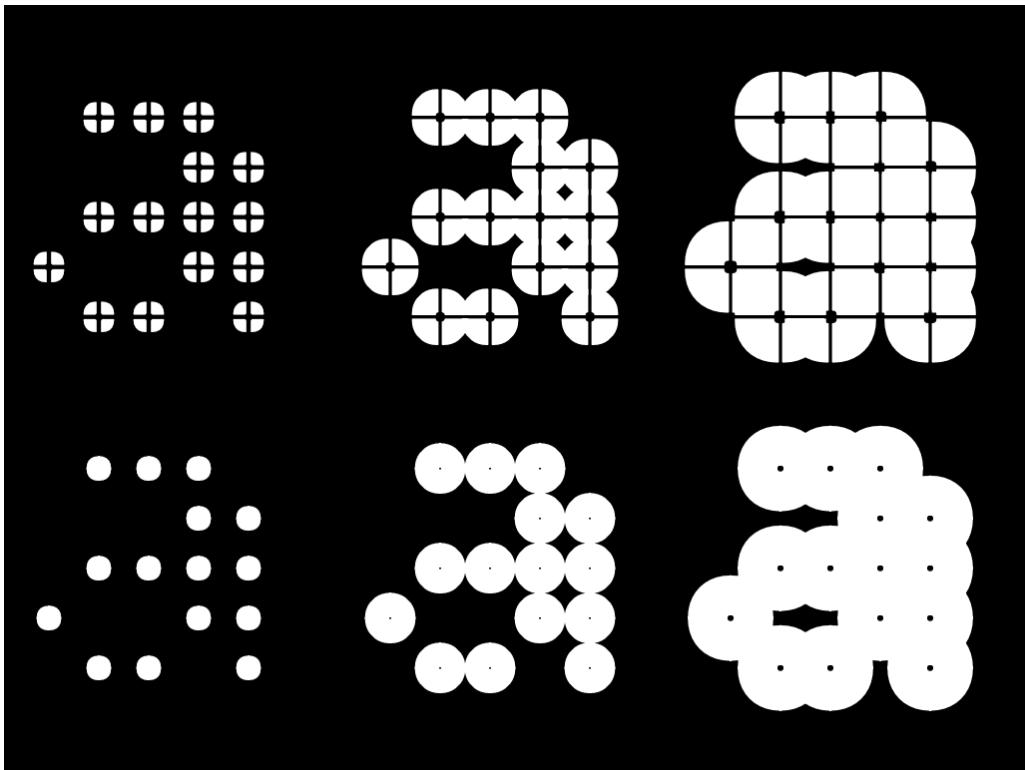




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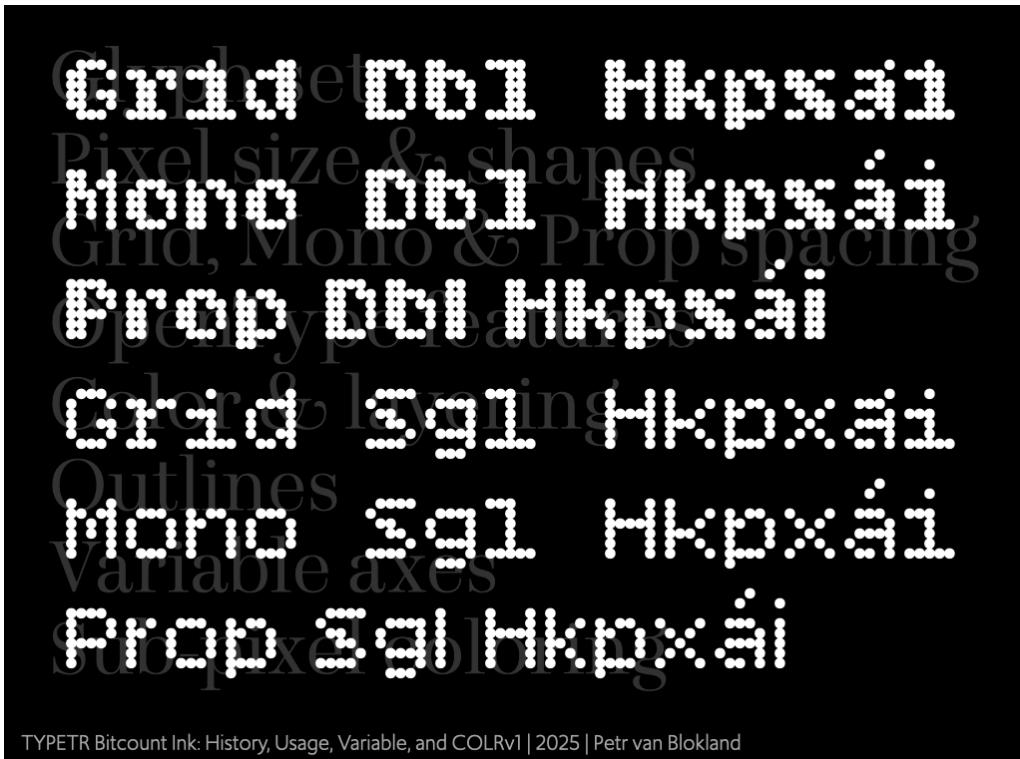


