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Letterform theories 1: Gerrit Noordzij's moving pen
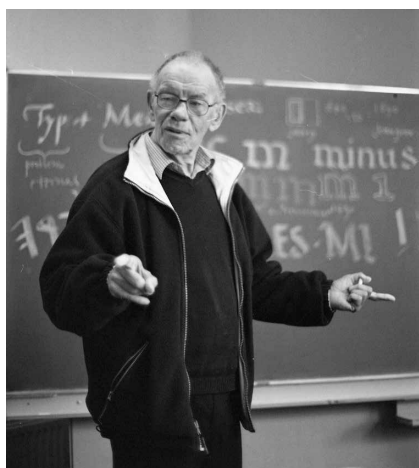## A tool-based model for the Latin script
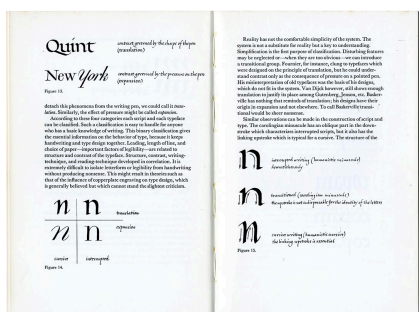

figure 1: Gerrit Noordzij in the KABK class
Image from: https://typemedia.org/noordzij/
noordzijatkabk.html

figure 2: 'Broken scripts and the classification of typefaces', Noordzij's first publication about his theory.
Image from https://hyphenpress.co.uk/2022/
05/06/remembering_gerrit_noordzij/

1 'As a toddler I looked at newspaper type and reproduced it by hand. I had to ask my mother what the letters said. She might have expected I would grow out of it, but no, I was able to read at age three. Not satisfied with knowing the meaning of letters, I wanted to know more about their form. I have kept a number of the drawings I made on small pieces of paper in kindergarten and in elementary school; you won't find a single one without letters.'
Noordzij said in the article
(Carel Kuitenbrouwer, 2007)

1. Introduction

Gerrit Noordzij (1931–2022) was an eminent typographer, type designer, researcher, and writer. He built his theories with several essays, articles and books. He started to teach at KABK in 1960 and had a letter design course from 1970 to 1990. Through teaching and researching, He built his theory, including the cube and the schema of four writing styles, which are well-known among type designers, and we can find them in the various books, articles, lectures and presentations in the type design discipline.

He began to publish his ideas to the world of international typographic discussion in 1970. First announced 'Broken scripts and the classification of typefaces' (Fig. 2) in *The Journal of Typographic Research*. The 'translation/expansion' and 'interrupted/cursive' properties were shown for the first time in this article. Through many articles and *The stroke of the pen: fundamental aspects of western writing* (1982) he wrote, he finally concluded his notions in *De streek: Theorie van het schrift* (translated to English in 2005 called *The stroke: theory of writing*) in 1985. After he left the KABK and died, his writing-based theory and process-based attitude still have been the practical and theoretical foundation of the course.

2. Gerrit Noordzij and background

Gerrit was born in Rotterdam, Netherlands, in 1931. When he was a toddler, he looked at newspapers type and reproduced them by hand[1]. We can find his love of letters already. He went to work at Boekenfabriek Van Rijmenam, which produced books, notebooks and calendars in The Hague and trained in bookbinding from 1948 to 1952 in evening classes at the lyceum. After two years, he got his bookbinding certificate and went into military service (1952-1954).

A visit to the publisher A.A.M Stols guided him to book cover work. Since 1954, his primary occupation was book design, and he worked for the best literary publishers like A.A.M. Stols, Que-

rido, De Bezige Bij and Elsevier. He often used his drawings and wood and copper engravings skills in his book design. Also, Piet van Trigt encouraged him to study at the art academy in Hague for six months in 1955. He did many kinds of work like calligraphy and engraving[2]. It is mysterious how Noordzij got his skills and knowledge. According to Fernand Baudin, he is entirely self-taught person[3].

In 1957, J. J. Beljon, appointed director of the Royal Academy of Arts in The Hague (ΚΑΒΚ), started to send Gerrit telegrams inviting him to teach letter drawing and typography in ΚΑΒΚ. Between 1960 to 1990, he taught writing subjects, including typography and type design, and directed the course in letter design from 1970.

figure 3: Several books Gerrit designed Image from https://www.typemag.org/post/it-all-starts-with-writing-gerrit-noordzij
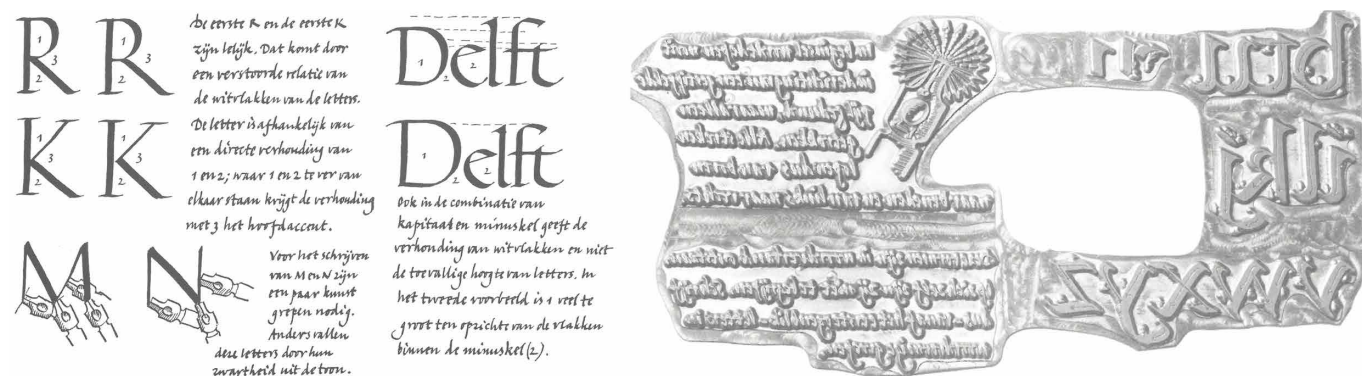

figure 4: Gerrit's early model of writing for teaching his students and its plate. (Bitter, Gewone letters, 2013)

During this teaching period, he started developing his theories on writing and typography. Though 'Broken scripts and the classification of typefaces' was his famous first publication about his idea, he constructed his theory by making printing plates about writing with a broad-nib pen in the mid-1960s (Fig. 4). Indeed, this time – everyone investigating readability research and experimental computer faces – Noordzij's theory seemed just eccentric. However, the rise of the computer, which became everyone's type design tool and could control writing and typog-

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4 In 1971, on the occasion of an A.Typ.I. Congress at London, he was one of a party including Andre Gurtler, Michael Twyman and Rene Ponot who prepared what was to become a Committee on Education in Lettcrforms on the same lines as the Committee of Manufacturers and the Committee of Type designers. Soon, on the suggestion of Ralph Prins, this new Committee of Educators organised seminars of its own, independently of the General Assemblies or Congresses of A.Typ.I. (Baudin, 1998)

figure 5: left: *The stroke of the pen: fundamental aspects of western writing* (1982) right: *De streek: Theorie van het schrift* (1985). He first outlined his theory of letterform in *The stroke of the pen*, and further developed in *De streek* and *Letterletter*.
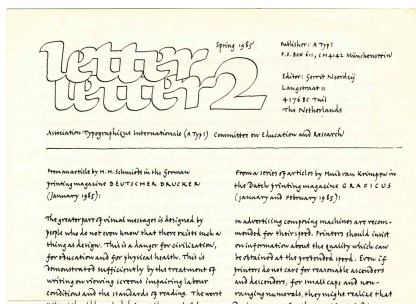Image from https://www.dutchgraphicroots. nl/en/gerrit-noordzij/

figure 6: *Letterletter*, a publication edited and designed by Noordzij. It was distributed to the members of the ATypI from 1984 to 1996. Image from https://hyphenpress.co.uk/2022/ 05/06/remembering_gerrit_noordzij/

5 Gerrit criticised these designer in several articles and interviews.
on Morison: Gerrit Noordzij, "The mannerist writing-book and Staney Morison In honour of Johan Neudörffer" in *Quaerendo* v.25 n.1 (Winter 1995): 59–71.
on Updike: "Updike & scholarship," in *Letterletter*: An inconsistent collection of tentative theories that do not claim any other authority than of common sense (Vancouver: Hartley & Marks, 2001): 63–4; "The Franklin letter," ibid., 65–71.

raphy by a single individual, made his theory more crucial: digital typeface is described by vectors, the digital manifestation of the stroke. He deepened his views by publishing *The stroke of the pen: fundamental aspects of western writing* (1982), *De streek: Theorie van het schrift* (1985), editing bulletin *Letterletter* for the Committee on Research and Education of ATypI[4] from 1984 to 1996 and a lot of articles and presentations. According to the bibliography of Gerrit Noordzij on the TypeMedia website, he wrote 59 articles and books.

