Summary Execution: The opentype optical size axis (opsz), is new to operating systems, developers and users. And also large ranges of optical sizes are new to type itself, as no previous technology included scaleable fonts and opsz, and unscalable typesetters of the past only scaled to a range of sizes appropriate to specific type size ranges.

Font Bureau have been involved in design production and evangelization of opsz, because of the improvements it offers readers. This improvement is different as sizes are reduced, than it is for sizes that are enlarged, and some information about my beliefs how and why have been distorted and published by Microsoft, discussions in forums, and the appearance of many fonts containing opsz axes, make opsz worth addressing.

History, of course: Large ranges of optical sizes are not new to type, but no previous technology included scaleable fonts and opsz. Typesetting mechanisms of the past, using unscalable type, offered discreet ranges of size. Machines made for text ranged from 6 to 18 points or so, for headlines from 24 points to 96, and different methods, from hand-drawn and photographic methods, were used for headlines and signage. Few if any other metal type fonts contain such a range as the one shown by W3C here: www.w3.org/TR/css-fonts-4/#font-optical-sizing-def. So a type user would be lucky to find close enough matches from one machine to another to successfully bridge a size span from e.g. 8 to 144 point.

In the early-1990's, shortly after its foundation, Font Bureau began receiving requests from users for types designed specifically for text, or for display, or large display or something in between. We researched what was done in the past by both looking at other studies and searching specimens ourselves. Today we are building variable fonts of a size range from really small to pretty big, with everything in between, and not much has changed, as far as what opsz means to type design, in our view.

Issue meat: Each font family has its particular needs in scaling over a broad range of sizes, as does each glyph. And... the changes to a type design going down the size range and effecting group-wide appearance, like weights, widths, and lowercase height, are the same group-wide changes made going going up, as going down. But the changes are for different purposes, and apparently purposes hidden from some people today and in the past.

Here (www.researchgate.net/publication/ 309754147_Sitka_A_collaboration_between_type_design_and_science), you can read a very interesting Microsoft study, that along the line quotes Harry Carter, and compares his rationalization of upscaling to a misinterpreted description I gave the author, who misinterpreted it even after it was written thus:

David Berlow <dberlow@fontbureau.com>
Jul 9, 2011, 1:54 PM

Hey Kevin,

[...]
This proposed study, depending on type selection, looks pretty cool.
[...]
[Kevin asks:]
"I can't remember exactly if you were proposing that the large optical size was optimized for recognizing large sizes, or for recognizing from increased distances?"
[I reply:+
My thought is that designs for larger sizes are optimized for the clarity of an aesthetic at distance, and for economy of space.
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Logic: Downsizing optical masters usually starts at a small size, 24 or smaller, while more typically spanning 14 down to 6 points.
Upsizing starts somewhere, typically small, and has an range off the type scale and into feet, meters and miles. So, it's not shocking to imagine that the purpose of larger type size can change over that vast span of values as all the glyphs and styles in the world could be optically mastered. I could go on about the difference between the range from 24 to around 144 point, as composition in that range is like centered on pages, i.e. text users are close to, that economic composition of, most benefits from.

The MS paper goes off in a different direction with the same quote, and written hypothesis;

"In agreement with Harry Carter [1937/1984], we felt that the larger sizes were optimized for elegance and visual interest: 'Shortened descending and ascending strokes are unforgivable on bodies over 18-point. It is quite legitimate to shorten the tails of the small founts to increase legibility and to lengthen them in the display sizes of the same face for the sake of elegance."

Microsoft/H.Carter/Hudson idea, as apparently represented, is based on an intentional decision to design for elegance and visual interest, as opposed to some typographic reality faced by composition of larger sizes. My conversation with the author explained that legibility is not such an issue at larger sizes as economy in composition. While, in fact, it may be true that "Shortened descending and ascending strokes are unforgivable...", in larger sizes, one does not get from a legible text face with shortened descenders and ascenders, to a more elegant appearance by lengthening the ascenders or descenders. Type doesn't use space that way today, and didn't in H. Carter's time. Ascenders get longer via the shortening of the lowercase height. But this is not for an aesthetic, so much a part of proper re-proportioning of the whole face. (And though the tails of things may be longer in some serif designs and may be seeming to get longer in many optical sizes of the past, they are actually not, they are just getting lighter for the same reason).