Animated /a pixels (see also Bitcount-nnn.gif)

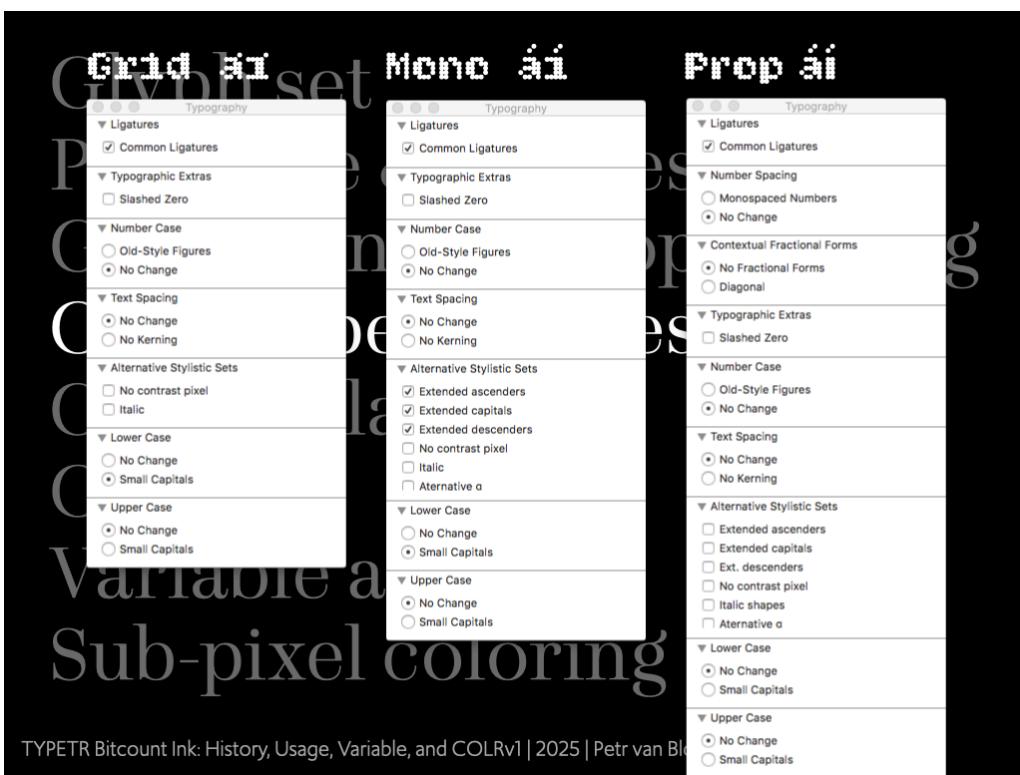
Glyph set
Pixel size & shapes
Grid, Mono & Prop spacing
OpenType features
Color & layering
Outlines
Variable axes
Sub-pixel coloring

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Grid, Mono & Prop spacing



Here an overview of the Bitcount style variants: "Grid" (5x7), "Mono" (5x10) and "Prop" (proportional x10). On top the "Double" stems and below the "Single" stems.



The supported OpenType features depend on the variants. E.g. extended ascenders and descenders are only available if there is enough vertical space to accommodate them. And the "Condensed" mode is only available in the "Single" variants.

Double 5x7	
Proportional	
Extended Tabular	
Smallcaps	
Superior Inferior	
Contrast pixel	
Single 5x7	
Condensed	
Extended Tabular	
Extended Condensed Tabular	
Old style	
Condensed Old style	
Smallcaps	
Condensed Smallcaps	
Superior Inferior	

Some examples of the wide ranges of figures that is available. Not even that – within context — even fraction numbers can be created in a 2x4 pixel grid. At least all 0-9 have their own recognizable shape.

