MODULARITY: AN ELEMENTAL APPROACH TO TYPE DESIGN

by Aoife Mooney
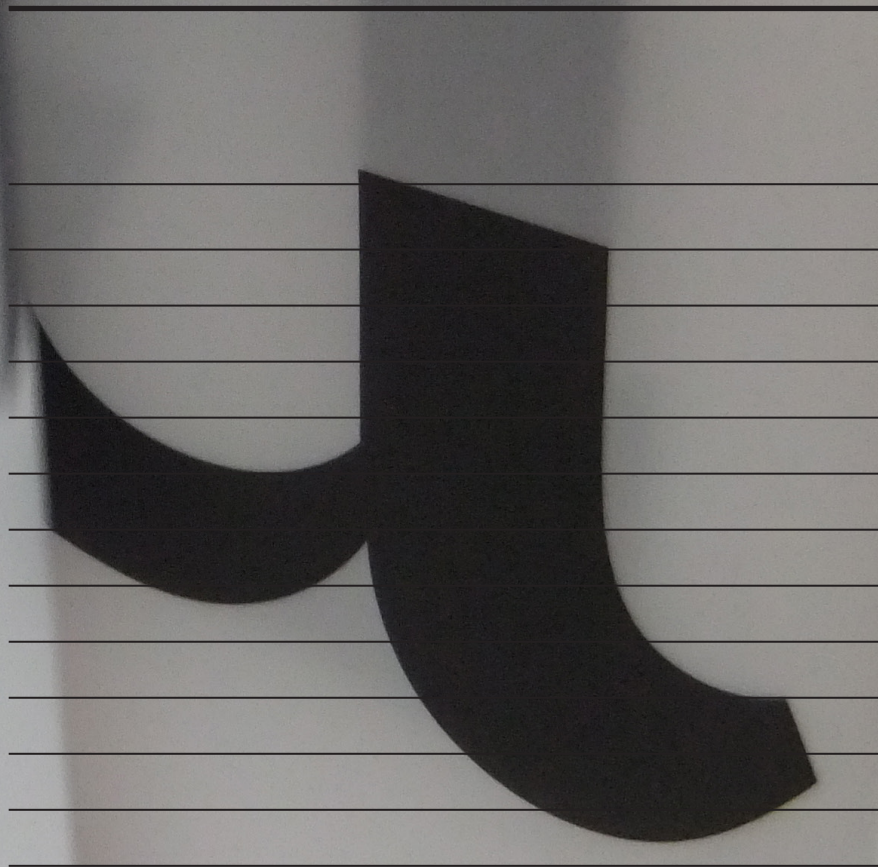
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ABSTRACT

This essay traces the role of an 'elemental approach' to typeface design. The term 'elemental approach' is intended as an overarching description of the approach to design that seeks to reduce, to pare back, to rationalise and to find the essence of the letterforms. As such, elemental type design encompasses modular typeface design, stencil lettering, typefaces designed based on a grid or the pixel, attempts to reduce and reimagine the Roman alphabet, and the design of systems of or for the construction of type. An approach to type design based on elements connotes an attempt to bring a scientific and rational method of enquiry to bear on the design of typefaces, as well as the notion that there is an ideal to be achieved, a model to be found.

I begin with an introduction to the concept of an elemental approach in all its forms, describing the notions implicit in this term, and then using examples of typeface design to trace factors affecting this principle in type design from three angles. Firstly, from an ideological or theoretical point of view, looking at conceptual factors which may have influenced an elemental approach—found in the work of typeface designers; secondly, from a technological point of view, looking at the means of production and restrictions found in manufacture that *require* or *suggest* a more elemental or reductivist approach; and, lastly, from an ergonomic point of view—tracing its basis in the manuscript origins of type, as well as discussing the limits of this approach with regard to legibility. The paper concludes with a reflection on the impact of this approach on new type designs and future approaches to the construction of the alphabet. It will show how the elemental approach to typeface design through the history of printing has followed an ever-shifting trajectory from calligraphic and manuscript influences to the idea of the letterforms as structures, and thus allowed an evolution in the conception of the alphabet and its construction, that leaves the field ripe for experiment, and essentially malleable.

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In typeface design, there is an ever-present tension between the constructed and the organic.[1] It is reinforced by the nature of typeface design, like any design discipline, or indeed, any craft or industry, which is delicately balanced on the relationship between the human and the machine. This paper is written with the intention of highlighting this tension, in looking at typeface design from an elemental perspective which is, in a sense, a reflection of the human attempt to contain and create order in its communication systems.

The segmenting of the skeleton of the alphabet has always been a feature of typeface design. With a basis in the stroke elements (figure 01) used to construct the earliest letterforms[2] and intended to represent sound, our alphabet has evolved through a crystallization process into a skeletal structure, upon which diversity and personality has grown and thrived.

This essay will focus on elemental[3] approaches to the design of the alphabet, and in particular modularity or 'modular thinking'.[4] A three-part thread can be traced through this deconstruction of the forms, and often complimentary but sometimes conflicting factors identified. The first is an *ideological approach*: a human preoccupation with rationality and proportion. This is the notion that there is an overarching 'correctness' and harmony to be found; an ideal that can be achieved with enough thought and consideration, and a proper understanding of nature and mathematics. It is based upon a conviction that the human mind is able to understand, break down and thus recreate, an ideal form of any product of nature. As typeface design bears a lot of similarities to architecture, in defining structures and in its relationship to ergonomics, Le Corbusier's theory[5] epitomizes this approach well, as do the tenets of Modernism, Constructivism and the De Stijl movement (figure 02). Another thread is the *influence of technology* on the construction and production of typefaces, which has at times provided the impetus to combine an elemental approach and parametric concepts with the automated power of the machine, and thus expanding the scope of the typeface designer, or at other times and conversely, forming a set of constraints either on the reproduction,

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1   CARTER, M., (1991-92) p. 1

2   UNGER, G., (1998) p.98

3   Term derived from the description of punches made of parts as 'elemental' in p. 10 BLAISE AGÜERA Y ARCAS, 'Temporary Matrices and Elemental Punches in Gutenberg's D-K type' in *Incunabula and Their Readers: Printing, Selling and Using Books in the Fifteenth Century*, edited by Kristian Jensen

4   ARNHEIM, R., (1955) p.53

5   LE CORBUSIER (1951) p. 15
     Corbusier's theory aims to create a 'measure' for the mass-production of manufactured articles, and architecture, he likened it to the 'writing down of music' with which he said it had been necessary 'to represent sound by elements which could be grasped, breaking up a continuous whole in accordance with a certain convention and making from it a series of progressions.'

use or creation of type. Last of the trio is the governing and fundamental influence of *ergonomic requirements* on any approach to typeface design with particular focus on the limits of modularity with regard to the duelling powers of convention and adaptation.
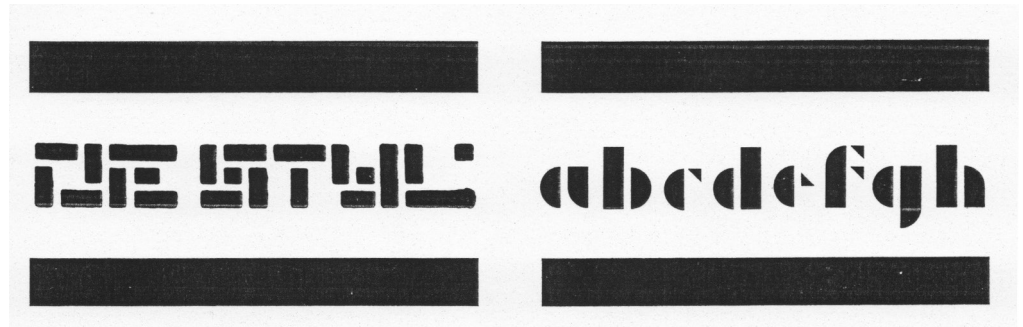
 This essay will trace elemental *approaches* through history, highlighting key representative typefaces and technological developments in order to show the relationship between these threads. Ultimately, it will illustrate a shifting emphasis in typeface design away from the pen, and toward a malleable set of structures, as defined by the concept, and not the tool.

As it is a broad topic that touches on many facets of human endeavour and areas of study, including language, communication, psychology, and even science, this essay is intended as a survey, pulling together relevant writing on the subject from different disciplines and highlighting examples by way of illustration. It is limited to a discussion of the Latin alphabet and it is by no means an exhaustive account of the trends in typeface design or a historical account of ideological trends or technological developments. Instead, it aims only to trace a thread through significant departures in light of their wider relevance to typeface design.

Examining approaches to typeface design where the designer has taken the approach of breaking down of the alphabet into its component elements, with a view to a systematizing or rationalizing of the construction of the alphabet, the term 'elemental approach' is intended to encompass the following broad categories and subsets of typeface design; Modular types, Stencil lettering, Pixel fonts: attempts to rationalise the alphabet and the production methods that demonstrate an elemental approach or way of thinking about the construction of type. There are overlaps between these categories. For example, the pixel is, in effect, a module, and often stencil lettering is modular (in the broader sense meaning constructed of a reduced kit of parts rather than a repeated single module). As a term, 'elemental approach' is intended to also encompass those typefaces and processes that are *subtly* modular but may have been constructed within a set of parameters, or in 'parametric' fashion. Here, an attempt is made to define the essence of the shapes before production, whether it be for ideological intent or technical requirements, and with this as a foundation, extrapolate from there, beyond the precedents of the manuscript forms.

KEY THEMES OF THE ELEMENTAL APPROACH

This is an approach in type design which seeks to formalise or reimagine the shapes of our alphabet based on the following principles:

1. The notion of reduction

2. A quest for a definition of the 'essence'
   or 'ideal' form for the alphabet

3. A desire to improve the efficiency of the production and
   usefulness of the alphabet for human processes[6]

4. An attempt to rationalise and formalise the decisions taken in
   the design of an alphabet, creating a rule by which to work.