After 1978, he mainly worked for Van Oorschot. His designs for the covers resulted in designs for different typefaces, Remer, Burgundica, Algerak, Tret, Ruse, Ruit, Apex, Solidus and Sudum. However, only Burgundica and Ruse are available digitally at The Enschedé Font Foundry (TEFF).

He died on 17th March last year, but De streek has been translated into over nine languages.

figure 7: Typefaces are designed by Gerrit Noordzij. He mainly used these for only his book cover design commision.

2.1 As a 'creative anarchist': teaching and research

Robin Kinross called Gerrit 'an anarchist, of the most creative kind'. (Kinross, 1997: 82) As an anarchist-craftsman, he began to criticise a historically determined view of typography – type designer Fred Smeijers has called 'a statue': a sort of demi-god of the typographic tradition (Smeijers, 1996: 178), or Paul Stiff has called 'the dogma of typographic autonomy' (Stiff, 2000: 126) – and he was the kind of teacher who supports the students, against the administration: he needed his students to explore a type of contrast, not copy from past typefaces. It especially points to the work of Stanley Morison – the Monotype typeface revivals and his writings – and, less so, in Updike's *Printing types*[5]. For instance, he explained that, in terms of mannerist writing, Morison had no coherent conception of the writing-book and improved their history with his disapproval. 'Morison removes Neudorffer intentionally from his position in the history of writing. On other occasions he did the same with the seventeenth-century French calligraphy of the Cabinet du Roi; it was inconvenient for his theory about the Romain du Roi. This makes Morison unre-

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6 'The Socratic method of teaching by asking questions also has the effect of shaping an individual's personality. The focused attention brought about by asking a student questions tailored to a student's own work rein- forces a belief in an individual's own choices. It is one reason that graduates of schools such as Harvard, Princeton or Columbia have such deinitive outlooks: the small class size coupled with a constant probing of their reasoning has the effect of creating strong-willed individuals.' (Cabianca, 2005: 7)
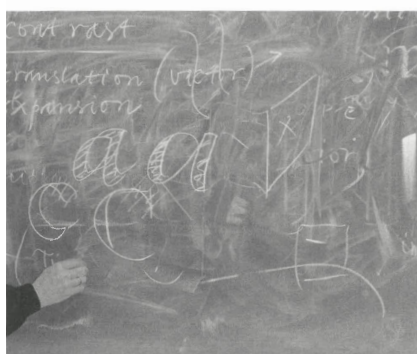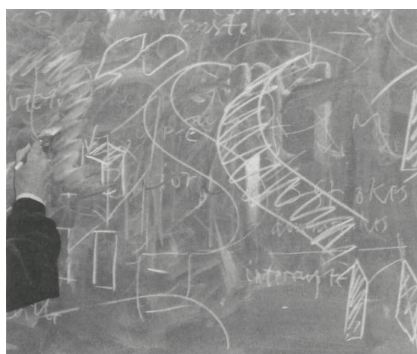
figure 8: Workshop by Gerrit in Kampen in November 2000.
(Middendorp, Dutch Type, 2018)

7 Friedlaender became typographic adviser for apprentice typesetter at Mouton printers in The Hague first, and produced a book entitled Typographisch ABC (1939). After the war, he started to teach typography and writing. his students include some professional typographer such as Otto Treumann, Dick Dooijes, Huib van Krimpen. (Middendorp, 2018: 101)

liable in everything he has written. I conclude: Morison was a swindler.' (Noordzij, 1995: 62)

In *De streek*, he wrote: 'For me there is … not much difference between teaching and research: in teaching I address my future colleagues, and in research into writing I meet colleagues from the past.' (Noordzij, 1991: 5) For him, history is essential to present-day practice. On the other hand, the great names are just colleagues who are good or not so good with their tools; thus, he wasn't bothered by the typographic statue.

His teaching method at KABK is couched in anecdotes and metaphors. He preferred responding to a question by relating a personal experience or observation more than a direct answer. This encourages his students to reflect and investigate his explanations. Therefore, it produces an individualised response to the matter at hand and avoids establishing a dogmatic approach to teaching[6]. I interpret his 'future colleagues and past colleagues' philosophy that, about past colleagues, he isn't affected by the typographic autonomy and evaluates past works as unbiased views. On the other hand, about future colleagues, he taught his students who have individual and independent viewpoints and are not dominated by his dogma.

2.2 His significance of 'writing'

'Writing' is significant in explaining Noordzij's notion. For him, at the foundation of all typography is writing: he wrote, 'From a typographic point of view, type is a special branch of writing that differs essentially from lettering.' (Noordzij, 1991) He regarded that there is no essential difference between handwriting and typography; they are both writing. He explained typography as 'writing with prefabricated letters' and asserted that 'there is little to understand about typography and type design once we understand writing'. With this, his great dogma and classes in writing introduce students to a basic view of letters and how letters work in combinations, in words, lines, and paragraphs. Henri Friedlaender (1904–1996), who worked under Rudolf Koch and taught writing and typography classes in The Hague and Amsterdam, affected the teaching of Gerrit[7].

In a stronger interpretation by Paul Stiff, 'Gerrit claims that his opponents have merely paid lip-service to the idea of learning about type design from handwriting, that they have not grasped it with the tenacity which is needed for genuine discovery, and so do not understand practical research: "The construction of writing is beyond the scope of scholars."' (Stiff, 2000: 126)

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8 Michael Twyman, 'Criteria for education in *Schrift und Leser*' (*Typographic* [Canada], vol. 11, no. 3, 1979, pp. 9–12).
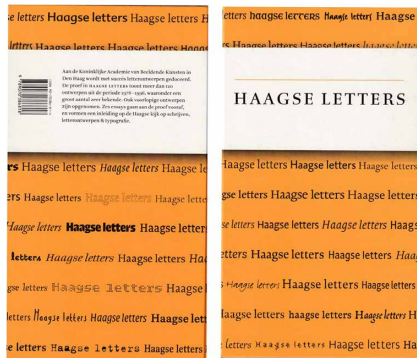

figure 9: *Haagse letters* is a book celebrating and documenting the phenomenon of the work that has followed from Gerrit's classes at KABK. It includes works by Erik van Blokland, Just van Rossum, Ruud van der Lans, and all the others. Later Ruud van der Lans started publishing *Emigre*.
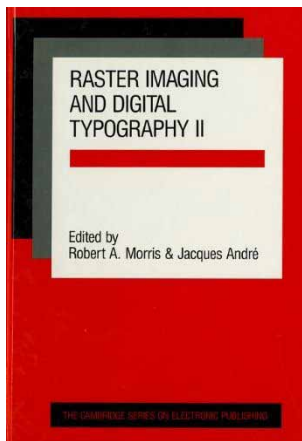

figure 10: Gerrit explained his theory with computers in several articles in books like *Raster imaging and digital typography II* and *Letterletter*.

9 Petr van Blokland talked in Typographics 2022: when Petr van Blokland was in kabk, there were no computers or digital teaching. However, he had his own computer and used it for his project, and Gerrit encouraged it.

