

Rethinking The Baseline

Explorations in Non-linear Typography

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Introduction

Aspects of modern typography that were defined around the time Gutenberg's press was presented to the world have come to be deeply rooted in daily perception. We take for granted the way words should be read, how text should be prepared and presented, to such a degree that "good" typography should often become transparent. This level of achievement has come through centuries of development, and many theories for working with text have stood the test of time. The work presented herein does not challenge the beauty of a letter, the aesthetic qualities of an optical kern value, nor the gestalt effects and theories which were studied and concretized throughout the better part of the 20th century.

What this work suggests, however, is that the digitization of the typesetter's workshop brought with it strict and rigid principles that belong within the realm of materials. For instance, principle of "leading" refers directly to the use of lead as a medium for creating space between lines of text. Beyond this, however, the remediation of typesetting also brought with it a methodological and linear process of working with words. A process whereby the act of placing one letter after another, of moving one block of text, changing characteristics of letters, and so on, happens in a step-by-step fashion. Furthermore, the abstraction from metal type and typesets to the mouse, screen and keyboard, effectively abolished the physical nature of typography. No more do the typesetter's hands get dirty during the creation of a new work.

The direct translation of typesetting techniques to the computer was a necessary first step. Now as new forms of technology are arising, computational devices are becoming faster, and physical interfaces are moving away from the keyboard and mouse, it is the right time to start thinking about the next stage of typesetting. This work attempts to do just that. The confluence of digital typesetting, computation as a medium for artistic expression, and the advent of graspable and tangible interfaces creates an incredibly interesting and open space for the field of typography.

Motivation

My goal is to develop new mechanisms that help us *rethink* our relationship to things we take for granted, and which can provide a foundation for the development of innovative approaches and new space for creative expression. At the moment, my work looks at a limitation in modern typesetting environments which shapes the practice of typesetting into a linear one. Through my research I have come to see this limitation as a by-product of design for keyboard and mouse interaction.

I share in the belief that this linearity occurs as many elements of digital typesetting environments have been developed as general remediations of printing press techniques. [1] In response to this, I have created a new kind of canvas for working with type using non-linear techniques, where many aspects of a letter, word or phrase can be controlled and manipulated simultaneously.

My technical approach finds its roots in two places: the use of computation as a medium for creativity, and the development of physical interfaces for high-fidelity interaction with software environments. The former can be seen in the work of contemporary computational artists who develop their own programming languages,



Figure 2. Drawing with TextDraw (2009)

writing software through which they are able to express their unique visions.[1,2,3,4] The latter can be seen in the development of Tangible and Graspable Interfaces which provide more natural affordances for control and interaction than the keyboard and mouse. Such kinds of interaction have been successfully applied to gaming, music, storytelling, and other computationally enhanced environments, but remain largely unexplored in the field of typography. [5,6,7,8] I am interested in developing new kinds of software / hardware interfaces as opportunities for returning to the field of typography, a physical quality that was lost when print moved to the screen.

Gestural & Nonlinear Typography

Over the course of the last two years I have been engaged in a media-art research project centered around the idea that smart interactive surfaces can help us rediscover and rethink paradigms that we take for granted in our everyday lives. Throughout this period I developed two applications, called TextDraw and TypeIs, which exemplify the possibility

for non-linear typesetting through original artistic software. As well, I used these applications to produce and exhibit artworks that support a challenge to fundamental concepts in the field of typography. Furthermore, both of these applications utilize elements that separate them from modern commercial typesetting software.

The act of creating, or even simply attempting to create, new mechanisms for production opens up an opportunity to deeply investigate the nature of a field such as Typography. In order to build something new one must first understand the elements needed for its construction. In the past, such elements were almost entirely material, or physical objects and processes – before being able to punch-cut moulds for casting type, an understanding of physical properties of metal alloys was essential. In today's digital world such elements can fall entirely within the realm of the intangible – creating new applications for typesetting requires a working knowledge of available underlying software frameworks. Both cases necessitate a thorough understanding of the qualities of the materials with which one can create.