It is essentially then, the *drive* to define limits and arrive at an ideal for the shapes of the alphabet. All of these themes demonstrate the influences of ideology, technology and ergonomics on their implementation and the modes in which the designer chooses to pursue them, with much overlap between them, often all four factors playing a part in a designer's decisions for their letterforms.

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6   Both for reading, and for the interpretation of text by machines

1 THE NOTION OF REDUCTION

The impetus to reduce and refine the shapes of our alphabet is closely related to the systematization of the alphabet for translation to various printing processes, and as such is often technologically driven. However, it has also been a prominent feature of various ideological trends throughout design history, most notably in the International Avant Garde[7], Bauhaus[8], Constructivist and De Stijl movements, as a means to their ideological ends of universalism, order and abstraction[9].
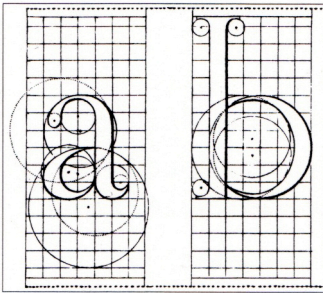
2 A QUEST FOR A DEFINITION OF THE 'ESSENCE' OR THE PLATONIC MODEL

Because the underlying forms of our alphabet are based on crystallized versions of a hand-written model, a preoccupation with finding a model or finite definition of what those shapes should look like is ever-present. This preoccupation is mostly concerned with proportion, and with finding a set of shapes that have the 'ideal' relationships with each other and in and of themselves. This desire is evident in the mathematical approaches to type design, where the notion of divine proportion and the relationship of the alphabet to the laws of nature have been explored, such as the alphabets of Feliciano[10], or Dürer (figures 03 and 04).

figure 03:
Romain du Roi, taken from
UNGER, G., (1998), p. 82, 100% scale
used with permission

3 A DESIRE TO IMPROVE THE EFFICIENCY OF THE ALPHABET

This is two-fold: The first aim is that of improving the efficiency of production of the alphabet, and can be seen in examples where the designer, punchcutter, stencil cutter or craftsman translating the type for production has reduced the shapes of the design to a 'kit of parts' in order to speed up the mechanical production of the shapes, for instance in the use of the counterpunch to create counters of identical shape and size[11]. The second impact or understanding of this, is in the idea that the alphabet, as a code, could better serve our language, and as such could be refined, expanded or reduced, to produce a more complete representation of our language and speech.

figure 04:
Durer's 'R', from UNGER, G.,
(1998), p. 82, 100% scale
used with permission

4 CREATING A RULE BY WHICH TO WORK

This is an underlying concept at work in the design of typefaces, and design in general. It is the drive for designers to justify and professionalize their decisions through the use or application of a set of parameters and rules.

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7   LUPTON, E. & LUSTIG COHEN, E., (1996)

8   LUPTON, E. & ABBOTT MILLER, J., (1993) p.21

   "Geometric form, gridded space and a rationalist use of typography
   have been fore-grounded as the prime lessons of the Bauhaus legacy."

9   WILLIAMSON, J. H., (Autumn 1986)

10   CARTER, M., (1991-92) offers a comprehensive account of these explorations

11   SMEIJERS, F., (1996) p. 76

Josef Müller-Brockman sums this up well in his book, *Grid Systems*:

> "The use of the grid as an ordering system is the expression of a certain mental attitude inasmuch as it shows that the designer conceives his work in terms that are constructive and oriented to the future. This is the expression of a professional ethos: the designer's work should have the clearly intelligible, objective, functional and aesthetic quality of mathematical thinking." [12]

It can be seen in the recurring attempts to find or apply reason and rationality to the conception of new alphabets through the use of the grid, a restrictive measure or reduced set of shapes. It is obvious already that these four themes have a large degree of overlap. In an attempt to rationalise and formalise, you might also employ a reductivist approach, or in a reductivist approach you might be looking for the essence, to pare away all excess and filter out an ideal set of shapes (figure 05). In this sense, an elemental approach is both reductive and generative, constituting a means of deconstructing an existing structure and providing a strategy for creating new ones.

figure 05:

Bayer's rationalisation of the 'a' from LUPTON, E & LUSTIG COHEN, E., (1996) p. 48 70% scale *used with permission*
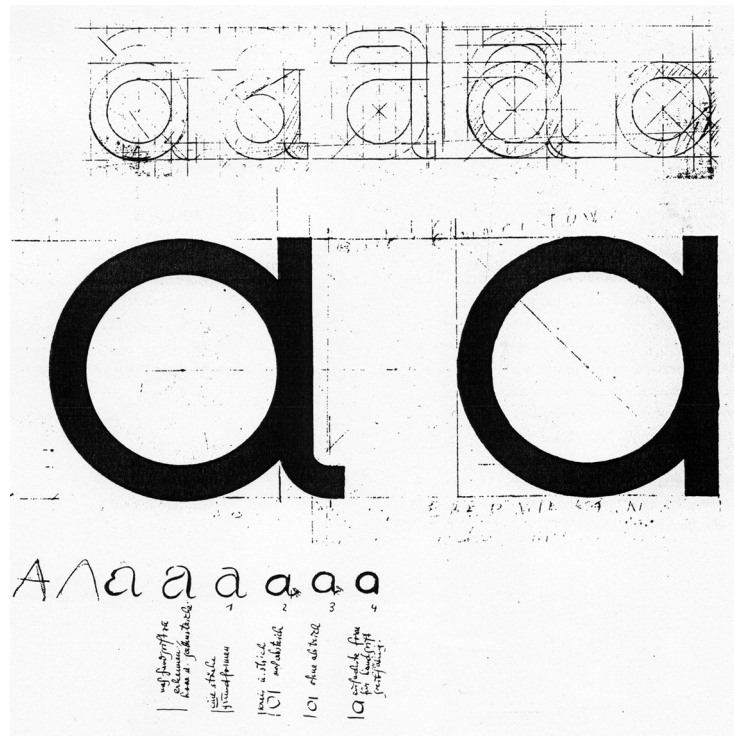
12   MÜLLER-BROCKMAN, J., (2007) p. 10

"Then above all, let us have no haste, no untidy confusion, no impulsiveness. All precipitancy and prejudice are to be avoided; all issues are to be divided into as many parts as possible; and one is to proceed with maximum orderliness from the simple to the complex, and practise a conceptual accountancy so complete and so general that one 'might be assured that nothing had been omitted.'" [13]

When we describe something as a 'modular typeface' we invoke a looser definition than that inherent in the term *modularity*. Modularity is a conceptual framework based on the *single* repeated module, or the basic unit, identical in each iteration, from which can be assembled larger products. A modular *system*, therefore, can be defined as a system built on the idea of a standardized unit, or a standardizing measure, process, or building block. In the module, there is the implicit notion of reduction, repetition, an essence, restriction, and limitation. Conversely, when the concept is employed in a generative manner, modularity can facilitate a freedom in construction, a joy in the process itself, in the system, rather than in the product.

'Modularity' can be seen, at base, as the essence of construction, analogous with the building process. Seen as such, it predates industrialization and the Age of Reason, and yet it seems as though it was born out of this era, being so closely related to the principles of rationalist thought and philosophy. It represents a manifestation of a human preoccupation with order and control, a desire to understand and deconstruct: it is both a *product* and a *process* of human thought and one means of breaking the alphabet into elemental parts.

In architecture, the concept of modularity is exemplified in Le Corbusier's *Le Modulor* [14] a system devised with the desire to identify the underlying patterns and rhythms and proportions of nature and consolidate them in order to establish a best practice for architectural design and indeed typeface design,[15] which would relate all architecture to the human proportion—a means to the 'ideal'. This drive to deconstruct and systematize, to somehow improve upon and replicate the perfection of nature, that there is an ideal, or a correct way to approach something, is the essence of modularity and constitutes an elemental approach.

Seen as a conceptual approach, or 'modular thinking'[16] rather than a form or product in itself, modularity can be observed to occupy various roles in industry and human endeavour. In typeface design its presence can be felt at almost every level of the process. In its role as a systematizing, reductivist principle based on limits and constraints, it plays a role in production as well

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13 GELLNER, E. (1992) p. 5

On Descartes' attitude to "the 'redesign' of 'his ideas concerning the world'"

14 LE CORBUSIER (1951)

15 LE CORBUSIER (1951)

Here Le Corbusier defines architecture as including the design of typefaces

16 ARNHEIM, R. (1955) p.53

as design, facilitating expediency and efficiency in production and constituting a rationale and basis for a designer's choices.

In the industrial era and even more so in the digital era,[17] modularity comes into its own.[18] The mechanization of the processes *of* humans *by* humans can only have resulted in a calcification of preexistent proclivities. In the mechanization of tools for constructing, in the tools created for the production of type, we see a consolidation of a rationalist and modular way of thinking. Industrialization itself bears the imprint of deconstruction, replication, and a bottom up approach beginning with the smallest parts and gradually expanding in complexity.

When we think of modular furniture and housing the immediate conception is of an easy-to-assemble prefabrication that is ready to use. Implicit in this understanding of modularity is the sense that you can buy modules and combine them in assembly to form bespoke solutions to whatever your specific needs are. In this way modularity represents both a restrictive and a freeing influence in production and design.

In this sense, then, in describing a typeface as a 'modular typeface', it is clear that we are invoking a slightly different conception of modularity which refers to a progressive construction from the micro to the macro, in measurable increments, rather than specifically the use of a *single* repeated module.