Though handwriting seems to generate letters on the spot, whereas typography applies prefabricated letters, about the distinction between handwriting and typography, he explained that 'as different modes of producing text assumes a system, the category of producing text with typography and handwriting for subsets.' (Noordzij, 1997: 89) Also, about the difficulty of the distinction between writing and handwriting, he suggested that the category needs a new label (matching the scope of the German word *Schrift*). Michael Twyman uses 'design for reading' as synonymous with *Schrift*.[8] Gerrit argued that once we understand writing, we will understand typography. However, Paul Stiff refutes this: we will not understand typography until we understand reading. (Stiff, 2000: 130)

2.3 His preference for techniques and digital tools

In *Haagse letters*, the book celebrating and documenting the work of Gerrit's classes in KABK, he described that he prefers the digitally determined marks of pen and pencil strokes, like cutting and engraving. Otherwise, he avoids techniques that produce indeterminate marks, such as etching and modelling. It can be operated with digital tools, he feels much more at ease in vector than pixel description. (Lemmen and Verheul, 1996: 68–9, Fig. 9) However, in his reply to Kinross in typography papers 2, he explained this technical preference varies with the dominant cultural attitude. (Noordzij, 1997: 89) Besides, while he focused on handwriting to apply type design, he also adopted a critical view on making digital tools. He wrote an article for *Raster imaging and digital typography II* (André & Roger, 1991, Fig. 10). He considered writing-based theory important because it is a tool for type design and one essential part of the type design process: 'Western writing cannot be separated from its tool.' (Noordzij, 1973: 81) Thus, it seems he also addressed these digital tools because it is also part of the type design process. Besides, it is connected to teaching: 'He was interested in computes because it forces the designer to think in rulesand in algorithms and in methods, and that is very much matching is what he always tried to do with his teaching.'[9] (van Blokland, 2022) This attribute appears in the attitude of KABK. For instance, his student, Petr van Blokland was a co-author of Ikarus M, and created RoboFOG with Erik van Blokland and Just Van Rossum. They became KABK instructors, and the current type design course at KABK includes a lot of tool-based programs like Python programming, the details of complex interpolation and stone-carving.

3. The theory

In *De streek*, Gerrit deepened his theory from the black and white, the stroke, the writing schema, and historical interpretation to the contrast in changes: the cube.

exterior shape

interior shape

figure 11(right): The exterior shape don't changes but relationship between the exterior shape and interior shape is changed by variation of the black.

figure 12(bottom): Space between letters is also affected by the interior shape. The space between letters of 1st combination and 2nd combination are same, but 2nd combination looks isolated.
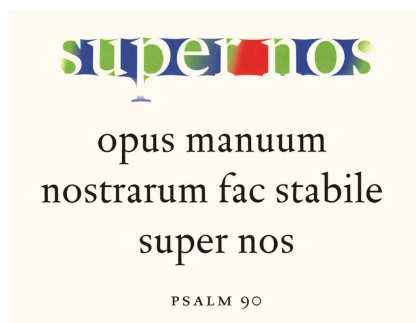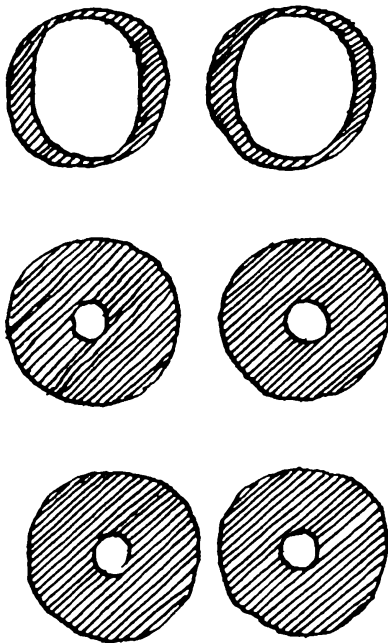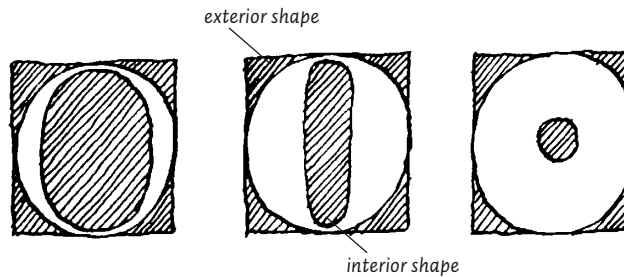

figure 13: Illustration from his book 'De handen van de zeven zusters', in which Noordzij writes about the different uses of white space: inside letters (green), between letters (blue) and between words (red).
Image from https://www.dutchgraphicroots.nl/en/gerrit-noordzij/

3.1 Black and white

As many type designers explained the importance of 'white' in type design, Gerrit also starts his theory with black and white. A letter is two shapes of different brightness (e.g. black and white, dark and light). Black is the shape which encloses the white. Black and white are replaceable with dark colours and light colours, and also they are interchangeable with each other. Gerrit called the *black* the stroke and the enclosed shape the *white* of the letter.

The white shape also changes when the black is altered and vice versa. In figure 11, in all three cases, the exterior shape of the 0 has the same area. The area is not influenced by changing of the black. However, the relation between the interior shape's surface area and the exterior shape's surface area changes. The perceptual significance of the exterior shape is affected by the interior shape; thus, the first rectangle is much greater than the third one.

Figure 12 shows changes between combinations of letters. The white space between the letters in the second combination is the same as the first, but the perceptual effect of this white is much more significant; it isolates the letters. In the third combination, the white between the letters is lessened, so it looks like the bond is restored.

He explained the importance of the white 'The relation between shape and countershape, which in writing amounts to the relation between white and black, is the foundation of perception.' (Noordzij, 1985: 15) In his book, 'De handen van de zeven zusters', he also showed different types of white space: inside letters, between letters, and between words (Fig. 13), while he also suggested that current studies of writing still has attended to the black of the letter than the white of the word.

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3.2 The stroke and its properties

Writing with broad-nib pens and flexing pens fosters an understanding of how stroke is written and learning to analyse the stroke. It will make the students apply their parameters to lettering and type design. Therefore, he made several terms to interpret the stroke. The white shapes decide the place of the black, but the black shapes make the white shapes, and the stroke is the most straightforward demonstration of the black shape.

figure 14: A stroke with the elipse imprint. It clearly shows elements of the stroke with terms like counterpoint, imprint, frontline and oriantation.
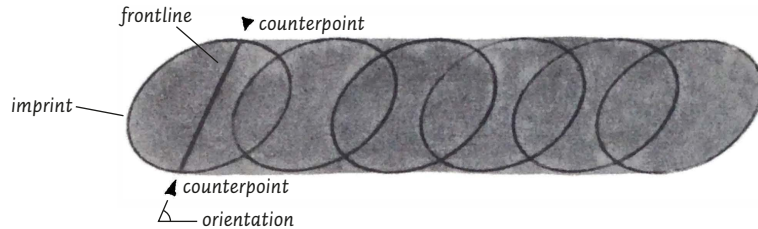
Imprint is the shape of the tools, like a pen, and the stroke is the continuous track of the imprint. In figure 14, the imprint is an ellipse. Also, we can only recognise the identity of the imprint with extremities, such as the shape of the stroke's start and end. Otherwise, the outline consists of straight lines. And these lines are the trace of a pair of points of imprint. Gerrit called this pair of points a *counterpoint*. Besides, the line through the counterpoint is called the *frontline*. Moreover, he often explains the vector's angle and frontline as the *orientation*.

