ERNST THOUTENHOOFD

The British Sign Language Variant of Stokoe Notation: Report on a Type-Design Project

TO BEGIN the project, I carried out a quick literature review to generate information about the various applications of British Sign Language (BSL) Stokoe notation. An informal email exchange elicited information from the very small group of academics who use BSL Stokoe notation, predominantly in the United Kingdom. Next I formulated a set of design characteristics, constructed a Latin alphabet, and prepared two new proposals for BSL Stokoe-type designs. The project was a small one, and the time restraints did not allow for testing and feedback of the proposals; hence this article in part also encourages feedback from other users of sign language notation systems. For now, therefore, the project's conclusions, although they fully satisfy the original project objectives, are limited to the resolution of design issues in the proposed new character drawings, which are listed in the appendix.

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Despite the focus on type design, the project deals with one key sign linguistic issue: the representation of simultaneity/sequentiality in sign movement. Nevertheless, this article also aims to introduce overlapping concerns, those that belong to typographical linguistics. What exactly the concerns of such a discipline might be have yet to be distilled from relevant issues in a wide range of subdisciplines, but the more common phrase "the language of design" gives an idea of the semiotic aspects they might cover. Because this project concerns the design of type, a character set to represent the symbols of, in this case, BSL Stokoe notation (an extended variant of ASL Stokoe notation), one might consider the focus to be on the minimal units of such a typographical linguistics, for example, paying attention to the individual strokes that constitute an individual character shape. For the typographer (and in information technology [IT] environments, authors are ever closer to executing proper typographic tasks) the choice of type is, together with the choice of paper and page layout, one of the first concerns in shaping a text.

Allegro: Composing Text

> I fashion a book of words, sentences, paragraphs and chapters. I am the author of this book. I fashion a book of words, lines, pages and signatures.[1] I am the designer of this book. The first book consists of language, and its words are in the first place intelligible [*verstaanbaar*]. The second book consists of paper, and its words are in the first place visible [*zichtbaar*]. . . . For the designer there is no need to visualize the language I write as author because I already did this as author in preparing the text that serves as copy to the designer. The designer fashions—from the author's book—a book. (Noordzij 2000, 6–7; my translation from Dutch)

> Inevitably there are huge problems. . . . [E]ven at the level of deciding on symbols to use, the process is a long one. (Bristol Sign Language Group 1979, 1)

These two quotes are in direct opposition to each other. In the first quote, the Dutch designer Gerrit Noordzij establishes a clear separation of overlapping responsibilities shared by the author and the designer of a book. But the distinction Noordzij makes is less clearly the common one between the form and content of a book as it is a deeper-level distinction between two different manifestations

of language. In Noordzij's projection clear communication between author and readership is established only as a result of successful partnership between author and designer. Each contributes particular language skills in the making of a book. Although without the author there will be no book, without the designer there can be no book. These two statements are subtly but critically different. In his keynote address to the Association Typographique Internationale (ATYPI) conference at the University of Reading in 1997, Crystal (1998) targeted this area of linguistic overlap; his speech was called "Towards a Typographical Linguistics." In the history of the book, another emerging subfield, the distinction Noordzij makes is also of concern:

> [B]ooks no longer figure as mere vehicles or packaging of texts; rather their material constitution—*mise-en-livre*—and the layout and typography—*mise-en-page*—are recognized as crucial in recruiting readers and conditioning the ways in which they read. (Frasca-Spada and Jardine 2000, 2)

The 1979 quote comes from a slim binder titled *Coding British Sign Language,* which contains the proceedings of the Sign Language Notation Workshop (May 11–13), at which an early group of sign language scholars and researchers from Bristol, Edinburgh, and Newcastle hammered out a consensus on the BSL notation system that would, in due course, be used in *Words in Hand* (Brennan et al. 1984) and the *Dictionary of British Sign Language/English* (Brien 1992; I refer to this standard authoritative work as the *BSL/English Dictionary*). Of those attending the workshop, no one seems to have been a designer.

There is no need to spell out the list of eighteen participants in order to make this assertion stick. The word *even* in the quotation gives the game away "as surely as a sock on the chin produces pain," as Wittgenstein apparently once speculated. In spelling out what is between the lines, the sentence might instead read something like this: "There are huge [linguistic] problems, but 'even' at the [seemingly less problematic] level of deciding on [the design of] symbols to use, the process is a long one."