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17   LUPTON, E. & PHILLIPS, J. C. (2008), p. 159 *"a pixel is a module"*

18   WILLEN, B. & NOLEN, S. (2009) p.61

   "Traditionally, modular lettering has responded to the limitations and possibilities of the media used to create it. Avante Garde designers in the early twentieth century used decorative, geometric elements from the letterpress to build modular letterforms. Their work explored and celebrated the grid, a trend also seen in the modern art and architecture of their contemporaries."

Modularity, with reference to typeface design is, in essence, a deconstruction in order to reconstruct. It is any typeface that has been designed with the intention of breaking down the alphabet into parts for reassembly according to a rule—designed with a reduced kit of parts or built out of a set of ingredients. For example, a modular alphabet could be built out of square blocks of equal size, as with the pixel (this would be the traditional sense for modular), or out of a limited set of shapes that might include a stem unit, a bowl unit, an ascender unit, and so on, like those of Dwiggins (figure 06), that would combine in different ways to create the various letters. These might not even be shapes that you could call a bowl or stem, as in Mangold's system (figure 07) but might be component shapes that can be combined to create the anatomy of each letterform in a new way. There are varying degrees of coarseness to the modular construction of typefaces—the more parts you use, the finer the detail and the more refined the solution.[19] Modular alphabets have generally occurred either through a conceptual desire[20] to create an alphabet within a framework, or because of a framework imposed by a new technological innovation.

figure 06:

Falcon stencils, Dwiggin's palette of forms for designing the typeface Falcon, from DWIGGINS, W. A. (1940) p. 4, 100% scale
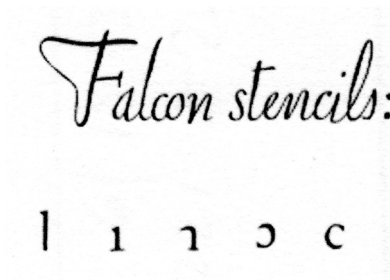
figure 07:

Andy Mangold's Modular type, this shows the individual modules which can be combined in any number of ways to create the letterforms. www.modulartype.andymangold.com *used with permission*

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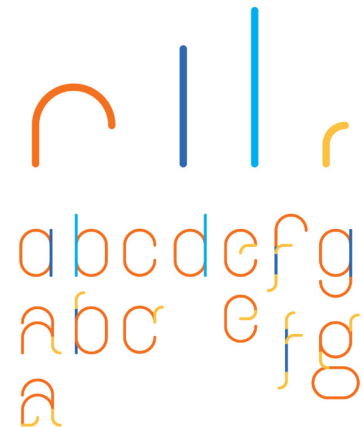
19   UNGER, G. (2005) http://www.typeworkshop.com/index.php?id1=Providence_03_2005&id 2=backgroundinfo [Accessed 07/09/10]

20   *Cult Love* http://www.typographer.org/archive/mag-interview-barnbrook.html [Accessed 07/09/10] *Barnbrook on the design of Prozac*

In an interesting feature on www.typeworkshop.com [21] a number of contemporary typeface designers were asked some questions about their modular typefaces and the role of modularity in typeface design. Their answers give some insights into the general conception of modularity within the area of typeface design. The common consensus seems to be that designing modular alphabets can be a way for a designer to challenge themselves, that they are easier because there is an understanding that they are a conceptual exercise, and often the idea of modularity is linked to technology. Two concepts in particular stand out as significant: the idea that all typefaces hold a degree of modularity, and the idea that this modularity has been implied since the creation of the writing code.

Usually when modular alphabets are spoken about they are generally accepted to fit into the 'display' category of typeface design, the rigidity and conceptual grounding holding a tendency to be unbending in the face of the requirements of legibility and making it difficult to make a purely modular alphabet for extended reading. [22] However, this in no way precludes the concept of modularity from being a very present *factor* in the construction and design of alphabets designed for use in small sizes for extended reading.

I think most typefaces are modular, to an extent.

Shared forms for similar parts (the left stem of b h k l, the bowls of n and h, etc.) are what make most 'normal' typefaces hold together in a cohesive way.

Christian Schwartz

What do you think the first modular typeface is?

Most probably the first alphabetic letterforms ever designed (Old Canaanite?) as these consisted of verticals, horizontals, a few diagonals and some curves. You cannot get more modular.

Gerard Unger

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21 UNDERWARE (Workshop)
    http://www.typeworkshop.com/index.php?id1=Providence_03_2005&id2=backgroun dinfo [Accessed 01/08/10]

22 LO CELSO, A., (2005) p. 35

Stencil lettering is a good example of the elemental deconstruction of the letterforms for translation. It is the process magnified. In this respect it demonstrates, particularly in the coarser examples, what the reasoning or conceptual basis was behind the breaking of the letters into parts. Here we see clearly the divergence present in type design and approaches to its deconstruction. It comes down to the difference between:

» seeing letterforms as a series of strokes created by a tool, in a particular order or in a way where the parts relate to each other and the tool that created them; and

» seeing the letters as forms or structures to be dissected and made seen as sets of components

Dwiggins' stencil letterforms (figure 08) are particularly demonstrative in this regard, in that they hold both approaches concurrently. They have the shape and modulation of a pen, respectful of the precedent, but interestingly, where the contours are broken for the purposes of stencilling, there is no relationship to the lifting of the pen or a natural break in movement. The breaks appear to be arbitrary or at least governed by some concern other than a representation of the tool. Here we see the letterform being constructed simultaneously as both a thing and a picture of a thing, with reference to the technological constraints and freedoms it is manufactured for and by. Now the shapes exist as models and not templates. In a more recent take on the stencil (figure 09), we see again this segmenting happening in a way wholly unrelated to the tool.

figure 09:

Grim Stencil 30% scale
from Slanted Magazine , p. 57
used with permission

figure 08:

Dwiggins's stencils, from KINDEL,
E. (2003) p. 74, 100% scale

> *"Just as in nature, systems of order govern the growth and structure of animate and inanimate matter, so human activity itself has, since the earliest times, been distinguished by the quest for order."*[23]

TYPOGRAPHY AS A REFLECTION OF CULTURE

Once the alphabet became an industrialized product, it became a focus for one of the enduring preoccupations of mankind: rationalism—the attempt to understand nature by way of mathematics or reason. The philosophical core of this approach is the idea that what happens in nature should be intelligible to man and thus must be definable and replicable. The idea of harmony and an 'ideal' is wrapped up in this concept. Nowhere is this more evident than in the tool that mankind created for the sharing of information—typography.

Typeface design, and the means by which type is reproduced, represent a microcosmic example of a wider dialogue that humanity has with its products. It is perhaps because of this unique relationship with language, and the relationship of language to civilization, that typography represents this dialogue in such a pure form. Typeface design and typography embody the symbiotic and interdependent relationship that language and culture have developed. The codification of spoken language has created the distinct realm of written language with its own grammar and influence. El Lizzitsky says:

> *"the graphic sign is neither transparent nor without residue, but has its own density. Perceived by the eye... which is often quicker than the ear, writing is silent. It bears the imprint of difference, repetition; the wheel is its emblem. Thus typography summons a new type of writer."*[24]

This is a writer who is conscious of the act of the reader, conscious of the tools that are used, the code that he or she writes with, and its potential as a meaningful contributor to the content and meaning of the text. Thus, typography cannot exist outside of its context; it is imbued with the cultural resonances of any given period within which it is created. Its form has a resonance of its own—it is not neutral, but *active* in culture.

It is inevitable that the products of our communication and mechanisms of social order would hold within them the search for pattern. Unger, in his book *Typography as a vehicle of science*[25] considers typography not only as a product, but as being part of a dialogue, influenced by and influencing our concepts of society and in turn representative of these shifting priorities:

> *"all these shifting movements and aesthetics suggest that typography, too, is fully part of a cultural dynamics, rather than merely being its vehicle. Ty-*

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23   MÜLLER-BROCKMAN, J., (2007) p.158

24   BOIS, Y. & HUBERT, C., (Winter 1979), p. 125

25   UNGER, G., (2007)

pographic products, just like other design products, are reflective of an era's cultural climate and of how people live and think. Typography mirrors the ongoing changes in society and how these influence the minds of designers and users alike."[26]

Here, Unger views the shifting ideological movements within design as both manifestations of their context, and forces for new directions. He describes letterforms in this context as being "due to a mixture of development and atavism."[27]

RATIONALISM AND MODULAR THINKING

"The invention of printing provided a potent weapon for attacking ignorance and superstition. It made literacy and universal education a practical and economic proposition. For several centuries the printed book was viewed as an object of respect and inspiration by those who strove towards a more enlightened society. The library became both the font and the manifestation of civilisation."[28]

Humanity has a long-standing relationship with rationalism and the desire to make sense of the world, and typography reflects this. Pattern-making and -finding, coupled with a desire to control and harness, are evident in every aspect of human endeavour. However, it is in the products of culture that it is most evident. Gellner has it that "We are compulsively drawn to a certain kind of pattern, and we would not be able to live without it." He asserts that:

"[C]ulture thinks in us. Conceptually and verbally we are astonishingly well-disciplined and well-behaved. Both our capacity to communicate, and the very maintenance of social order, depend on it. Associations are born free, but are everywhere in chains. Society would hardly be possible otherwise. Our interpersonal concepts are circumscribed by publicly imposed limits." [29]

This influence of a rationalist paradigm is evident in the many elemental approaches to typeface design and typography. Design, in general, has regularly exhibited the Cartesian principles[30] through the conception of design as a problem-solving activity. Problems are approached in a *systematic* way, broken into parts, and solutions built from micro to the macro, solving problems in a bottom-up approach in order to ensure a complete solution to any brief. The role of the grid in design in this context highlights a distinctly rationalist ap-

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26 UNGER, G., (2007) p12

27 UNGER, G., (2007) p. 12

28 SPENCER, H., (1968) p. 7

29 GELLNER, E., (1992) pp. 33-34

30 WILLIAMSON, J. H., (Autumn 1986) p.20

proach to typography.[31] In *The Grid: History, Meaning, Use,* Williamson highlights this and describes the use of the grid as a reflection of rationalism:

> *"First, there is the intense fascination with surface appearance and its description. This is coupled, in leading individuals, with the quite different interest in the invisible laws and structural principles that underlie external appearance. And third, there is the increased status of the rational mind itself, seeking to discover structure through critical observation."* [32]

This same attitude can be traced through the design of typefaces, particularly those exhibiting modularity. It is of note in Williamson's observation that he makes the distinction between the 'surface appearance' and the 'invisible laws', since this divergence is equally prevalent and perhaps even more pronounced in typeface design. It seems that this rationalist tendency, epitomized by a modular approach, has shared this divergence. The alphabet has been seen through this modular prism as both a form or 'surface' to be described through a methodological break-down into component parts and as an underlying skeletal structure imbued with proportional correctness and harmony.