figure 14: A stroke with the triangle imprint. While swelling curve, the counterpoint changes to several counterpoints.
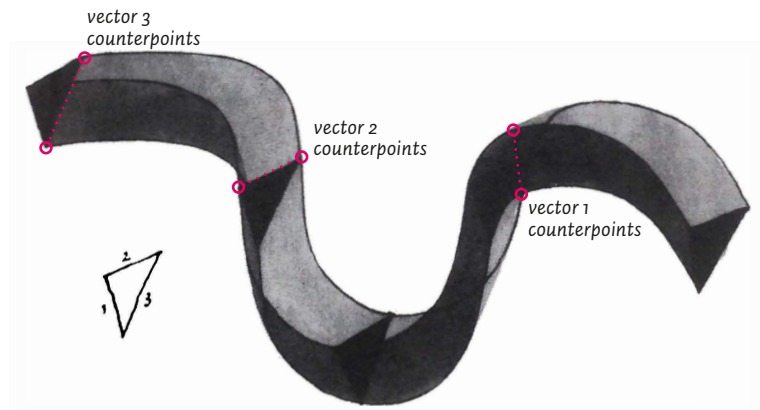
In figure 15, the imprint of the implement is a triangle. The combination of three vectors which have the length and orientation of each of one side of the triangle produces the stroke. The dark track is the trace of vector 1. In this case, 'Whenever the lines described by the vertices of the implement intersect, a different vector becomes the counterpoint of the stroke.' (Gerrit, 1992)
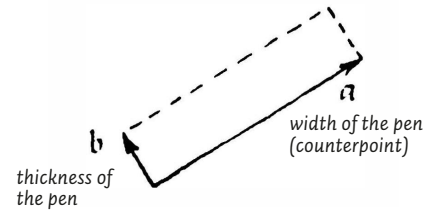
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figure 17

figure 16(left): The schema of the stroke of a broad-nibbed pen. This schema is simple because width and orientation is fixed.

figure 17(right): The broad-nibbed pen usually has thickness of the pen b. However, it is ignored in the schema.

The stroke, which is the trace of one vector, in figure 16, indicates the schema of the broad-nibbed pen, which we can easily imagine: as the simplest tool. This stroke, made with a broad pen, has an imprint. Figure 17 is the schematic of a broad pen; vector a is the counterpoint (the width of the pen), and vector b is perpendicular to a, which is the thickness of the pen. However, in this stroke, the thickness of the pen is negligible if it is not as long as it affects the width of the pen. Practically, many typefaces have an intentional thickness, affecting the stroke's shape. Yet, nowadays, a typeface of large size is always scaled from a small body simply, though past punchcutters made styles each size in metal type era optically.
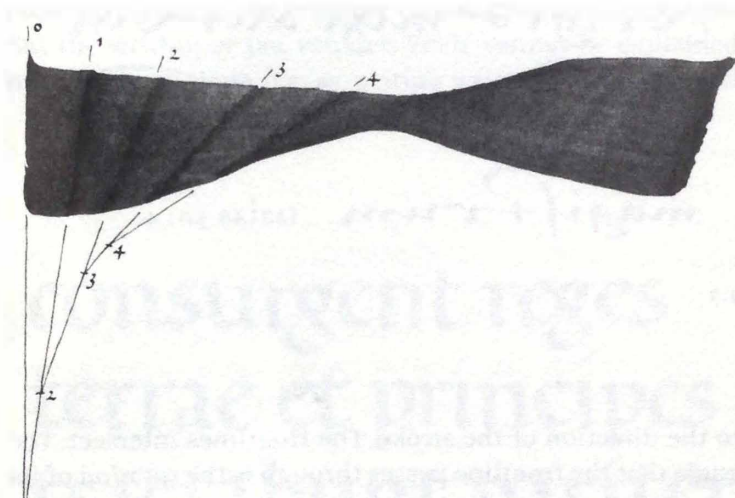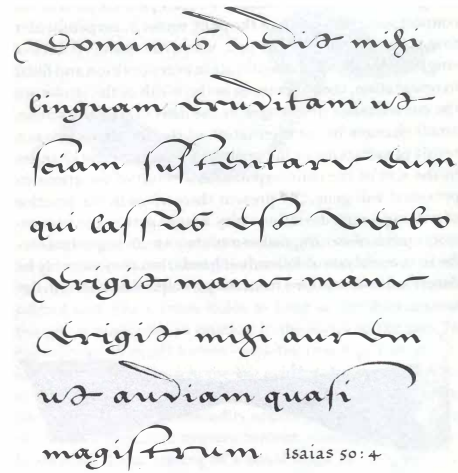

figure 18(left): If the stroke was written with a broad-nibbed pen and the heartline is straight, the width of the stroke is changeable because of the rotation of the pen.

figure 19: Dutch standing running hand (upright cursive)

Changes in the properties of the pen, such as changes in the width of the pen or changes in the orientation of the pen, present themselves in the practice of writing. Though they are described as deviations from the principle schema in figure 18, they are an essential factor in analysing individual hands. Orientation changes are called rotation, which we can see from Dutch manneristic calligraphy, which will be mentioned later, from the first half of the seventeenth century.

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Gerrit categorised three *sorts of contrast*: the difference between thick and thin in the strokes. They are one aspect of the schema of writing from different cultural histories.

Translation: the contrast of the stroke is the result of changes in the direction of the stroke alone, because the size of the counterpoint is constant and the orientation of the counterpoint is constant. This is from antiquity and the Middle Ages. (Fig. 16)

Rotation: the contrast of the stroke is the result not only of changes in the direction of the stroke, but also of changes in the orientation of the counterpoint. The size of the counterpoint is constant. This is from mannerism. (Fig. 18)

Expansion: the contrast of the stroke is the result of changes in the size of the counterpoint. The orientation of the counterpoint is constant. This is from romanticism. (Fig. 19)

figure 20: This spatial model makes understanding the expansion contrast easier. The bottom images are the simulation of some flexing pens.
Left: a stroke with a low-flexibility pen, the pressure is increasing. Right: a stroke with a high-flexibility pen, the pressure is not much. These strokes seem the same, but in this case, some elements of the stroke were different.
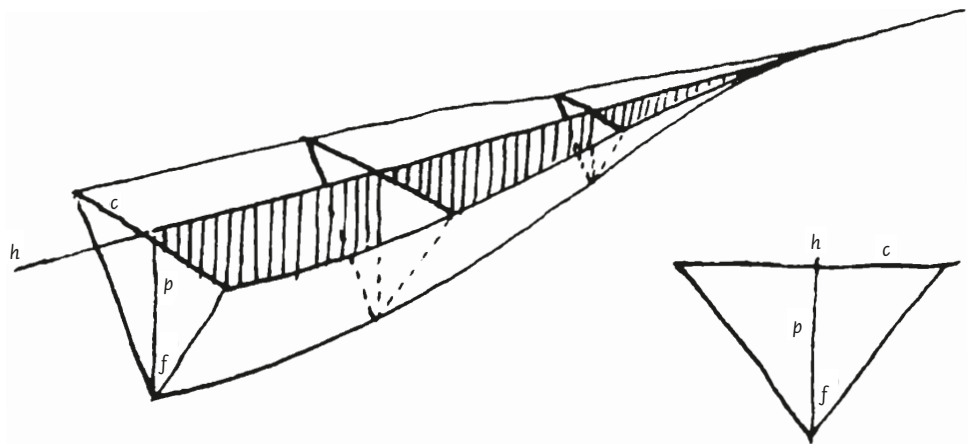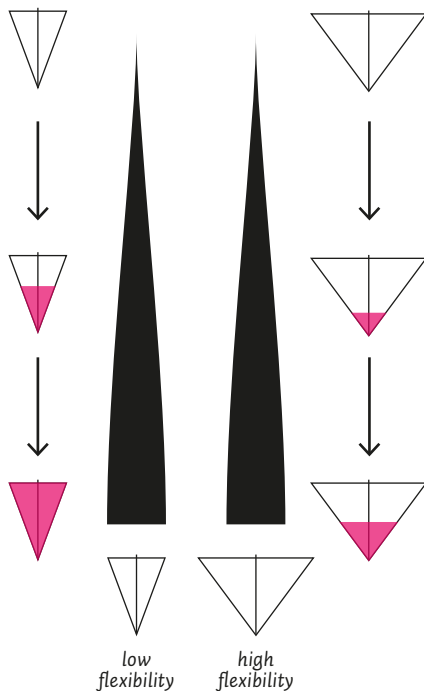

low flexibility   *high flexibility*

Figure 20 is a spatial model of expansion.