I sympathize. Designing type is never a minor matter, not even when the font's core character constructions are already very familiar. In 1964 the designer/calligrapher Chris Brand designed the typeface

Albertina for the opening of the Royal Library in Brussels (in 1965) and named it after then-King Albert I of Belgium. Although to an untrained eye Albertina may look like any ordinary typeface, a colleague of Brand makes the smoothly ambiguous comment that it is clear that the typeface was designed against a very tight deadline, claiming that one can observe the effects of this rush in various parts of the type, and goes on to single out a range of roman, cursive, and capital characters, such as the

> N in the roman [which] is remarkably narrow just like the (asymmetrical) W. The . . . numbers share the height of the capitals and seem very large; nevertheless the capitals are smaller than are the ascender characters. (van Krimpen 1986, 276; my translation from Dutch)

The design of Albertina took well over a year and a half; many years later I was briefly one of Brand's students. Centuries earlier, in the wake of the introduction of moveable type, few printers worked with more than three or four different sets of type (called *cuts*), and the early trade of moveable type was more characterized by reselling than by new designs (Eisenstein 1983); printers who were unable to cut their own type therefore faced a considerable investment. Now, in the twenty-first century, the reasons for regularly issuing new typefaces are no different from those behind the design and manufacture of many other products: in part fancy and fashion, in part because old problems find ever new or different solutions, and in part because new problems arise. This is especially true for the past few decades in the wake of new electronic printing and distribution techniques (the personal computer, inkjet and laser printers, and local and global networks). Companies such as Xerox employ full-time type designers to explore the relationships between duplication and printing techniques and the characteristics of type, while Microsoft also has its own typography research and development department. So Noordzij may be wrong in suggesting that designers do not visualize language: They do, if not by visualizing text, then most certainly by representing and characterizing it.

Therefore, the notion that sign language scholars can put their heads together and hammer out a new notation system in a three-day workshop without drawing upon the knowledge and skills of

experts in writing, while moreover demonstrating no awareness whatsoever of even the most common or obvious issues in designing characters ("symbols"), would leave most type designers utterly baffled; indeed my own bafflement is already on record (Thoutenhoofd 1990, 1992). Although design has regrettably been fashionable for quite some time—it has thankfully overtaken me in a hurry—design is not a superfluous attribute: Like Noordzij's book, a "not-designed" product logically cannot exist. Whether sign language notation exists could therefore actually be the subject of interesting, if somewhat philosophical, debate, but I will pragmatically propose that if something made by people exists, then there must be a design, even if it is a weak one and the result of mere unselfconscious acts on the part of the designer—such as the designs of the ASL and BSL versions of Stokoe notation.

That the group of sign language enthusiasts, now reading like a Who's Who of sign language and deaf studies research in '70s and '80s Britain, was struggling with the complexities of both linguistic and design clarity is most aptly illustrated by the exemplar proposals of one contributor, Bencie Woll (future professor and coauthor with Rachel Sutton-Spence of *The Linguistics of British Sign Language* [1999]). Apparently Woll had stumbled upon relevant musical metaphors to represent forms of discursive articulation in sign language. Woll therefore reported in an appendix to the proceedings that she used the following somewhat baroque annotations in her sign language descriptions—compositions, I might say—of that time:

staccato	used for a sign made jerkily/abruptly
forte	for a sign made "bigger" than usual
piano	for a sign made "smaller" than usual
andante	slower relative to the average speed of signing for an individual signer
allegro	faster relative to the average speed of signing for an individual signer

(Bristol Sign Language Group 1979, 27)

Unfortunately, neither the text nor history records what Deaf participants in particular thought of borrowing musical terms for sign language discourse annotation, but seeking such parallels between sign and musical "language" articulation is itself a significant indication that the design of a writing system, in that *other* manifestation of

language, is also not a matter of sign linguistic knowledge alone. Indeed, like music and sign linguistics, both type design and typography boast their own linguistic traditions and terms for aspects of construction and representation, covering issues such as organization, placement, rhythm, balance, contrast, density, translucency, spacing, and kerning, plus a remarkable set of words—now sadly no longer in use—just to describe paper formats and type sizes. That a musician will be able to point to similar terms, meanings even, in music merely suggests a wider definition of language than one that some might feel comfortable using—Woll of course graciously excepted. It is also one that is more properly Saussurian, so that the metalinguistic study of these types of parole belongs no doubt more conventionally in the semiotics department. In the meantime, for BSL Stokoe

> It was decided that *orientation* of the sign is an important distinguishing feature, in addition to hand configuration, movement and position in space. It could be coded using subscripts while superscripts would be used to refer to the movement of the sign. (Bristol Sign Language Group 1979, 2)

Weaknesses in the Original Designs

The members of the Sign Language Notation Workshop in Newcastle largely accepted the basic analytical structure and character constructions of Stokoe's parameter-driven notation, as used in the *Dictionary of American Sign Language Based on Linguistic Principles* (Stokoe et al. 1965, which I henceforth refer to as the *DASL*), but giving more specific attention to the notion of orientation. Nevertheless, those conversant with ASL Stokoe notation, such as that of the *DASL,* will quickly adapt to the BSL Stokoe descriptions in the *BSL/English Dictionary.* For those less familiar with Stokoe notation, both dictionaries provide excellent introductions.