RATIONALISM: A FOUNDATION FOR PROFESSIONALISM

The preoccupation of design with rationalism could in part be due to rationalism's role as a mode of *applying* a scientific foundation to the process of design. Particularly with regard to Modernism in design, there is an implication that designers are part of a system of communication—part of the machine and separate from the content of their products. Also found here is the idea that rationalization produces neutrality, removing the human element because of its relationship with the perceived logic of the machine and the imposition of an 'anonymity'[33] by virtue of this translation process. This can grant credence to design decisions, and ultimately absolve the designer of personal responsibility and moral judgement. Müller-Brockmann describes the use of the grid in typographic layouts as having been 'scientifically proven'[34] to be more readily accessible to the user. It is in this very subtle use of the term that we see a desire to justify, to give weight to, and ultimately to *professionalize* the work of a designer. He sees the grid as a means for the designer to construct a professional ethic that will in turn foster a rational and orderly society.

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31   FROSHAUG, A. (2000)

  "To mention both typographic, and, in the same breath/sentence, grids, is strictly tautologous. The word typography means to write/print using standard elements; to use standard elements implies some modular relationship between such elements; since such relationship is two-dimensional, it implies the determination of dimensions which are both horizontal and vertical."

32   WILLIAMSON, J. H. (Autumn 1986) p.20

33   MÜLLER-BROCKMAN, J. (2007) p.161

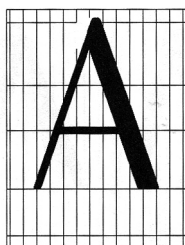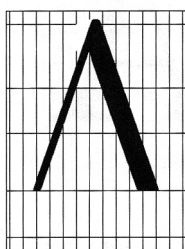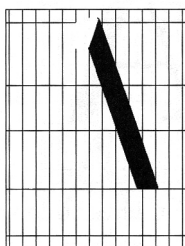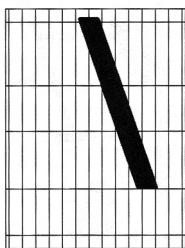34   MÜLLER-BROCKMAN, J. (2007) p.13

This 'scientifically proven' fact, which would allow designers some authority in their decisions is in fact missing from much of design practice. It is absent primarily because typography is the frontier of human communication[35] and, as such, is closely intertwined with the nuances and vagaries of perception and human cognitive processes, which are adaptive and fluid. It is constantly reacting to this frontier. Type was created for the benefit of communication, and yet its efficacy is influenced by the modes in which this communication takes place. It is governed by ever-fickle human adaptation mechanisms. The boundaries and premises within and upon which new designs are based are fluid and unreliable. So perhaps rationalism answers this question for designers, giving them a set of parameters and a reasoning that can be stood by, that has foundations and is conceptually sound in the manner of all rationalist thought—self-affirming and exclusive of external forces or things that would mediate the quality or purity of concept and execution.[36]

METAFONT: THE PLATONIC MODEL

Early developments in the digital production of fonts saw a rethinking of the nature of the shapes of the alphabet; the process of translation for new media and the production and reproduction of the alphabet was explored in myriad ways.[37] One of the early attempts in this area sheds some light on the dichotomy in the approach to the deconstruction of the alphabet in both design and production. This program was Metafont, developed by computer scientist Donald Knuth in the late 1970s and with significant contributions from Richard Southall. It was built based on the concept of the *penstroke* (see figure 10). Believing that at that point in time printing technology had come to be "essentially based on discrete mathematics and computer science, not on the properties of metals or of movable type",[38] Knuth used mathematics to create an underlying ideal model or "meta-font":

> *"a schematic description of how to draw a family of fonts, not simply the drawings themselves."* [39]

In doing so, he demonstrated the viewing of the alphabet as a set of skeletal structures and implied that there was an 'ideal' basis from which new alphabets could be extrapolated. However, in this notion of the stroke, which gave designers the option to optically adjust junctions and parts of the

figure 10:

Building of 'A' from strokes from KNUTH, D. (1999) p. 9, 100% scale *used with permission*

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35   LUPTON, E. *in* HELLER & MEGGS (2001)

"*typography is the frontier... typography turns language into a visible, tangible artifact, and in the process transforms it irrevocably.*"

36   ROBERTS, L., (2002) p. 123

This also reflects the 'designer self-obsession' and tendency to be introspective as a profession that Ellen Lupton has commented on, the 'it's like this because I thought it' attitude, which she describes as how 'design is polluted'.

37   RUGGLES, L. (1983)

38   KNUTH, D. E. (1999) p. 263

39   KNUTH, D. E (1999) p. 290

shapes in the individual letterforms, Knuth also incorporated an elemental or modular approach, in his use of repeating functions to create similar shaped curves or parts of the forms (see figure 11). For example "The method used to draw an S stroke is also used as a sub-routine that draws many parts of many other characters"[40]

figure 11:

Attempts at rendering the 's' from KNUTH, D., (1999) p. 276, 100% scale *images generously supplied by the author*

SSSSSSS

A central issue raised with this approach was that in defining a set of pre-existing parameters[41] for future shapes to be based upon, the system could never fully accommodate or represent the *entirety* of the range of possibilities for the alphabet. The argument ran that the potential of parameterization as a means for freeing the alphabet and reading process from the status quo lay in those parameters that were *not yet* established, and that creativity would find its path *here* and not through an interpretation of pre-existing structures. If this is true, then the potential for the forms of the alphabet exists in finding new parameters for its description, new ways of reducing it to its elemental components, new ways of breaking the shapes and describing components. This would help to shift the conception of the alphabet away from the foundation of a stroke-based set of movements, to a more abstract set of structures, ripe for reinterpretation.

Knuth's primary concern with Metafont was in being able to create a system that will allow for speed and completeness, and using maths, create the *ideal type*. This is not unlike Morison before him, who challenged "some modern designer who knows his way along the old paths" to work towards "maximum homogeneity", which for him would be a step "nearer [to] an ideal type".[42] Knuth also relied on precursors and precedents for his notion of the model and derived a way to recreate this model through a rationalist approach. In his *Digital Typography*, he cites the work of Feliciano, Pacioli, Torniello and Palatino (see figure 12), and comments on Feliciano's desire to "put the principles of letterforms on a sound mathematical foundation"[43]

Rather than being restricted by technology, he saw this as a challenge to create technology to facilitate the requirements of typeface design. In doing so, he attempted to leverage the field of mathematics to improve the means for producing typefaces and to improve their quality. Metafont demonstrates an unusual relationship between ideology and technology. In this example, there is a role reversal. Instead of the technology imposing limits on the de-

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40   KNUTH, D. E. (1999) p. 279

41   HOFSTADTER, D. R. (1985)

42   MORISON, S. (1924)

43   KNUTH, D. E. (1999) p. 37

signer's ideological intent, here, the technology is created to be flexible,[44] and the driving concept or ideology becomes the restrictive force. This is of note because this shift seems to have continued throughout the subsequent developments in digital typeface design; there is a proliferation of modular typefaces despite developments in technology that would allow *more* idiosyncrasy to be employed and impose *less* restrictions on the production of the type.
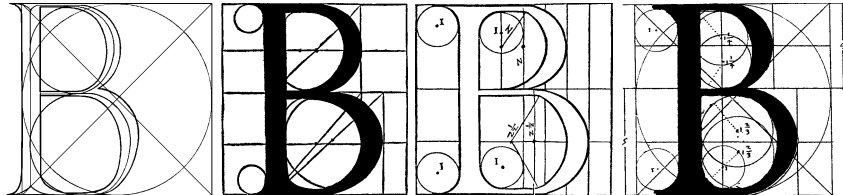
Knuth's work sits nestled between the constructivist thinking of modernism and the deconstructivist thinking of post-modernism in its attempt to find a universal, whilst also exposing an underlying structure. This post-modern tendency is still in evidence today in designs that expose the underlying structure and concept in a work and somehow make the user or reader complicit in their contrivance.

LEGIBILITY RESEARCH AND ALPHABET REFORM

The calligraphic model discussed above—a model for typeface design that is derived from the modulation of the imagined stroke of a tool—has also been argued to be a key contributer to the rhythm and differentiation of the letterforms. As such, it is an essential part of any typeface in helping the reader to read. In this sense, it has fulfilled a role in ideologically-driven experiments aimed at improving the usefulness and efficiency of our alphabet. This role and value has been contested and hotly debated throughout typographic history.