h heartline
The line runs the centre of the stroke.
p the changing pressure on the pen, as the depth of the stroke
This determines the width of the stroke by responding to the flexibility of the pen.
f the flexibility of the pen, pictured as the angle of a wedge running through the keel of the stroke
If the flexibility of the pen is low, the triangle will be more narrow and sharp. If it is high, the triangle will be wide.
c counterpoint
$c = p \cdot \tan f$

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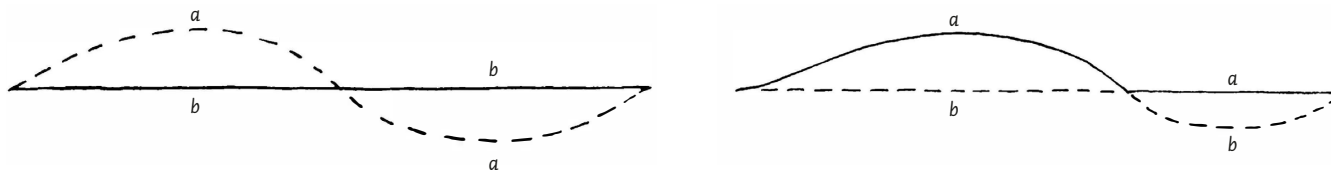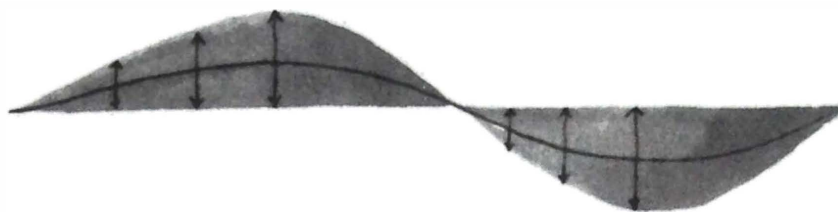figure 21: A swelling expansion stroke. When focusing on the contour, this stroke looks simple but is not.

figure 22(left): The contour seems a sine curve *a* and straight line *b*.

figure 23(right): But actually a changes from curve to straight line, and b changes from straight line to curve.
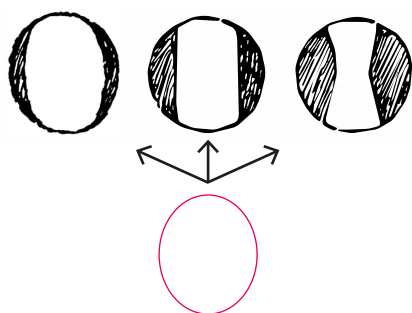

figure 24: Each character *o* was written with the same heartline, but right *o* looks strange. This is the effect of the size of counterpoints.

Figure 21 is a stroke of expansion with the pressure; it is swelling. Between the left and right strokes, the orientation of the frontline and width of the stroke is the same, but the direction of the heartline is different. In figure 22, the contour can seem like a straight line with a sine curve. However, the left and right straight line is not connected. They are different contours, and figure 23 shows precisely which contour is which.

Character *o* in figure 24 have the identical heartline and the same type of contrast. The only difference in the shape is the swell of the counterpoint. In the model of expansion, it is the difference in the pressure or the flexibility of the pen. Typographically, this model indicates the similarity between *Baskerville* and *Bodoni*. In freehand writing, the differences will appear at every stroke. It is impossible to control completely the degree of expansion.
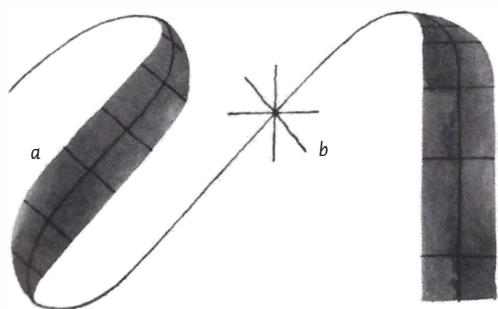

figure 25: Whereas at point *a*, the orientation of the frontline is clear, the orientation at point *b* is interpreted every orientation.
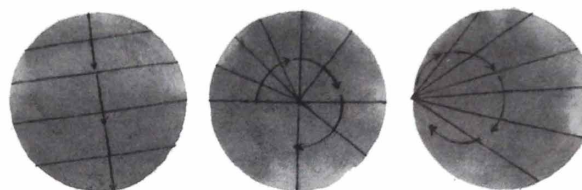

figure 26: If the size and the orientation of the counterpoint is changable, we cannot describe actual mode of writing from these shapes. Left: the size changes, Middle: the orientation changes, Right: both changes.

The orientations of the frontline and counterpoint coincide. In the thin segments of figure 25, the frontline has no orientation because there is no counterpoint. We can say that the frontline has every orientation.

If both the size and the orientation of the counterpoint can change, we can't conclude the mode of writing from the shape of the stroke correctly. In figure 26, we can deduce variable properties of the pen to write the shape.
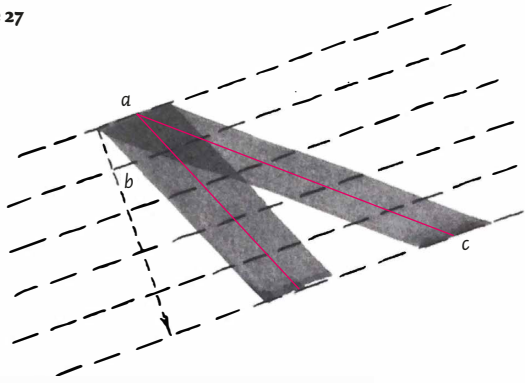
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figure 27

figure 28
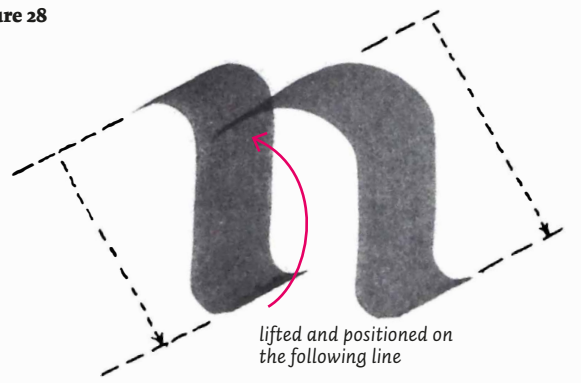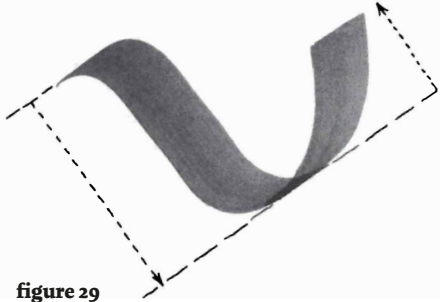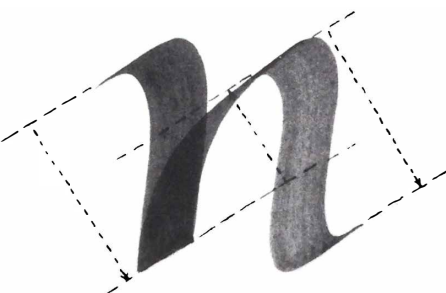
lifted and positioned on
the following line

figure 29

figure 30

In figure 27, the orientation of the front *a* is fixed. The direction of the front *b* is perpendicular to the orientation of the front. However, the direction of the stroke *c* is different from that of the front. The movement of the stroke does not necessarily coincide with the movement of the front. In figure 28, the pen lifted at the end of the stroke and positioned the following stroke, making a new front. The stroke of figure 29 turns in the direction of the frontline and back in the opposite direction. In focus on the direction of the front, it stops at the end and goes in the reverse direction.