See?

(That is a suspect illustration as the makers were not able to scale the individual letters accurately enough to show the relative x-heights of each size master properly. Instead, by scaling them to about the same height the tails appear to lengthen. If properly scaled, they would be seen as shortening.)

[Elegance has nothing to do with it, and forcing subjective reasoning, an aesthetic reason for upsizing's optical changes, is damaging. Given a choice between that and a rational subjective reason why would one choose the subjective?]

Regardless, Explain:
Measurements of lowercase line lengths are a good place to start There one finds that in 6 point masters, a-z, are typically 25% wider relative to a 12 point master's lowercase width, than proportional scaling would be. So, if the 12 point lowercase a-z was 2 inches, a 6 point lowercase, 1/2 the size, is not 1 inch, but 1.25.inches.

And from 12 to 6 point it's not just the widths of lowercase that are changing, they're just really easy to measure. The height of the lowercase as related to the em, is growing, which indirectly shortens the length of ascenders, the alignments of which are pinned to the uppercase's height and can't grow much. In making the lowercase widths increase x-height height increases to maintain the proportions of the design. And weight increases to maintain the appearance of the 12 point at the smaller size.

In old and modern typography, the descenders are the child of the space below the baseline, and are separately adjustable in text faces to provide for the range of line lengths found in column widths, which along with size, define linespacing. This called and calls for descenders with adjustable lengths independent of any sort of elegance.

So, if all the opposite is done for large sizes, then the length of descenders is still dependent on the line spacing, the length of ascenders remains with the cap height and can only indirectly grow taller as the lowercase shrinks, as it also becomes narrower, lighter, and becomes more closely spaced. This was not, and should not usually be done to make the ascenders look longer. as part of an aesthetically pleasing rendition of the typeface. It's part of a system, where sizing down does not lose legibility, and sizing up does not lose readability, that depends either on economy of space, or

The reading experience is not one thing, but if you were to divide it be text and display type, you find the need of the composition to keep the reader's focus still. This means from word to word and from line to line the reader is moving the eyes only, not the head. While page to page requires the nearly unconscious movement of a hand, and has changed in mobile digital media to "thumbing" from page to page.

More economically designed display type, that is the parametric opposite of more legible text type, matches well with what was done in the old technologies and fits right in with the new. We could look at hundreds of specimens from the past that show this, but fortunately we now have variable fonts that can demonstrate this perfectly.

Here is the specimen of a 12 point master Amstelvar Roman, where I can adjust every one of the values of a font that I mentioned above. The main stem weight, thin stems, widths, ascenders, descenders, and lowercase height are all adjustable to 1/2000th of an em...

Downsizing from our 12 point master.
It looks lighter than the 12 point, so we add a little weight.

That appears too crowded, so we increase the width to make more space

...and then some more for space around the letters,

Then it looks too wide, so we increase the lowercase height, which, because the ascenders are tied to the caps, makes them appear a little shorter. As long as these don't appear shorted than the descenders, it does not bother the reader.

Finally [we might do something else if I forgot something]...

Then looking a upsizing,

Architecure

Architecure re

opsz 144

Architecure

YOPQ -100, YTLC -42, XOPQ -26, XTRA -170

Architecture

YOPQ -100, YTLC -42, XOPQ -26

Architecture

YOPQ -100, YTLC -42

Architecture

YOPQ -100

Architecture

Default

Architecture

XOPQ +9

Architecture

XOPQ +9, XTRA +8

Architecture

XOPQ +9, XTRA +8, YTLC +19

Architecture

XOPQ +9, XTRA +8, YTLC +19, YOPQ +5

Architecture

opsz 8

opsz12 Architecture
opsz8   Architecture
opsz12@8 Architecture

abcdefghijklmnopqrstuvwxyz
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Amstelvar

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Roboto Flex

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72 pt   48   24   18   14   12   10   8   6   5   4

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