Emil Ruder saw stroke modulation as imperative for the legibility and beauty of a typeface. In his seminal text *Typography* he advocates for the role of the calligraphic model in legibility:

> *"A typeface in which something of the original written form cannot be discerned may rightly be called degenerate. The changing pattern of thick and thin strokes in writing with a broad-nibbed pen must be retained in the thick and thin strokes of a typeface, even in sans-serif, so that letterpress can also be enjoyed as a rhythmic pattern."*[45]

Here the relationship with the previous 'tools' of communication is still strong, and the ergonomic function still related to the dynamism of the broad-nibbed pen and scribal rhythm. On the other hand, Ruder is one of the strongest advocates of a rationalist approach to typography and the use of type. There is a divergence in his ideological bent that reflects a shifting conception of the

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44   RUGGLES, L. (1983) p. 21

It is of note that a lot of designers found the system difficult to navigate in practice

45   RUDER, E. (1981) Student Edition, p. 150

alphabet from calligraphic models to malleable structures. This is summed up in his description of the future of typography, foreseeing that "discipline, coolness and objectivity will continue to be the cardinal features of typography in the future since its nature is largely decided by its dependence on technique and function." [46] In his stance on the calligraphic tradition, he views this model as an ergonomic necessity—a prerequisite for the rhythm of the printed word to mirror that of the handwritten and, in so doing, maintain the same degree of legibility. Contrary to this, and concurrently, he also seems to view the processes of producing and setting of type as imbuing the message with 'objectivity' and 'discipline'. While believing the rhythm and modulation of the pen to be essential to a legible type, he asserts that "the type designer should avoid idiosyncrasies as far as possible in his typefaces since these are detrimental to the universal use of the type".[47] Thus we see in his philosophy a tension between the requirements of the function and the influence of the process.

By contrast, Herbert Spencer[48] distinctly stated that "a marked contrast between thick and thin strokes does not contribute to legibility" and more recently, Zuzana Licko has emphasized the adaptability of the human eye to make sense of shapes and to fill in gaps, arguing that the eye reads best what it reads most.[49] Evidently, there has been some difficulty in quantifying the effects of the forms of the typeface on the experience of the user, and reaching a satisfactory conclusion.

In legibility research, the notion of the essential parts of the letters has been explored (see figures 13 and 14), which reflects a reductivist stance on the alphabet. What parts are disposable? What should be retained as essential? What makes an 'a' an 'a'? These experiments have a relevance to

figure 13:

Alphabet, Brian Coe, designed to identify the defining part of each letter. from SPENCER (1968), p. 62, 70% scale
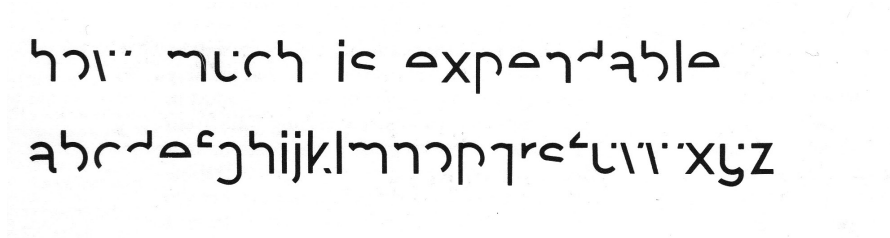
the idea of a Platonic model for the alphabet and play a part in any discussion of an elemental or modular approach to the alphabet in that they can help uncover defining characteristics of the letterforms, and the current limits of experiment, in order that the experiments and thus typefaces remain legible and usable. If there is indeed a single shape that can define each letter of the alphabet and distinguish it completely from the others, perhaps it would

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46   RUDER, E. (1981) Student Edition, p. 162

47   RUDER, E. (1981) Student Edition, p. 8

48   SPENCER, H., (1968) p. 26

49   LICKO, Z. (1990) p. 12

mean the death of modularity, which is built on the repetition of elements, of building from similar shapes. If the essence of legibility is differentiation,[50] and synecdochical representations of our conventional shapes are sufficient for disambiguation, then where does that leave modular construction?

figure 14:

Spencer illustrating the way the ways words are recognised from SPENCER (1968) p. 17, 100% scale

⌐ꞁƆ is not recognized as 5 nor ⟨Ɪ as K and that although the arrangement g has all the elements of a familiar word, and in their

n
i
d
a
e
r

No discussion of approaches to the design and construction of the forms of the alphabet would be complete without also considering the attempts at alphabet reform as representative of an elemental approach. In alphabet reform we find all the hallmarks of reduction, rationalization and economy. This has happened for many reasons: to improve the legibility of the signs of our alphabet, to increase the efficiency and economy of production and to serve the ideological end of a more complete and true representation of the sounds and structure of language. Examples of this are some of the most pared-down and reductivist constructions of our alphabet to be found.

figure 15:

Single Alphabet, Kurt Schwitters, 1927, from SPENCER (1968), 100% scale

MŪSʃK ʃM Lēben dēr völker AM 2.ʃŪLʃ
20 Ūhr dʃRʃGʃert ʃM opernhAUS
WARSₘhAUS berŪhMTer dʃRʃGent werke
polnʃSₘer MeʃSter preʃSe 1–5Mk.

Giants of typography, such as Schwitters (figure 15), Tschichold, Cassandre and Bayer, have all made attempts to rationalize and improve on the shapes of the alphabet. In his seminal book, *The Visible Word*, Spencer deals with the conception of the alphabet in these ways and highlights examples of some of these alphabets designed with the intention of reform.[51] Each time a designer

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50   ARNSTON, A.E., (1998) p. 58 *"Similarity is necessary before we can notice differences"*

51   SPENCER, H., (1968) p. 57 *"Some designers, recognising that the printed rather than the inscriptional or handwritten letter has become the norm, have attempted to rationalise and simplify the design of our existing alphabet by constructing the letters from geometrical components; others have suggested entirely new sets of signs."*

makes a new typeface, there is a reassessment of the forms—an idiosyncratic approach to the methodology. In alphabet reform particularly, there is also the sociological and ideological intention of creating something more efficient or more legible, as well as the evidence of a technological influence instigating a response on the part of the designer. As Spencer noted, and which seems now more relevant than ever:

> *"New media and new techniques of reproducing the visible word are provid-ing new opportunities for alphabetic communication as well as imposing changes in the design of the signs we employ. The reconsideration of our alphabet is, therefore, no longer merely a theoretical exercise but an activity which, on practical grounds, it is today both desirable and opportune to pursue with vigour."*[52]

"RHYTHM IS TYPE"[53]: RHYTHM AS AN IDEOLOGICAL END

There are many contributors to the underlying principle of rhythm in type. It begins with the letterforms themselves, grounded in and founded by the movement of the hand. In fact it even begins before that; the writing exercises we learn as children are concerned with imparting this sense of rhythm, of ebb and flow (figure 16). It is tied into how we see, how we read, and how we make. As Barthes has it, rhythm "predates the invention of writing and of painting"[54] and thus, they are born out of the "same nonfigurative and nonromantic gesture, one that was simply rhythmic." It appears to be part of our physiology and our psychology as a species to think in terms of rhythm. It exists in speech, the varying rhythms of speech and language reflected in their visual representatives.[55]

In Noordzij's *The Stroke theory of writing* he notes that the rhythm of the text is formed by the relationship between the black and white shapes of the pattern of the letters, and that one "can only experience the relationship if the relationship is clear."[56] Rhythm aids language and thus communication, and as "typography is the frontier"[57] it underpins the design of type.

For this reason, there is a need in typeface design to both construct rhythm, and respect it, to be mindful of the preexisting requirements of harmony and balance and the rhythms created by similarities in the skeleton shapes of the alphabet, as well as the relationship between the forms, which
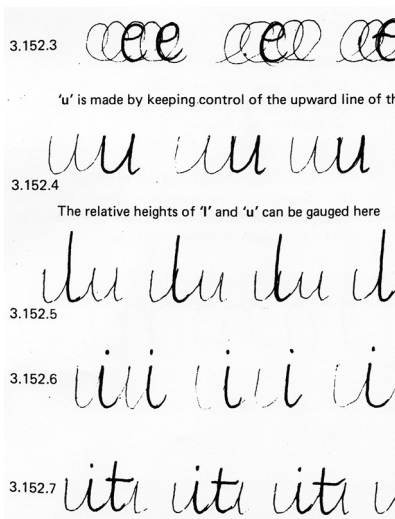
figure 16:

Taken from a supplement of 'Education': entitled 'Teaching handwriting', from GRAY, N. & WALLIS, P. (1978)

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52   SPENCER, H., (1968) p. 58

53   HELLER & MEGGS (2001) p. 32

54   BARTHES, R. *quoted in* BOIS, Y. & HUBERT, C. (Winter 1979) p.121

55   BENEVISTE, E., *quoted in* BOIS, Y. & HUBERT, C. (Winter 1979) p. 121
  "rhythm designates the contradiction between the continuous and the discontinuous… operative even at the level of the letter."

56   NOORDZIJ, G. (2005) p.41

57   LUPTON, E. *in* HELLER & MEGGS (2001)
  "typography is the frontier… typography turns language into a visible, tangible artifact, and in the process transforms it irrevocably."

can have an impact on the rhythm of a text. Diverging from these already established consistencies and relationships must be done with an awareness that this can potentially break the rhythm that makes the text legible. Lo Celso notes, however, that there is a fine line between rhythm and monotony and that "actually emphatic ideas of rhythm, like the ones sustained in some display typefaces, clearly do not enjoy legibility in text sizes. Thus rhythm and legibility appear to then be intrinsic correlates in type design, reached through an inextricable equilibrium."[58] In this sense the 'emphatic ideas of rhythm' could be interpreted as a *rigid* modularity—the construction of an emphatic pattern rather than an intuitive rhythm.