In the letter in figure 30, the front moves forward, back, and forward. When there is no pen rotation, the front sweeps across an area bounded by parallel lines.

interrupted construction

running construction
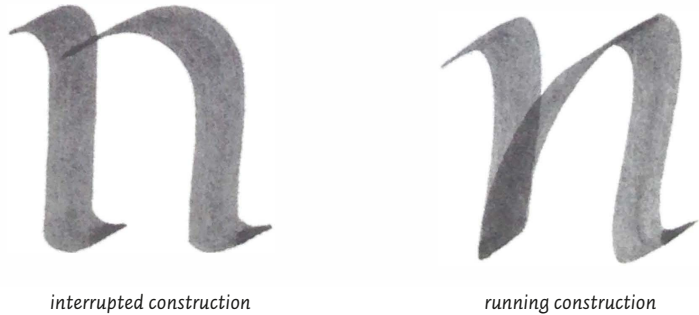
figure 31

Running   Interrupted

Translation

Expansion

figure 32

Gerrit classified these two types of the construction of a script by the difference of the front. The first one is an *interrupted construction*. In this, the front either moves in a single direction. The second one is a *returning construction*. The front reverses its direction and turns back in this construction. Then, the writing schema occurred with *expansion/translation* and *interrupted/returning* construction. He made this classification based practical way against Vox System classification which categorises typefaces with an arbitrary view and makes the boundary between categories.

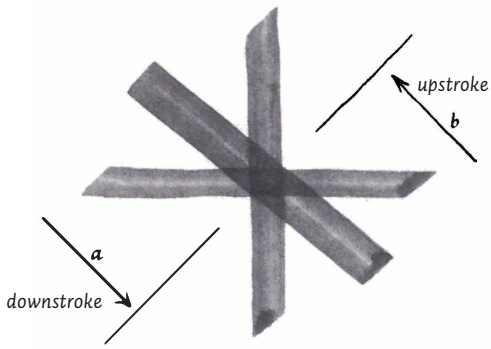Masaki Ando
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figure 33

In handwriting, these two directions of the front are determined as a *downstroke* and an *upstroke*. In the downstroke, the writer draws the front toward his hand. Only downstrokes construct the interrupted construction. In the upstroke, the front returns to the opposite side of the downstroke. The running construction consists of joining upstrokes between the downstrokes. In figure 33, the strokes moving in the direction of *a* are downstrokes, and those moving in the direction of *b* are upstrokes. He crassified several handwriting with this model.
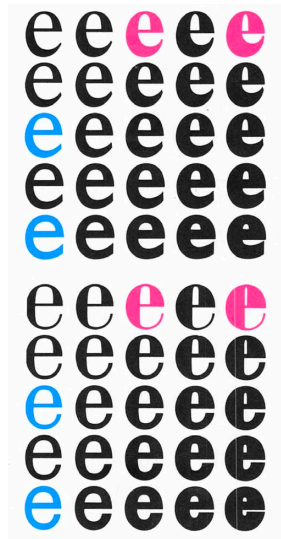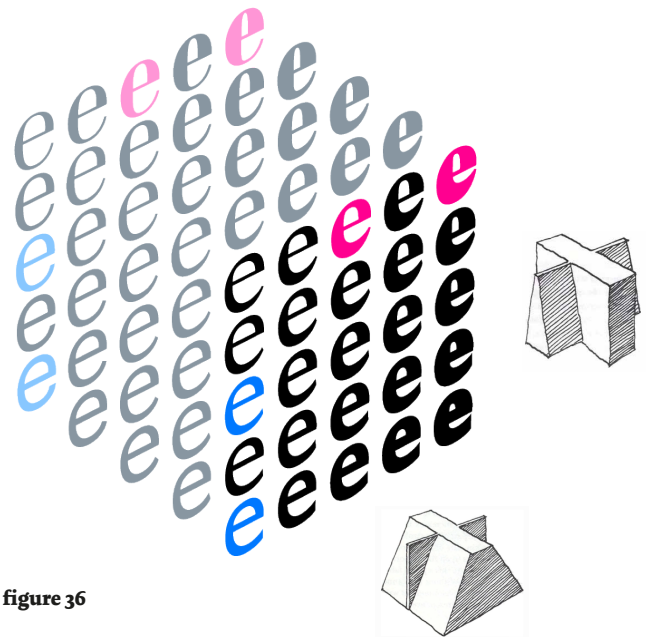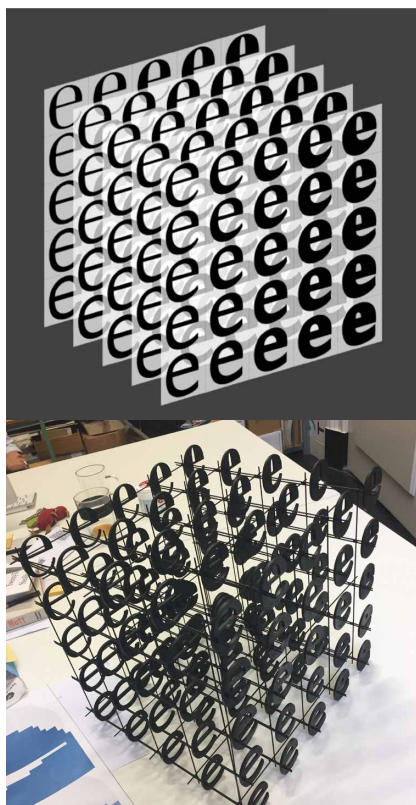

figure 34

figure 35

figure 36

3.2 The cube

Gerrit supplemented his idea of contrast with the innovative cube. His first idea of contrast in *Dossier A–Z* indicated increasing contrast (red) and decreasing contrast (blue) (Fig. 34). He developed his theory to two x-y coordinated plane in *Haagse* ABC (Fig. 35), and finally completed as the cube, which developed in *De streek* (Fig. 36). The *x* axis shows decreasing contrast, the *y* axis shows increasing contrast, and *z* axis shows changing type of contrast: between translation and expansion. He described the changes of contrast with model in the image. It looks a hexagon, but it is a three-demensional cube. In figure 37, some of designer developed the cube to make it more straightforward.

figure 34: The first contrast model by Gerrit was shown in Dossier A-Z in 1973.
Image from https://hyphenpress.co.uk/2022/05/06/remembering_gerrit_noordzij/

figure 35: Gerrit developed the previous diagram to plane in Haaguse ABC in 1978. These characters were interpolated.
Image from https://vimeo.com/344106339

figure 36: The cube, was interpolated by Petr and Erik van Blokland in *De streek*, 1985.
Image from https://typemedia.org/noordzij/

figure 37: Further developments (or play) of the cube. Top: the animation of the cube by Just van Rossum in Daily Drawbot shows layers behind the surface. Bottom: the real cube by Erik van Blokland.
Image from https://typetr.typenetwork.com/news/article/The-Gerrit-Noordzij-Cube, https://letterror.com/misc/noordzij-cube.html

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漢字 漢字

Kaisho
(interrupted)   *Gyosho*
(running)

figure 38: Kaisho is interrupted construction and Gyosho is running construction in Japanese writing. Gerrit's theory seems functional in this image.

ぬ

figure 39: Many *hiragana* characters include upstroke natively. Writing these characters with interrupting is weird.
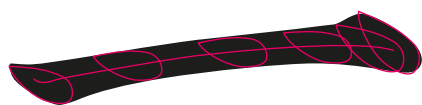
figure 40: Writing with brush has many properties which are not in tools of western writing.
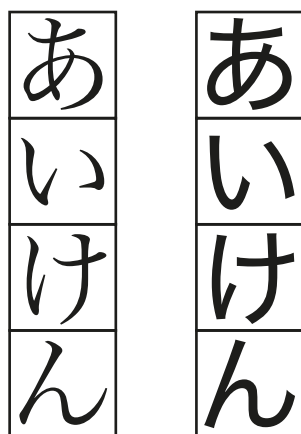
あ あ
い い
け け
ん ん

figure 42: It is difficult to create a Japanese Gothic typeface with only decreasing contrast from Mincho because the Mincho typeface has several peculiar elements.
The body of characters in Japanese typeface is square, so the space between letters is not affected by the weight of the stroke.