Since BSL has a variant complement of handshapes, a double set of diacritics has over time become necessary to account for all of the variant handshapes (cf. the *BSL/English Dictionary*). The Durham TS Stokoe notation font I finally designed in 1989 specifically for the typography of the *BSL/English Dictionary* also retained the use of subscripted characters for orientation and superscripted characters for movement, although I assigned larger-than-usual sizes to the sub-

and superscript characters in order to aid legibility in smaller font sizes. Because of the need for double diacritics over the handshape capitals, the *x*-height of the character set was already much compromised. As one can judge from the application of the same font in "Word Formation in British Sign Language" (Brennan 1990), the legibility of the font is very easily damaged, an effect that is predominantly attributable to the weak character-level design characteristics.

The need for sub- and superscripts at this basic level of the system has an additional damaging design effect: In alphabetic texts subscripted and superscripted characters stand out because they are infrequent occurrences in a system that overall has a strong horizontal linear direction and weight, most often deriving additional horizontal linear support from the character serifs; this is why serif type is sometimes classified as text type in typography and why sans serif is never used in book text. With the orientation symbols and the movement symbols occurring in considerable numbers (and the movement symbols moreover in vertical columns), they no longer stand out as sub- and superscript characters; rather, their effect is to make the overall horizontal line of notation appear wobbly.

However, it is the organization of the movement symbols that, over time, has become the greatest impediment to wider implementation of the BSL Stokoe notation system, in particular in IT. Sign descriptions in the *BSL/English Dictionary* require far more simultaneous movement characters, conventionally placed one on top of another in stacks—as Mandel (1993) refers to the symbol columns—than foreseen by the original inventors in the *DASL*; its editors foresaw only two simultaneous movement *(sig)* symbols (*DASL,* viii–ix). In the desktop publishing (DTP) environment of the *BSL/English Dictionary,* stacking could be achieved only by superimposing two separate text blocks for each sign notation (as if two parts of a notation were on a separate transparency). Notating in much more common word-processing packages such as Microsoft Word required a monospaced version of the font.[2] The use of the latter font is most akin to advanced chess: Because of the movement stacks that always appear at the end of a hand configuration, the user needs to think multiple keystrokes and text lines ahead in order to construct a correct sign notation. Moreover, the number of symbols (149) required

for BSL Stokoe makes a font properly encoded for both Windows and the Mac OS a logistical difficulty. This is because, beyond the 94 characters of the limited ASCII set of locations for alphabetic characters, the two platforms have assigned different locations for a slightly variant set of characters, while Adobe company (responsible for Acrobat Reader and its PDF file format, for example) utilizes its own encoding formats. Both Mac OS and Adobe add "expert" encodings to this list, sets typically used for small caps, nonaligning numbers, and ligatures. In practice this means that only 94 characters are guaranteed to translate correctly among different systems. For the alphabet this means that mostly only uppercase and lowercase letters, numbers, and standard punctuation are "safe"; accented characters, for example, are not.[3]

In summary, whatever the linguistic demands on the system, the design weaknesses of the BSL Stokoe system are proving top-heavy and are threatening to crash the entire system. Quite remarkably for such an "early" UK text on Stokoe notation, the workshop participants seemed to anticipate problems of this nature:

> Research considering the level of movement required and the type of orientation which constrains signs was encouraged and it was hoped that transcription difficulties may be eased. (Bristol Sign Language Group 1979, 19)

But then there are those who might claim that Bach's work anticipated the Beatles. Nevertheless, one of the key objectives of the research project was therefore to topple the stacks, or in other words to "linearize" BSL Stokoe notation.