In the past, even the teaching of handwriting has been questioned in light of the technological climate. In an ATypI presentation in 1978 Wim Crouwel suggests a new approach to the teaching of handwriting borne out of the new relationship with the printed word, and elucidates the possibilities inherent in a reimagining of the alphabet[59]:

> *"along the lines of cellular patterns as a basic structure for design in general. Regular patterns, in the widest sense, allow the greatest freedom of forms and shapes, and at the same time bring a specific point of view which goes like a red line through every form that results from this way of conceiving design. Let crystallography serve as an excellent example in Nature!"*[60]

EXAMPLES OF IDEOLOGICAL MODULARITY

Having looked at some of the kinds of ideological approaches that have governed modularity and its use in typeface design, I will now turn to three specific and 'emphatic' examples of modularity, *Prozac*, *Expletive Script* and *Decoder* (figures 17 – 19) and discuss their relevance and significance.

As a name for a typeface, *Prozac* conjures ideas of sterility and homogenization. One wonders whether Barnbrook is making a commentary on the idea of reduction itself and its relation to human nature. In its essence, *Prozac* functions well as a display typeface. In calling it *Prozac* and reducing its component parts to a meagre six modular elements, Barnbrook is commenting on the sterilizing influence that this way of thinking has on the products of our culture and interactions.[61]

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58   LO CELSO, A., (2005) p. 35

59   CROUWEL, W. (August 1973)
   "the possibilities are endless, and teaching is no longer accepted in the old way (the way that stands for 'the man who knows teaches the one who does not know')… the result is that there is no longer any basic standard to which we can refer, either for shape in general, or more specifically for letterforms."

60   CROUWEL, W. (August 1973)

61   Cult Love http://www.typographer.org/archive/mag-interview-barnbrook.html
   [Accessed 07/09/10] *(Barnbrook on the design of Prozac)*

He is exposing the way we try to control circumstances without regard for human use. In reducing the modes by which we read and communcate too much, we blunt their efficacy.[62]

With *Expletive Script*[63] Barnbrook has challenged the notion of taboo language, employing variant shapes that can change the form of a word and make it more or less readable, highlighting the power of type to subvert or make clear the meaning of a text.

Barnbrook describes the name as:

> *"a comment on the power of language – the idea that certain words are 'forbidden' is fascinating, these words when spoken with a certain intonation can be almost physically painful. They are also great indicators of the social structure; some words lose their offensive nature, others become unspeakable."*

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62 BARNBROOK, J. http://www.virusfonts.com [Accessed 13/09/10]

   "maybe simplified letterforms would result in simplified communication, similar in effect to taking a tranquilliser."

63 BARNBROOK, J. http://www.virusfonts.com [Accessed 13/09/10]

Lastly, *Decoder* is an experimental typeface from Gerard Unger which was designed to allow the user to combine modular elements to form letters. These elemental parts were based on the parts of Unger's text typeface, *Amerigo*.

In all of these designs there is a studied self-consciousness and recognition of the value of the form of the letters as expressive tools, as well as an attempt to engage the user in considering these forms.

TECHNOLOGICAL FACTORS INFLUENCING MODULARITY IN TYPEFACE DESIGN

THE DESIGNER'S RELATIONSHIP WITH TECHNOLOGY

*"Changes in the technology of text invariably
 trigger changes in the shape of text."*[64]

All technology, like any human product, is inevitably governed by the pre-occupations of its creators. In typeface design, we can see that rationality, deconstruction and replication are of ongoing interest. The mechanization of human processes has irrevocably shifted the way we conceive of our products and communication. However, this process is also subject to a delay, as each new wave of technological improvement takes time to implement and disseminate. Each new wave, embraced with excitement, can have unforeseen effects on the products it aids in manufacturing and the rationales, methods and ideologies that give them context. It may have been developed to serve a need that grew out of a previous technology or have been devised based on a model for another field. Each new development can throw up both novel solutions as well as problems for both product and process.

The designer's relationship with technology has changed incrementally through the years as technology has become more integrated in the fabric of our culture. According to Nesbitt,[65] for Paul Renner, "types … were reading symbols and that were gradually leaving the older conception of written symbols behind. Therefore, a new and beautiful type style was only possible through the direct and functional use of all our present mechanical equipment for producing type." Kinross[66] describes Bayer with a similar stance, declaring that "to print a hand-produced letterform on a machine is a false romanticism". In an article on the use of typography and photomontage beginning with El Lizzitzky and a rethinking of the value of typography in the reading process, Yves Alain Bois quotes El Lizzitsky as saying:

*"we rejoice at the new media which technology has placed at our disposal …
 the perpetual sharpening of our optic nerve."*[67]

In doing so, he attributes this new approach in communication to the technology having improved and somehow altered the reader's process; technology designed for the requirements of the reader entering a dialogue with them and creating a new process; the two in tandem, reader and process, reaching a new height. The technological aspect of Bayer's argument belies the idea that invention frequently causes a rebirth or a rethinking—each merely an improvement on the previous, imposing its own set of *new* limitations on the user or

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64 BERNHARDT, S. A., (1993) p. 1

65 NESBITT, A. IN HELLER & MEGGS (2001) p. 86

66 KINROSS, R. (2002) p. 239

67 BOIS, Y. & HUBERT, C. (Winter 1979) p. 115

producer. Zapf[68] too says of this technological impact:

> *"In alphabet design — I do not want to use the term type design anymore, for type design to me means metal, and is associated with Gutenberg's invention for casting type — we should take advantage of today's possibilities and needs, using the new tools like Ikarus and Metafont. We should create designs that fit within the structured pattern of the digital principle."*

TECHNICAL REQUIREMENTS OR PROCESSES INFLUENCING AN ELEMENTAL APPROACH

Throughout typographic history, the notion of repetition has been a prominent feature. In the repetitive nature of punch-cutting and related smoke-proofing, the casting and recasting of hot metal and even in the products themselves, the repeating iterations of an image. In each wave of technological advancement, specific technological restraints have influenced the design of type, resulting in a rationalist or elemental approach. In the punchcutting era, the necessity to improve the speed of the laborious and meticulous process resulted in the use of counterpunches.[69] This was a more efficient way to produce the punches but also a process that succeeded in creating a consistency and harmony throughout the forms. It allowed the punchcutter to maintain relationships established in the manuscript tradition, without having to contrive to replicate the similarities in each of the letters with a similar construction. Counterpunches were punches used to create the negative space in and around a letterform quickly and consistently. There could be punches made for the inside of a 'p' for example, that could then be used for the inside of the 'b','d', 'q' also.[70] In this process, therefore, we see a desire to uphold the inherent modularity[71] and rhythm of the written word.

In both letterpress and hot metal processes we also see the use of the line measure, a feature left over from the manuscript origins of type and incorporated into the use of the grid, forming a continued relationship between the rhythm of the printed and written word.[72] The notion of assembly according to a grid, and within the constricting measure of a line, bears all the hallmarks of an orderly and rationalist approach to type. It also imposed a limit upon the *design* of type, requiring adjustments to be made in the approach to the width of the letterforms in order to accommodate the line measure. Also implied in the hot metal era, though not specifically having an impact on the forms of the letters, is the inherent notion of reusability and a cycle. In hot metal setting the letters are cast and melted and recast, almost humbling the

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68   ZAPF, H. (1985) p. 30

69   SMEIJERS, F. (1996)

70   SMEIJERS, F. (1996) p. 76 *"you can use certain punches for more than one character. An obvious example is the counter in the lowercase d,b,p and q."* For reasons of efficiency and consistency *"the repetition of shapes is a fundamental factor in type design."*

71   VERLOMME, M. (2005) p. 7
    "This early modular system provides with a regular rhythm of white space,which is very much what the eye perceives at small sizes"

72   FROSHAUG, A. (2000)

letterfoms, they are merely part of a system, disposable, repurposable, and ephemeral. They are universal. They are *subordinated to the system*.

In photo-setting, also, although this process manifested the breaking of the restrictions of the physicality of type up to this point, it still adhered to a grid. While it made possible almost any manipulation the designer wanted to make to existing shapes, the shapes for photocomposition were still housed and framed within a gridular system. The letters were photographed on sheets of translucent material against a grid. This grid is the foundation of type.[73]

Seen as such, it is arguable that no technology thus far has freed type from its rational and systematic foundations. With the advent of the pixel we see a consolidation of this relationship between type design and the rationalizing influence of the grid and an elemental approach. This 'picture *element'* is decidedly modular.[74] It breaks any image that it displays down into a structure composed of a single repeated module—the ultimate deconstruction in order to reconstruct.

EXAMPLES OF TECHNOLOGICALLY IMPOSED MODULARITY IN TYPE

We have already seen how the mode of production can dictate new limits and force a designer to conceive of ways to solve inadequacies of a new technology. The relationship with the grid and technological constraints is significant.[75] The grid implies a deconstruction of a surface into cell-like parts, which become individuals. Wim 'Gridnik' Crouwel's[76] approach epitomizes this relationship. Wim Crouwel's response to the CRT technology in 1967 is an excellent example of how this limitation can be mutated, extended and turned on its head. Crouwel is a graphic and typeface designer whose work hinges on the tension inherent in modularity. His *Neu Alphabet* is a good example of modularity employed for both technical *and* conceptual reasons. It was designed for the Cathode Ray Tube system, and as such is made up of 45 and 90 degree angles and shapes only. Unhappy with the rendering of curves (figure 20), he created this solution to work *with*, rather than *in spite of*, the technology. He reimagined the skeleton of the alphabet, not only in the proportions and the subtleties of connection and relationship of the letters to each other, but also the shapes of the letters themselves, applying an underlying grid structuring system, and then expanding this to its limitation.