4. Further development and objections

4.1 Viewpoints in other scripts

Gerrit's writing-based theory is helpful in understanding the creation of letterforms and has influenced the current TypeMedia course at KABK. However, this theory is only effective in the Western script and its tools. The interrupted construction (*Kaisho*) and the running construction (*Gyosho*) in Japanese *kanji* are shown in figure 38. His theory of letter construction seems to be effective here. However, some *hiragana* have upstrokes in interrupted construction by nature. We cannot write ぬ (nu) with only downstrokes, and the stroke of a Japanese brush is much more complicated than his model of expansion or translation. The imprint of the brush is a teardrop shape, and the width of the stroke changes along the height of the brush: I can describe it as a kind of pressure. And the writer uses rotation, naturally. So it is a 'mixture of expansion and rotation'. The brush, on the other hand, has a peculiarity: the tip of the brush remains as it moves away from the medium. With this soft tool, the imprint can be changed by several movements.
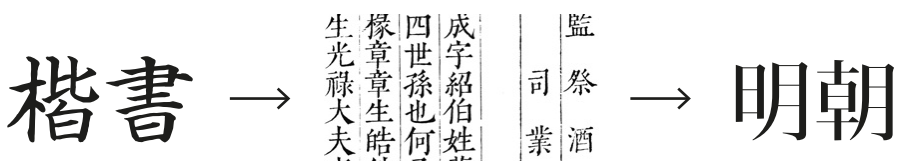
楷書 → 〔table〕 → 明朝

figure 41: While development from *kaisho* to *mincho*, the effect of brush are simplified. Image from https://www.kinkido.net/Chinese/ CHN/CHN08-1.jpeg

   In terms of Kanji, the Chinese characters, is the current main style based on handwriting? *Mincho*, the main style of Kanji that corresponds to Roman, was developed from Chinese woodblock printing in the Ming Dynasty. Basically, it is based on the Kaisho style of writing, but developed further (Fig. 41). In addition, the skeleton of the Japanese 'Gothic' typeface, which is sans serif, differs greatly from Mincho because it was designed for sans serif typefaces imported to Japan in the 19th century. When focusing on the white of the letters, Japanese script is based on strokes more than white space. Gerrit also pointed out the space between letters, but in Japanese, every letter has a fixed square body. Besides, there are massive combinations between letters because of the unique construction of letters and vast character sets.
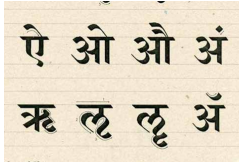
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figure 43: In Arabic script, it includes upstroke naturally because of its wiriting direction. In Devanagari script, running construction in typeface looks so 'handwriting' typeface.

As for Arabic and Devanagari, although the tools for these scripts produce translation contrast, there are many differences from Western scripts. The writing direction of Arabic script makes many strokes upstroke. And some letters in Devanagari are basically made up of interrupted construction.

4.2 Development from Gerrit's theory and teaching

'Hague type designers', namely Gerrit's students – his 'future colleagues' – began to show their works from his teaching in 1980s and 1990s. His theory is usually understood as writing-based, but we can also interpret it as 'process-focusing' theory. His students created several typefaces and softwares with not only his theory, more attended 'process of type design'.

figure 44: The classification for a type catalogue of urw by Albert-Jan Pool. He made the classification more helpful for customers with Gerrit's theory.
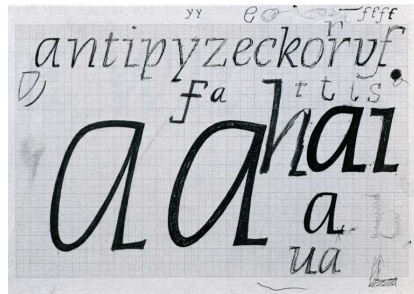(Middendorp, 2018)

Cursivium

figure 45: *Cursivium* by Jelle Bosma, was released for Linotronic 300 imagesetters in 1986 but never released as a digital font.

PMN Caecilia

figure 46: *Caecilia* (initially called *Academic*) by Peter Matthias Noordzij, was released by Linotype in 1991.

figure 47: The sketch of *Caecilia*. It was a Peter's graduation project.
(Eindhoven: Lecturis, 1983)

Albert-Jan Pool studied at kabk for six years but never graduated. He worked at urw as a type director after a job at Scangraphic. His important achievement is a type catalogue and the type classification on the catalogue. He distinguished typefaces with the amount and direction of contrast, and shape of the serifs. This idea is not new, but it included Gerrit's influence. It is worthy and useful for customers to define combine contrasting fonts.

Jelle Bosma and Peter Matthias Noordzij (son of Gerrit) simultaneously developed a new concept in early 1983 at kabk. They did it unbeknown to each other, but the concept is similar: *humanist slab serif*. Early twentieth-century slab serifs like *Rockwell* and *Memphis* are geometric proportion, and their italics are just slanted. Their typefaces, named *Cursivium* and *Caecilia*, have traditional proportions from handwriting with the influence of

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Gerrit's theory. Cursivium, Jelle's typeface, was only published for Linotronic 300 imagesetters by World Typeface Center in 1986 but was never published as a digital typeface. On the other hand, Peter developed this typeface as his graduation project in 1984 and exhibited it at ATypI in London. Then, Adrian Frutiger immediately decided that it qualified for publication. However, it took much more time to publish. pnm Caecilia was released by Linotype in 1991 finally. Jelle joined Monotype and shows his speciality: hinting and designing and optimising Arabic and Tamil types and a syllable script for native Canadians. He developed FontDame, a tool for automating the production and hinting of TrueType and Opentype fonts. After publishing Caecilia, Peter established a type foundry and typographic design studio, The Enschedé Font Foundry, in 1991.

figure 48: *VijfZeven* by Petr van Blokland was developed for low resolution screen. He argued contrast increase legibility of the typeface. He added other styles and released after student project. (Middendorp, 2018)
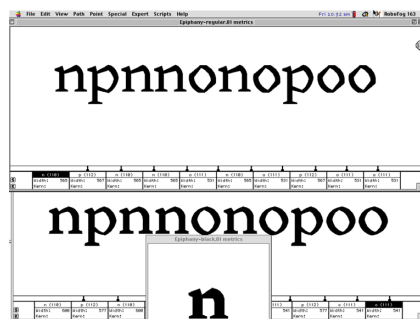

figure 49: RoboFog started as a custom version of Fontgrapher 3.5. It was developed by collaboration with Petr and Erik van Blokland, and Just van Rossum.
Image from https://www.futurefonts.xyz/xyz-type/cedar/posts/77-flash-back-19-years

Petr van Blokland was a pioneer of digital tools even in his student days. When he entered KABK, there was no digital environment, but he developed his computer with the do-it-yourself kit and taught himself programming in high school. He challenged combining his digital technology with Gerrit's typographic system. His *VijfZeven* ('*FiveSeven*') type family was started as his student project in 1978 (Fig. 48). He made this typeface for low-resolution screens and characters measuring five by seven pixels. Though he incorporated contrast in this small amount of pixels, it became more legible. Later, he developed typography and type design software, such as Ikarus M and RoboFog (Fig. 49). He is one of the current teachers at KABK, and he says that 'every design can be scripted'. (van Blokland, 2017)

LettError by Just van Rossum and Erik van Blokland made the well-known intelligent typeface '*Beowolf*' (Fig. 50), released in 1990 by FontShop. Beowolf is based on the 'randomfonts' concept and was developed to reproduce the liveliness of letterpress against the perfection and smoothness of the current print environment. They developed the typeface by hacking PostScript