The production of TextDraw and TypeIs has helped validate two fundamental assumptions about the field of typography. Despite the potential for digitization to untether typesetting practices from their historical precedents, the act of typesetting remains inherently linear. This linearity is strongly influenced by the tools and materials with which typographers are able to accomplish their practice. Additionally, since the introduction of new forms of media and techniques in the mid-60s, of which software plays an important role, the physical nature of the practice of typesetting has been largely lost.

The first application, TextDraw, addressed the linearity and lack of physicality present in modern typography. It did so by considering the impact of new technologies on the ability to provide a paradigmatic shift towards non-linear control over typesetting environments.



Figure 2. Traditional baseline as a horizontal rule (above), Weighted baseline built with points (below).

TextDraw is designed to be used with a stylus that can capture such things as pressure, location, tilt and rotation.

These aspects provide the basis for capturing a variety of movements and hand positions which can be used as gestural input for typesetting. In doing so, TextDraw attempts to do so by bringing back elements of lost physicality, through the creation of gestural interfaces which provide higher degrees of expressivity than the traditional keyboard and mouse.[9]

Gestural Typesetting in TextDraw

In typography, the baseline is an implicit element used for measuring the vertical placement of text, which Bringhurst describes as an invisible line “on which [most] letters rest.”[10] The baseline is an implicit element because it only appears as a result of typesetting, and is not a real object in the sense that it can be changed. In software, however, the baseline is an explicit object that contains letters.

Creating baseline itself as an explicit object, which provides the basis for defining text attributes, is a different approach than the one taken by modern typesetting softwares. Essentially, in abstracting attributes away from individual letters I am attempting to shift the idea of the baseline from an imaginary entity to one that is also responsible for creating the look, position and feel of text itself. Rather than the baseline arising from the visual composition of text, it is the visual composition of text that arises from the creation of the baseline.

In TextDraw, gestural interaction is captured and stored in a set of weighted points which contain position, rotation, pressure and tilt information. When a path is created, by drawing a line into the application’s canvas, it takes a section of text and attributes each letter based on its position along the line. As each letter’s attributes are determined, those attributes help determine the position and attributes of the following letter. Specifically, the attributes for every letter in a line are

dependent on that letter's distance from the beginning of the line, with its distance being dependent on all the letters which precede it along the line.

Modern typesetting software breaks bodies of text down into lines, and then into runs of characters. These runs are essentially sets of sequential letters which have the same attributes (e.g. point size, font, italic). In TextDraw, it is uncommon for individual characters to be lumped into the structure of a run because the fluid and intuitive nature of gestural typesetting often provides subtle variations in attributes from one character to the next. Because of this, it is the attributes of each individual letter are determined by its distance from the beginning of the line on which it is being drawn. Furthermore, because each letter's distance determines its attributes the concept of a run of letters having common characteristics becomes obsolete. In general, the reason for this obsolescence comes not from the technique of gestural typesetting but from something more fundamental.

The principle behind the idea that text can be broken down into lines, and then into runs of characters, which all fit within shapes and areas in a typographic composition presupposes something crucial. The metaphor behind the construction of a basic run of characters supposes that all characters will be consecutively laid out on a line. This is an important point, and fundamental to this work because this approach assumes that the traditional concept of an implicit baseline as a horizontal or vertical element is the most appropriate form for typesetting in a digital context.

Having created TextDraw, I took a 6 month hiatus from developing to focus solely on working *with* the application, rather than *on* it. I was able to "draw" with type, but wasn't really sure what that implied. So, I started exploring the differences between inked lines and lines of text. Working solely in black and

white for this period, I produced a series of works whose aesthetics were largely based on versions of various woodcut prints by Gustave Doré. I was able to trace lines using my pen's pressure sensitivity to smoothly adjust the size of each letter as I was drawing.

Afterwards, I experimented with shading and the qualitative aspect of using text as texture, subtle adjustments to the tilt of my pen changed the opacity of each letter. The product of these experiments were the Alice in Avenir series, where I combined chapters of Alice in Wonderland with images from its original publication. Through this period of creative work I learned much about the artistic experience of gestural typesetting. However, I felt that the process of creating works with TextDraw remained inherently linear because the application only moved through a text one letter at a time. To move beyond this I needed to develop a system which would handle moving through a text in non-linear fashion.