We see here not just a response to the technology but a dialogue with it—a reformulation of a technological requirement as the conceptual basis for a new piece of work. In this rather abstracted alphabet, we see new relationships between the forms themselves. The harmony is created out of a rationalist approach, a rhythm created in the repeated shapes and reflected
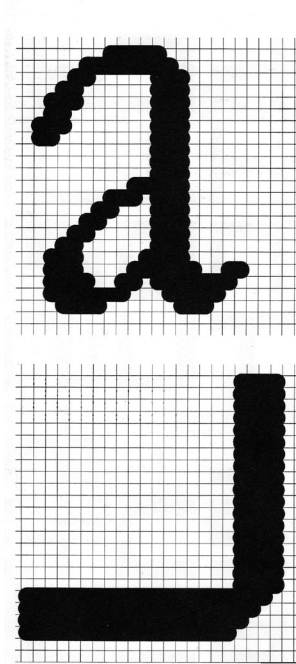
figure 20:

Images from Wim Crouwel's Proposal for a Neu Alphabet, (1967) 6pt Garamond enlarged for CRT technology, Neu Alphabet 'a' SPENCER, H., (1968) *p. 68, 40% scale,*

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73 *Ibid.*

74 LUPTON, E. & PHILLIPS, J. C. (2008), p. 159 *"a pixel is a module"*

75 *Ibid*. p. 176
   "The grid has a long history within modern art and design as a means for generating form."

76 nickname due to his consistent use of the grid in his work

elements. This is a *theoretical* approach to type design and Crouwel himself has said that it is not a typeface intended for extended reading.[77] This is because the relationships are too close; the forms are not readily distinguishable from each other, particularly where they break with the traditional skeletal model and in effect ask the reader to learn these new symbols in place of the old ones in order for them to be read with ease. This is not to say such a departure could not work, but in this example Crouwel has demonstrated the potential, and even the path to getting there, but also highlighted the need to move *incrementally* towards it, on account of the vagaries of human perception and cognitive requirements.

Here modularity becomes an aesthetic rule, in a struggle between legibility and aesthetic integrity. Crouwel asserts this himself in an interview where he describes his process frankly, saying of his work:

> *"when I have to make a choice between readability or a little shift to make it*
> *a little more aesthetic, then I often choose for the aesthetic side instead of*
> *for the readability … when you think you are a functionalist, you think you*
> *do something to make it readable, to make it comprehensible for people…*
> *and then suddenly while working you think if I do it a little more to the right*
> *it looks better but it's not better readable … I feel myself being a functional-*
> *ist, a modernist, but aesthetics always stand in the ways, but uh well that's*
> *your nature… now I let it go…"* [78]

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77 HUSTWIT, G., *Helvetica*, (2007) DVD extras available on YOUTUBE at time of publication at: http://www.youtube.com/watch?v=i-HVW-oeoeo [Accessed 13/09/10]

78 HUSTWIT, G., *Helvetica*, (2007) DVD extras available on YOUTUBE at time of publication at: http://www.youtube.com/watch?v=i-HVW-oeoeo [Accessed 13/09/10]

The interest in, and influence of, this project is still felt, as can be seen in the relatively recent digitisation of the *Neu Alphabet,* as well as a series of other Avant Garde alphabets by Foundry Type (figure 21).

Upright Italic – no broken stem

Hey you! I have a problem. I missing a person. I'm looking for a little greyman, somewhere here. Once he repaired my broken font, and this time I need his help

Maybe you have seen him? I heard a rumour; it's been said he is constructing a typeface c I desperately need such kind of a typeface. I love pixels, you know, those small squares c

It must have been quite an operation – one pixel after another, first bu even more letters. He started ten years ago – likely it's a whole family

YOU KNOW — I'M JUST DAMN CURIOUS OF WHAT THIS GREYMAN IS DOING, SO I BEG YOI HIDING PLACE. I DON'T WANT TO DISTURB BUT... AND IF HE'S NOT HOME, CAN I DOWNLO

A more recent design based on the requirements of technology is *Unibody 8* (figure 22), a typeface designed by Underware for the requirements of rendering small text sizes for on screen reading. In this sense it is a typeface devised for technological constraints.

However, this functional typeface also boasts an 'upright italic' which may be upright for the purposes of increased legibility but which also has a decidedly script-like structure. One wonders if this is, again, an example of the restrictions of the technology being reimagined as a boon rather than a limitation, and modularity being employed intentionally, at least in part, for the challenge of achieving greatness within a very limited scope.

GUTENBERG'S ELEMENTAL TYPEFOUNDING

> *"Letters and the ways in which they work together as words and texts have taken on their shapes in the hands and minds of sculptors, writers, and typographers essentially on the basis of ergonomic concerns. Prior to the development of typography, the shapes of letters and the basics of typography were largely fixed already in manuscripts…The marginal change in typography during more than five centuries partly accounts for the view that there are strict typographic rules, or even laws…As far as typography is concerned it is mostly a matter of conventions, which in contrast to rules, are often subject to interpretation."* [79]

Recent research[80] into the methods of type manufacture used by Gutenberg have elicited some surprising results. It appears that methods of punching and

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79   UNGER, G. (2007) p. 14

80   AGÜERA Y ARCAS, B. & NEEDHAM, P. (2003) p. 10

casting that were assumed to have been unchanged since Gutenberg's time, may actually have evolved over time and were not practised in their more well-known capacity[81] until later in printing history. Research into the forms of the letters of Gutenberg's Donatus-Kalendar (or D-K) type[82] have revealed that it is possible that Gutenberg in actual fact used a method of 'temporary matrices and elemental punches'.

It suggests that he produced the letterforms using a kit of parts or 'elements', and then punched these into a temporary matrix for the casting of type. Only this would account for the inconsistencies in the letterform shapes throughout the printed incunabula. When examined, the positioning of the serifs, and the dot of the 'i' and hyphens are all minutely shifting or morphing when compared, in a way that doesn't happen purely from use or the distortion of the printing process, which suggests that the letters were cast and recast and in this process, the elemental parts of the letters were formed slightly differently with each iteration. Approaching the breaking down of the alphabet into component parts like this means that from the first mass-produced printing types, the forms as well as the use of the letters have been systematized and a governing framework applied.

figure 23:

12 identified 'i' sorts in the Bulla Thurcorum taken from AGÜERA Y ARCAS, B. & NEEDHAM, P. (2003) *used with permission*

'Elemental' is the term I have used to describe the over-arching approach to the deconstruction and delimitation of the structures of the Roman alphabet. It seems particularly fitting in light of this research, which shows that the earliest typefounders employed a method of using elemental or component letter parts when constructing the metal types. In this instance, it appears that the elements were descriptions of pen strokes maintained from manuscript origins. It is interesting to note that in something like the lowercase letter 'i' the dot (see figures 23 & 24) shifts also. This means that the elements were used interchangeably to construct any number of different letterforms, thus creating a consistency and relationship between the members of the alphabet.

This ergonomic dimension is of note here, as it constitutes one way of thinking about the shapes as parts based on movements. It also shows the origins of the relationship between legibility, consistency and efficiency as

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81   *Where a single punch is made and punched into a long-lasting matrix which is reusable and a quantity of types can be cast from each matrix.*

82   http://www.codex99.com/typography/62.html
     "The Donatus-Kalendar (or D-K) type, was Gutenberg's first typeface, used for the *1448 Kalendar*, his editions of Donatus' *Ars Minor*, as well as the later 36-line Bible."

factors influencing the approach to the design of type. The rhythm of the hand is clearly being upheld in this approach with repeated shapes and terminals creating a pattern mimicking that of the written form where strokes are combined to make different shapes. Agüera has pointed out that at this time, the minim was everything and the alphabet and distinguishability of the shapes was almost considered as secondary to the rhythm.[83] As Ruder, the great exponent of the International Typographic Style, has it, "the advent of the

figure 24:

'minim' with and without bows
AGÜERA Y ARCAS, B. &
NEEDHAM, P. (2003)
used with permission

machine has brought home to us again the value of a working rhythm." [84]
So it was with the first iterations of type produced for manufacture that the concept of rhythm, and of a deconstruction of the shapes of the letterforms, was manifest. To further this discussion, it can be argued that not only does modularity play a role in the construction of a piece of text, but also reinforces the modularity inherent in language. The repetition of certain shapes and values within a typeface reflects the notion of language as a link between thought and sound, a code that rationalizes and gives form to their synthesis[85] and can aid the reader in creating a pace for the eye to read by and thus absorb information.[86]

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83 AGÜERA Y ARCAS, B. private email correspondence, 2014

84 RUDER, E. (1981) Student Edition, p. 18

85 LUPTON, E. & MILLER, A. (1996) p. 53 (Laws of the letter) *on Saussure's conception of language*
"*Saussure argued that thought and sound are shapeless masses before the acquisition of speech. Without language, the realm of potential human sounds is just a field of noise... Language links these two layers and cuts them up into discrete, repeatable segments, or signs. 'Ideas' emerge only when both of these formless slabs are sliced into units.*"

86 SMEIJERS, F. (1996) p. 47 *defines the beginning of the rationalization of the alphabet as the humanist developments in the Italian renaissance "the humanist letters are often made of bits and pieces glued together, with great pain." previous to this "in his desire to rationalize even the miniscule into geometric form, the scribe had to do battle with the natural or bodily conditions of writing."*

TRANSLATION,[87] DECONSTRUCTION AND REPRESENTATION

As we have already discussed, printing represents a translation of written letterforms into repeatable symbols. These very basic marks can be defined as the straight line, the curve, and the diagonal line. From these elemental parts, whole alphabets and systems of writing have developed. The prevalence of one shape over another varied the world over, as well as whether these shapes were joined or left as discrete units, varied with the differences in tool, but the basic movements of the hand dictated these three simple parts. From these shapes, a coded system to represent the sounds of speech developed, and as the system of writing developed, and the knowledge of the world was written and spread. Scribes refined these forms with care and once this code was committed to the printing process and these shapes became the basis for printing types. This set of symbols became models. Once incorporated into this new process, in which these shapes had to be 'translated', the alphabet became a canvas. While, even now, the type designer is keenly aware of these calligraphic precedents and conventions in the design of their letterforms, once the alphabet was assimilated by the printing process it became subject to deconstruction, translation and reinterpretation.