Toppling the Stacks

As it turned out in the course of the research project, the issue of representing the distinction between simultaneous and sequential movement turned out to be something of a red herring at the level of design. First of all, it is a question of need dictating convention. Without linearizing the vertical columns of movement notation, the system is of no practical use in IT environments, whatever legitimacy it may have in other contexts. It takes no great visionary to divine the future of a system of communication that cannot practicably be

used electronically, even though it is perhaps possible to imagine the development of parsing subprograms or software Xtras. Given the wide range of software and all the coding required for such a solution, I do not foresee much of a future for movement stacks. Indeed, one must not forget that computer technology itself assumes the Roman alphabet (and its horizontal-linear functioning) in its basic functions, so much so that it is now a pervasive proponent of the Roman alphabet and a next major step in its evolution—indeed, even in China:

> [T]he future for the Roman alphabet looks rosy—but without displacing traditional Chinese script. Anyone using a PC in China must be Roman-literate to use a keyboard. E-mails, still used only by the literate few who communicate abroad, are often written in English anyway. Working in Chinese, you type using the Roman system: Pinyin. (Man 2000, 282)

Moreover, in other Stokoe variants, such as the probably more widely used HamNoSys, the distinction is mostly, and quite simply, downplayed. The only reference to the distinction in HamNoSys description is that "simultaneously occurring movements must be enclosed in square brackets" (Prillwitz et al. 1989, 22), but in BSL this convention would introduce a potentially significant number of square brackets, which are comparatively large and obtrusive elements. Mandel is equally concise in his reference to the sequential/simultaneous movement distinction, and he proposes a comma to separate each sequential movement character; characters not separated by a comma therefore represent simultaneously occurring movements (1993). Moreover, since the *BSL/English Dictionary* reveals a great number of sign movement descriptions starting with simultaneity—for example, for much circular movement—this usage is proposed for BSL Stokoe. With reference to circular movement, BSL Stokoe notation uses a complement of stacks to distinguish various kinds of movement (*BSL/English Dictionary,* xxii). In order to simplify these somewhat, the new designs include separate symbols for clockwise and counterclockwise movement.

The New Type

> From the viewpoint of type design, however, I have problems with a considerable number of the original character designs because they

> are insufficiently discriminating (or contrasting), such as squares, parts of squares, and rotated parts of squares; arrows pointing up, down, left, and right; and so on. HamNoSys is even worse in that respect.[4] As far as I am concerned, such form derivatives are in direct conflict with the requirements of letter form and word form (some of them probably being universals) in reading and writing. In that sense it seems advantageous to use the Roman alphabet character set because you get centuries of development and optimalization for free. (email message to Mark Mandel, December 3, 2001)[5]

> The fifty-five symbols used to write American sign language [sic] stand for just fifty-five things visibly unlike all the rest. Moreover, grouping within the fifty-five helps to learn the symbols and what they stand for. . . . [N]ineteen will be immediately recognized by the reader who knows and uses the American manual alphabet, but appearances are misleading. (*DASL,* ix)

In this instance both quotes have an overlapping concern—that of visual discrimination. Stokoe et al. refer to identifiable elements of sign form, whereas my concern is with identifiable elements of letter form (1965). In my email to Mark Mandel I wrote of my concern that in any writing system the characters should visually be maximally discriminating (2001). This is not as simple as it sounds. Consider the lowercase set of the Latin alphabet. The *a* appears to have little in common with the *t:* They are indeed quite different. Yet in terms of rhythm, balance, and contrast (interplay between fore- and background, black-and-white letter shapes), they are nevertheless well matched. Some characters show greater resemblance, such as the *b, d, p,* and *q*. Nevertheless, they exhibit critical differences in the locations of the ascenders and descenders relative to the curves, in the serif details, in the contrast development of the curve strokes, and in the enclosed white shapes (the character *bowls*). Their overall effect is that readers rarely mistake one for another, not even in fluent reading (of course, word images have a lot to do with this, too). We do not think of those characters as being much the same thing because they are visually sufficiently distinct. Moreover, each of these characters is perfectly balanced with the very dissimilar constructions of the *a* and *t:* They all clearly belong within the same language, within the categorization of type to the same dialect, and in their design detail perhaps identifiably to a particular language user (type designer).

A *b* is therefore not simply a horizontally flipped *d* or a *q* rotated 180°. By contrast, < and > are much more like one and the same

FIGURE 1. Note the visual consistency, rhythm, and balance of these Times New Roman characters, as well as the varying details and contrast in the character bowls and serifs.

shape. That this quickly leads to problems in reading is demonstrated by replacing *a, e, m,* and *n* for this type character in the first quote:

> Fro≥ th< vi<wpoi≤t of typ<-d<sig≤, how<v<r, I do h>v< probl<≥s with > co≤sid<r>bl< ≤u≥b<r of th< origi≤>l ch>r>ct<r d<sig≤s, b<c>us< th<y >r< i≤suffici<≤tly discri≥i-≤>ti≤g (or co≤tr>sti≤g), such >s squ>r<s, p>rts of su>r<s, >≤d rot>t<d p>rts of squ>r<s; >rrows poi≤ti≤g up, dow≤, l<ft, right; >≤d so o≤.