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figure 50: *Beowolf* (1990) and *Beo Sans* (1992) by LettError were 'randomfont' with a built-in function to change the outline. Image from https://letterror.com/fonts/beowolf.html
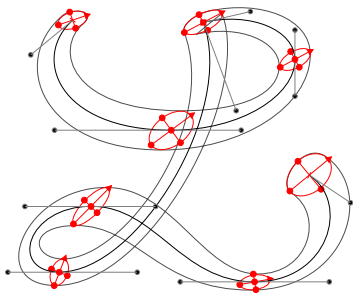

figure 51: The fundamental model of LTTR/INK. Designers can adjust width, thickness and orientation of each point. It is apparently based on Gerrit's theory. Image from https://www.lttrink.com
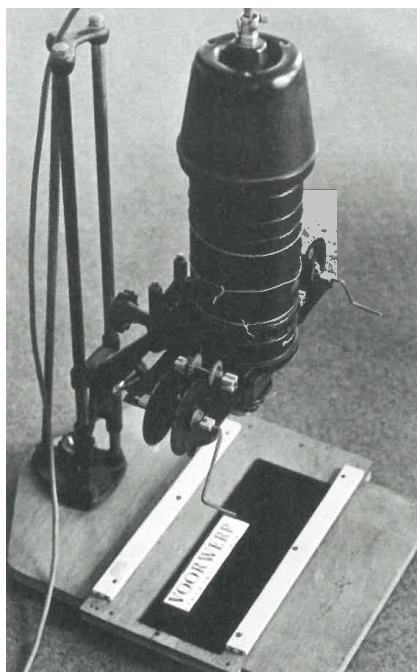

figure 52: Gerrit developed and used a low-tech photosetting system to use his typeface in large size, 1973. (Middendorp, 2018)

by adding a new function named 'freakto': draw a line or curve to a random point near B. They created many typefaces with their technology. FF *Schulbuch* by van Rossum has intelligent behaviour. It has three types of letterforms, and each character is connected in context. He used the Scripter program for this. They have also pursued the automated part of the design process, such as DrawBot, LettError's Stamp Machine, *BitPull*, etc. Currently, they are a teacher at KABK, and Erik is head of TypeMedia.

LTTR/INK is the plugin for Glyphs and Adobe Illustrator made by LTTR/CORP, Martin Cetkovsky and Filip Zajac. They were not alumni of KABK, but obviously, they inherited Gerrit's theory: 'It is because it's bringing digital type design back to its roots of writing.' on the LTTR/INK website. This plugin lets you type designers designing letters with a skeleton, not an outline. Type designers can also set parameters like width, orientation and thickness for each point. This feature is apparently based on three sorts of contrast – Translation, Expansion, and Rotation – from Gerrit's theory. LTTR/INK fosters designers to understand the fundamental work of contrast and try more variations of the contrast.

4.3 Objection and contemporary viewpoint

Although Gerrit published his brilliant theory and typefaces from writing, they also have several drawbacks. For instance, the theory is only for text typefaces in the western writing system. In his schema, geometric sans and much high contrast typeface seem irrelevant or wrong. Besides, Kinross pointed out that Gerrit's typefaces are almost unfinished and unavailable to anyone except their maker. He made typefaces to use in his designs, so in strict view, Gerrit never saw himself as a type designer: a provider of typefaces to others. Though he devised his low-tech photosetting system (Fig. 52) to use his typeface book cover in big size, and Monotype, Linotype and Berthold negotiated to publish his typefaces with him, he was still reluctant to finalise or fix his typefaces like much designer is. Kinross described this as 'a fully workable typeface requires that it be put through the mill of "justification" (spatial fitting of the characters), as well as adaptation for different technical format.' (Kinross, 1992)

Paul Stiff explained that the challenging problems are not connected to type designers or typographers from the telescopic perspective of information design. Non-designer people do most designing, so he illustrated a '*meta-document*', an 'automatic typography' system some digital typographers tried to solve the problems. In this system, typographers define all styles of design

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```
76
77    h1 {
78      margin-top: 10rem;
79      font-family: "Mint Grotesk ExtraBold", "Noto Sa
80      font-size: 5.4rem;
81      font-weight: 900;
82      line-height: 1.2;
83
84      @media (max-width: 960px) {
85        margin-top: 8rem;
```

figure 53: Style declaration in css. Writing in html or MarkDown is interpreted as sort of meta-document.

format like 'heading', 'subhead', 'caption', and 'list' in advance, and the author will declare correspondence between style and text. This is different from what professional typographers normally do: design texts after they have been written. (Stiff, 2000) We know this is similar to css in web and Paragraph Style in Adobe Indesign.

figure 54: Some OpenType features of Liza. It imitated the characteristics of handwriting with contextual alternate amazingly, so many viewers might not notice this is a typeface. Image from https://www.underware.nl/fonts/liza/features/OpenType_features/

Underware, a graphic design studio and type foundry based in The Hague, Amsterdam and Helsinki, is making several technology-based playful typefaces and leading the development of current typeface design circumstances. Underware was established by Bas Jacobs and Akiem Helmling in 1999. They met at KABK while they were students of the postgraduate course, and Sami Kortemäki, also a fellow student, joined in 2001.

Liza, a typeface they created in 2009, is a prominent connected typeface. When typing with Liza, each letter changes each typing by context; the feature called *Out-of-ink* (reproducing ink dip because of out of ink), *Introducer* and *Finaliser* (letters changes on position) and more (Fig. 54). It implies Gerrit's thinking: ligatures as a mental module of writing to the context.

figure 55: Duos Write by Underware in 2018 has two axis: 'write letters' and 'write text'. It is built on standard OpenType feature, so it contain the text information. Image from https://www.underware.nl/blog/2018/06/new-fonts-duos-in-n-out-and-duos-write/

After implementing Variable Font to OpenType, they began to animate typefaces. Their typeface *Duos* has both a weight axis and an axis of writing animation. Besides, you can animate all strokes simultaneously and write from left to right with this
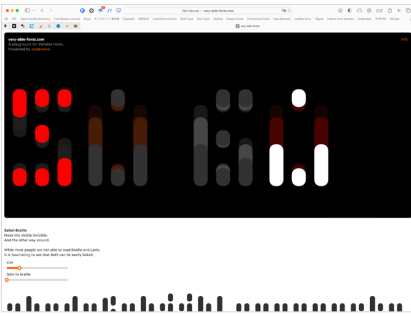
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figure 56: very-able-fonts.com, their playground of variable fonts to explore the possibility of the feature.
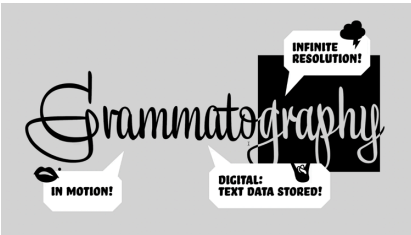

figure 57: Advantages of Grammatography by Underware foster function of current digital typefaces. Though it is text, it includes axis of motion too.
Image from https://www.underware.nl/blog/2019/09/introducing-grammato/

typeface. This is still a typeface so that you can select the text. Furthermore, they currently work on *Grammatography*, which was announced in ATypI 2019 Tokyo. Grammatography (they call Grammato) is an animating typeface developed from Duos and changeable from one letter to another letter. Grammato fills the gap between 'writing by hand' and 'writing with fonts'. One of the purposes of Grammato is education: 'One major reason for that is the missing information in fonts. For Chinese for example, the stroke order and stroke direction is as important for the learning, understanding and memorisation of a character as is the static shape of the completed character'. (Underware, 2019)

Because their typefaces are built on standard technologies, we can use their typefaces and features in apps, operating systems, websites, videos and more. Whereas LettError made Beowolf for print, Underware aims modern medium: onscreen, on which everything can move.

5. Conclusion

Though only in western writing civilisation, the theory is still effective in type design. Similarly, his attitude of process-focusing is inherited while responding to modern mediums through the current TypeMedia course at KABK and more type designers. As a designer in the contemporary type industry, understanding technologies and processes in type design is essential. Besides, we cannot avoid the influence of writing in the type design process. To use Underware's words, 'Future is written'.

(4987 words)

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