Most industry standard font-editing programs like Fontlab, Robofont and Glyphs encourage and support a way of conceiving of the shapes that reinforce the notion of an outline and volume rather than skeleton, offering the option of building shapes through defining components. In the s ense that printing requires a reconstruction of the letterforms as defined by their manuscript predecessors, there is a deconstruction inherent in the process. In order to accurately represent the shapes, they need to be dissected and reformed in printing types. In this manner the systematizing of the shapes of our alphabet began. This was a convergence of economy, efficiency, clarity of purpose and harmony of shape and proportion. In this respect, the technological process and the process of translation or representation created a working method that was informed by the deconstruction of the alphabet. More importantly, it created a legacy and a precedent for future approaches to type design and production.

THE LIMITS OF MODULARITY

> *"Just as the norm of the oakleaf is not perfectly realized in any one specimen*
> *so can no rule of proportion be expected perfectly to appear in any thing.*
> *This makes the task of finding such a rule harder rather than easier"*[88]

Written language, being a code, as already noted, *implies* a rationalization. It is a system, and as such, its translation to production implies a methodical

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87   LUPTON, E. & ABBOTT MILLER, J. (1993) p. 27 (4) *"The term translation is also used in geometry where it refers to the uniform movement of a figure in a single direction. In discussions of language, translation refers to the act of exchanging symbols from one system with symbols from another."*

88   ARNHEIM, R. (1955) p. 54

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figure 25:

Slanted Magazine 30% scale

used with permission

approach.[89] However, this system is not so rigid as it may at first appear. The rhythm of type is easily broken by a systematization that is too complete.[90] Too mechanical or rigid a construction of the parts of the alphabet will undermine this rhythm and cause the text to be less legible. In this situation the imposition of a rigid modularity will fail to construct a readable, usable face.

> *"In other words, what I have called 'modular thinking' is defeated by the fact that as we ascend the scale from the atomically small to the astronomically large we encounter levels of near chaos, which disrupt the continuity of the order, and also 'integrative levels' (Novikoff), at which the whole is not the sum of its parts: 'Knowledge of the laws of the lower level is necessary for a full understanding of the higher level; yet the unique properties of phenomena at the higher level cannot be predicted a prioiri from the laws of the lower level.'"*[91]

Often, the use of a bottom-up approach to the design of typefaces can hinder the overall effect; the application of an unbending rule established at a micro-level and magnified across the alphabet can result in forms that, while rigidly constructed and uniform, do not allow enough differentiation and disambiguation of the letterforms to create a rhythm rather than a mere pattern.[92]

> *"Digital tools, at first, necessitated (due to technical constraints), and later explicitly encouraged (due to technical advances) specific kinds of representations that would challenge their historical antecedents. Now in the late 1990s, the mutation of letters continues. The spatial and temporal opportunities of cyberspace are resulting in even more radical depictions of letterforms that offer expanded formal and stylistic possibilities, while further challenging the norms of reading and writing."*[93]

The effect of the gradual deconstruction of the alphabet and repeated conception of it as a set of parts or a model to be reimagined in more abstract

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89 KINROSS, R., (2002), p. 115
   "In Dutch, for example, the word 'lettertype' is in current use…" "But if we remember the deeper meaning of 'type', as a pattern or model of something typical, then 'lettertype' begins to make sense. The concept is of a set of letters that are models, from or after which reproductions are made: thus the idea of printing is inherent in the word 'type'"

90 SMEIJERS, F. (1996) p. 24
   "by being intended for reproduction and by the way in which it is designed to form words. This way of making words is like a process of prefabrication." "visual rhythm…the less you observe this principle of balance, the less legible will the result be" "if we want to make text legible, certain basic visual and perceptual facts have to be observed." "…perfectly balanced type does not and cannot exist…this is not the issue…the issue is to develop and find good balance based on and using these doubtful imperfections."

91 ARNHEIM, R. (1955) p. 53

92   http://www.youtube.com/watch?v=OheCakSQSxk
   Eric of Process Type says of this that *"A rhythm leads you from left to right as opposed to a pattern which will sometimes circle back on itself"*

93 STAPLES, L. (Autumn 2000) p. 1

terms has allowed for a more accepting audience and because of this a freedom in designs for the Latin script. Familiarity with abstracted views of the letterforms, combined with attempts to define the essence of each form, have led to the gradual increase in the creation of typefaces like *History* (Peter Biľak), which exemplify this newfound freedom (figure 26), and tools like *Fontshop's* 'Fontstruct' and *House Industries* 'PhotoLettering', which showcase a democratization of the alphabet in the digital era. We have also seen a reemergence of the influence of the calligraphic model in the work of foundries like *Underware* and *Aléjandro Paul*, albeit using more informal or colloquial forms, and employing the advancements in *OpenType* technology in exploring the possibilities of contextual alternates and variable forms.

figure 26:

Typotheque specimen of History
www.typotheque.com
used with permission
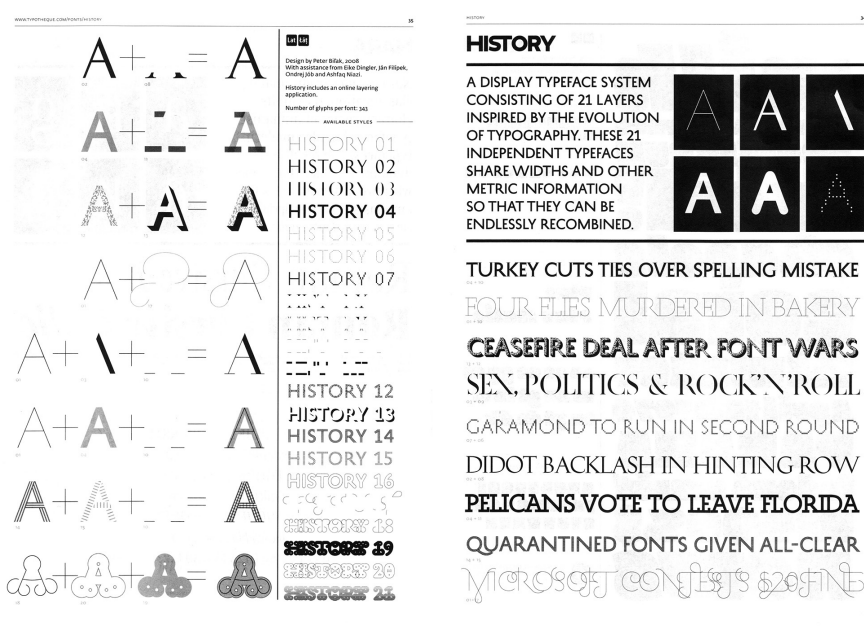
The designer is now so comfortable with the idea that the forms of the alphabet can shift that typefaces like *History* allow the user to effectively 'build' their own typeface. Here the 'elements' of the face are the personalities or 'atmospheres'. The proportions remain unchanged, but the type's 'face' is constructed in an ad hoc way by the user, turning on or off elements as they need or want them.[94]

> *"the past and the future of the letter (where it comes from and what remains open to it) are independent of the phoneme."*[95]

The elemental approach can be identified throughout the history of the development of type, beginning with the earliest incarnation of the written word in print. It has been influenced by and represents a manifestation of rationalism and Cartesian principles. The influence of technological developments

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94 See also Matthew Carter's 'snap-on' typeface for the Walker Art Museum.

95 BARTHES, R. IN BOIS, Y. & Ē, C. (Winter 1979)

can be seen to have been an extension of this ideological undercurrent as the mechanization of type-making, by its very nature, encourages the deconstruction and delimitation of the alphabet as a set of repeatable elements. The final arbiter in the elemental approach to typeface design is the ergonomic basis, which at once both requires and opposes an elemental approach. The human relationship with pattern and rhythm underscores the need for consistency and harmony between the forms while imposing limitations on the degree to which this is employed. The need for disambiguation and differentiation, which aids recognition, places an onus on the designer to both homogenize and build in idiosyncrasy—two quite opposing forces.

The varying sociological intentions of designers in employing an elemental approach serve to highlight the tangled and inextricable relationship typeface design has with culture, and its role as both a passive product and active participant within human communication.

The impact of the elemental approach on the conception of the alphabet has been incremental. However, it is clear that in the last century, the approach to letterform design has changed. Designers have been looser in their interpretation of the 'model' and have embraced an elemental approach as a means to creativity and innovation in the construction of letterforms. The sense that the forms of the alphabet are malleable and that their structures and shapes are open to interpretation, combined with an increasing visual literacy on the part of the reading audience who are capable of reading abstracted representations of our fossil models has led to a shift in the landscape of type design. In recent years the prevalence of modular alphabet design has exploded, almost in direct opposition to the increasing quality of screen resolutions and production methods. No longer constrained by technology, it is as though designers are finding new ways to challenge themselves and new ways of looking at the skeleton shapes of the alphabet within a set of self-imposed parameters. So it is evident that modularity does not exist because of a *necessity* to pare back, or to fit to a requirement, but also exists as an ideological end in itself.

This tendency can be seen to be a consolidation in the conception of the alphabet, moving from the letterforms as a series of strokes, to the idea of them as malleable structures. Arguably, the modularity of the technological history of type, and the fact of the translation process inherent in typeface design, have both contributed to this shift and reinforced it. As such, the study of modularity in typeface design offers an example of the dialogue between man and machine. Therefore, it has wider relevance to a design community grappling with their role and relevance in a rapidly shifting technological landscape.

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