Non-Linearity in TypeIs

Naturally, the technique of gestural typesetting is a non-linear one and requires more than a straightforward, linear access to the text which is being drawn. In order to accommodate this, a novel line management and text storage system was designed into the new application. Among many advantages, including efficient storage and access, TypeIs provides non-linear access to various components of a body of text. When a body of text is loaded into the application, it is broken up into a set of component strings, each of which can be accessed individually. Even though the current implementation uses a pen-based interface and draws a single line at a time, it is possible to access multiple components of a text simultaneously. In a simple experiment, a bit of modification to the user interface resulted in a multitouch version of TypeIs where each finger is



Figure 2. A photograph of *The Don's Imagination* (2009)

drawing words from different parts of a text.

Just as I stopped developing and started working creatively with TextDraw, I picked up my stylus and spent again a period of months experimenting with TypeIs. Throughout this period I moved beyond black and white experiments to a range of works in colour. With the sophistication of new system, I was also able to create interactive installations and 3D-printed type sculptures. During this period I also collaborated with the choreographer Joan Karlen to produce dynamic poetic aesthetics for the ballet Trace.

Rethinking The Baseline

Represented in these two applications is a fundamentally new way of constructing typographic works. This new way can be seen as the result of using a new kind of mechanism, a weighted baseline, a software object which attributes characteristics to letterforms. This mechanism provides the ability for recording multiple forms of input which provides the opportunity for non-linear control over the aesthetics of a piece. The non-linearity which is possible through the

use of this baseline is supported by another

mechanism which provides non-linear access to all the elements of a given text. The weighted baseline shifts the typesetter's traditional practice of editing characters and words to manipulating the elements of a typographic environment.

TypeIs attempts a first, though small, step towards bringing physicality back to the practice of typography through the use of gestural interaction. An overall vision, and motivation for the work, sees the development of tangible interfaces for typography where the typographer can once again actually touch and control the tools needed for typesetting.

Rethinking The Baseline implies that its purpose is to investigate modern typesetting and to propose new inventions where old mechanisms may have reached their potential. It suggests, too, that new technologies provide the starting point for reconsidering paradigms that are taken for granted in our daily lives. Finally, and most practically, it elucidates the fact that the creation of gestural and non-linear typesetting

environments require the invention of a new kind of baseline.

In traditional typesetting the baseline is an abstract idea, an ephemeral line which appears only after letters have been aligned to one another. In TextDraw and TypeIs, the baseline has become an object that the typographer can mould and create through gestural and non-linear interaction. A new object, which becomes central to the creation of artistic works, provides the starting point for rethinking established ideas and paradigms of thought. In a synthetic media-art-research practice, new mechanisms provide the opportunity for the creation of new aesthetics, and new kinds of expressive activity create the space for the development of practical innovation.

References

1. Jason Lewis and Bruno Nadeau, "Writing with Complex Type," Proceedings of the Digital Arts and Culture Conference (2009).
2. John Maeda, *Creative Code*. Thames & Hudson (New York, N.Y., 2004).
3. Casey Reas and Ben Fry, *Processing: A Programming Handbook for Visual Designers and Artists*. MIT Press (Cambridge, Mass., 2007).
4. Josh Nimoy's official Web Site, "Textension: Word Processor Variations," February 2011, <http://www.jtnimoy.net/workviewer.php?q=32> (accessed September 1, 2011).
5. Elise van den Hoven, Joep Frens, Dima Aliakseyeu, Jean-Bernard Martens, Kees Overbeeke, and Peter Peters, "Design Research & Tangible Interaction," TEI'07 (2007): 109-15.
6. George W. Fitzmaurice. *Graspable User Interfaces*. University of Toronto (Toronto, Canada, 1996).
7. Hiroshi Ishii, and Brygg Ullmer, "Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms," CHI'97 (1997): 234-41.
8. Sergi Jordà, Guenter Geiger, Marcos Alonso, and Martin Kaltenbrunner. "The Reactable: Exploring the Synergy between Live Music Performance and Tabletop Tangible Interfaces." TEI'07 (2007): 139-146.
9. Rhyne, J. "Dialogue Management for Gestural Interfaces." ACM SIGGRAPH Computer Graphics 21, no. 2 (1987): 137-42.
10. Robert Bringhurst. *The Elements of Typographic Style*. Hartley & Marks Publishers (Vancouver, Canada, 2005).