Single Prop Condensed

\$123,456,18

Single Prop Condensed Tabular

\$123 .456 ,18

Single Prop Smallcap Condensed

\$123,456,18

Single Prop Smallcap Condensed Tabular

\$123 .456 ,18

Single Prop Oldstyle Condensed Tabular

\$123 .456 ,18

Single Prop Oldstyle Tabular

\$123 .456 ,18

Single Prop

\$123,456,18

Single Prop Tabular

\$123 .456 ,18

Single Prop Smallcap

\$123,456,18

Single Prop Smallcap

\$123 .456 ,18

Single Prop Oldstyle

\$123,456,18

Single Prop Oldstyle

\$123,456,18

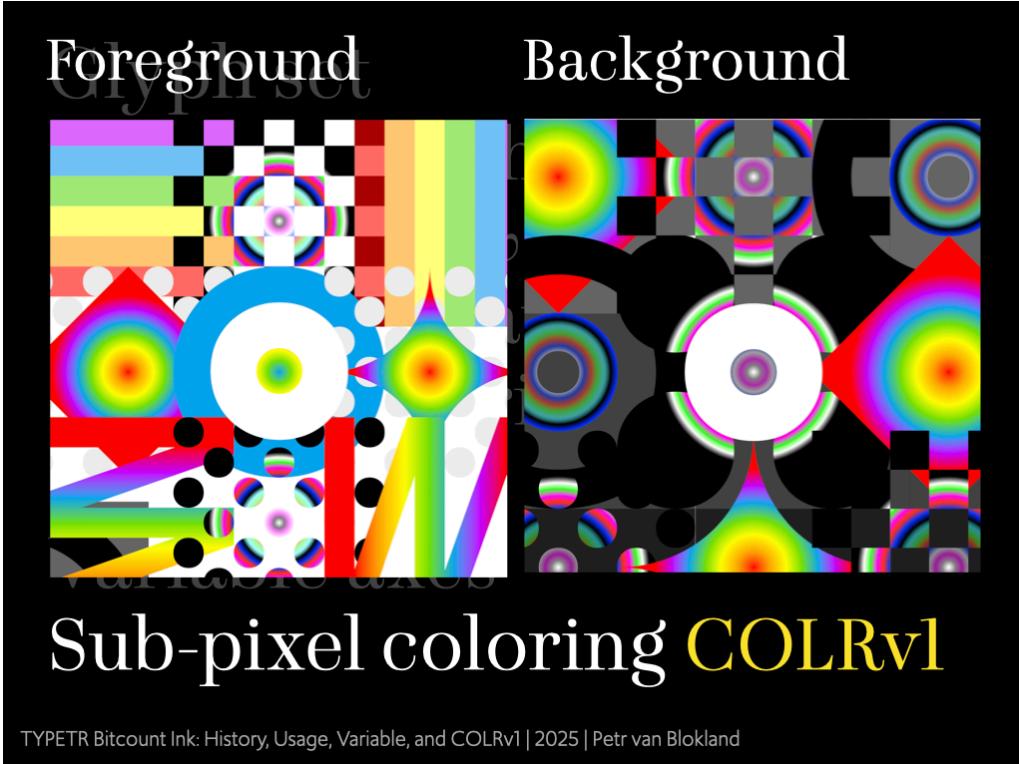
Examples how the figure variants behave in currencies.

Glyph set
Pixel size & shapes
Pixel shape
Grid, Move & Prop spacing
Weight (pixel size)
OpenType features
Expanding quadrants
Color & layering
Slant
Cursive
Outlines
Variable axes
Sub-pixel coloring

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Variable standard black-pixel axes that define the pixel mask shape in COLRv1 usage:

- Pixel shape [ELSH]
- Weight (pixel size) [wght]
- Expanding quadrants [ELXP]
- Slant (shifting rows positions)[slnt]
- Cursive (replacing italic shapes) [CRSV]



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COLRv1 is using the regular pixel shapes as mask for 2 “static” color layers. There is a “Foreground” image with partial transparent areas. And similarly there is a “Background” image, slightly different from the foreground.

The “Foreground” layer is guided by 3 independent axes:

- Size [SZP1]
- x-position [XPN1]
- y-position [YPN1]

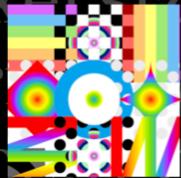
And the “Background” also has 3 independent axes:

- Size [SZP2]
- x-position [XPN2]
- y-position [YPN2]

The total amount of axes in the Bitcount is 10, but since they are all independent from each other, we don’t need the same amount of master drawing that otherwise would have been necessary for a 10 dimensional design space.

Glyph set

Pixel size & shapes

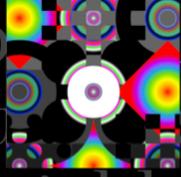


Foreground size

Grouping & Prop spacing

Openings & features

Color & layering



Foreground x

Foreground y

Outline styles

Color & layering

Outlines



Background size

Color & layering

Outlines



Background x

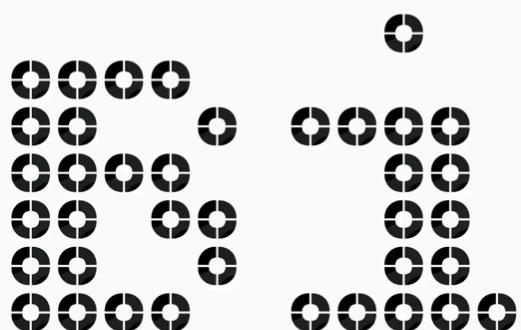
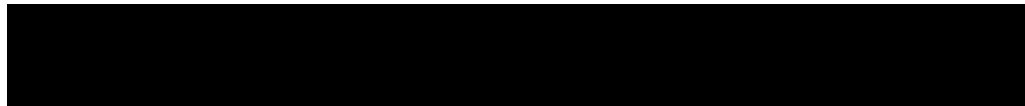
Background y

Variable axes

Sub-pixel coloring COLRv1

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Sub-pixel coloring axes



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Typing /canvas shows the full Foreground and Background layers.



Bitcount is
a family of
styles, the
core shape
of letters

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The element in the middle shows the selected pixel shape mask on top of the Foreground + Background

TYPETR Bitcount

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Discord: TypeLab Club

github.com/petrvanblokland/TYPETR-Bitcount

bitcount.typenetwork.com

On Google Fonts in 2025



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