If our forebears had thought this a good idea, we might now all be reading something much more akin to Runic or perhaps even Ugaritic scripts, both lost variants of the Roman alphabet (although Runic was apparently in use in remote parts of Sweden until the seventeenth century; cf. Man 2000, 256). I can however predict that, in the process of reading, the replacement characters are being skipped, and word identification becomes entirely dependent on the surrounding characters in one's attempt to reconstruct a legible word image: As character forms, the <, >, ≤, and ≥ are insufficiently discriminating, whatever they might mean as symbols. Note furthermore that individual words (and even lines) are less well delineated, whereas nothing in the spacing has been changed; this means that the replacement characters are not well matched to the alphabetic shapes. Our reading requirements would have caused Runic to fall into disuse even if nothing else had. This also means that there are rules and conventions one can discover in typographical linguistics; it means furthermore that one can violate these rules.

The difficulty we have in distinguishing left and right (as in left- and right-facing characters) is also evidenced by much of young children's early writing. Mirror-inverted *E* and *S* in particular are common because they appear to be the same thing as the correct version.

The children are perfectly correct in this assumption. After all, in whichever direction the red car passes me by, it is the same red car; from whatever angle I photograph my house, it is clearly my house in each of the pictures. All of these mirror-inverted character shapes can be made with legitimate character strokes. In fact, many Greek scribes made no particular distinction between left- and right-facing characters. We might conclude that they do not contravene the rules of the language. But whichever way an *E* faces, to both the Greek and the child it logically has the same meaning.[6] So it appears that character orientations that are "the same thing" but have different meanings are insufficiently discriminating in writing systems. The perception of their difference in meaning contradicts our logical assessment and therefore rests on a more conscious and slower process of analysis; we might conclude that this contravenes the rules of the language of literacy.

Many of the creative resources of type design lie in the history of writing and the writing implements used in the past; this is the same for Hebrew, Arabic, and Chinese lettering and writing, for example. Despite using different tools and resulting in quite different designs, Chinese writing employs some methods and character constructions that are remarkably similar to those practiced in Roman writing. In the case of Roman writing the use of a chisel or broad nib produces a consistent contrast in the construction of letter forms, as well as practical limitations on the kinds of strokes a scribe can produce: For example, with the broad nib all downward strokes are thick, all upward strokes are thin. As a result, the entire complement of alphabet characters is constructed from a very limited reservoir of letter strokes—another reference to the minimal units of a typographical linguistics. As opposed to teachers teaching handwriting in schools, type designers do not invent new constructions. Rather, their expressions (their type designs) normally demonstrate an understanding of the rules in this language of type design. Indeed, the *humanist minuscule* construction of virtually all modern text (including this text) has remained unchanged since it first appeared in the early-fifteenth

century in books written in European mainland scriptoria, while Stanley Morison, the designer of the now-ubiquitous Monotype typeface Times (1872), commented on inscriptions in Augustinian and Trajan period majuscules (capitals) that the Romans

> achieved a height of excellence that has won recognition, universal in the West, as the unsurpassable rendition of the Latin alphabet. (Morison quoted in Man 2000, 263)

The Design of William C.

My approach therefore was to design, first of all, a standard alphabet typeface to which one could match the notation characters. The project research had produced a few guiding principles: The type should be of the common humanist minuscule construction, the capitals should have a matching set of small capitals that one could use for handshapes, the type should ideally run quite narrow since a single sign notation uses generous numbers of characters, the type should be suitable to both book print and screen representation, and the type should be "sturdy"—usable in many contexts.

The series includes italic type, roman regular, medium, semibold and bold type, as well as a set of small capitals—a full typographic set was intended. Figure 2 shows examples of William C. Regular, William C. Regular Smallcaps, and William C. Italic in size 36.

The italic is much fatter than the italics of more common type, largely to retain a clear screen image; I did not generate separate screen bitmap fonts. Because all the fonts are TrueType and the number of path points (coordinates) per character is kept to a minimum, their screen image is tolerably clear except for small screen sizes. Because of the relatively small x-height, sizes below 12 or 14 result in considerable distortions, notably cluttering, fragmenting, and irregular spacing of the characters. The comparatively long ascenders and descenders suggest that the type is akin to traditional "book" versions of existing type, so it has a set of nonaligning numbers.

William C. Stokoe Senior

In the first version of BSL Stokoe, many character designs match those of the original system, but including all of the various adaptations for use with BSL. However, a number of character shapes were changed in a bid to improve the overall legibility and visual clarity of

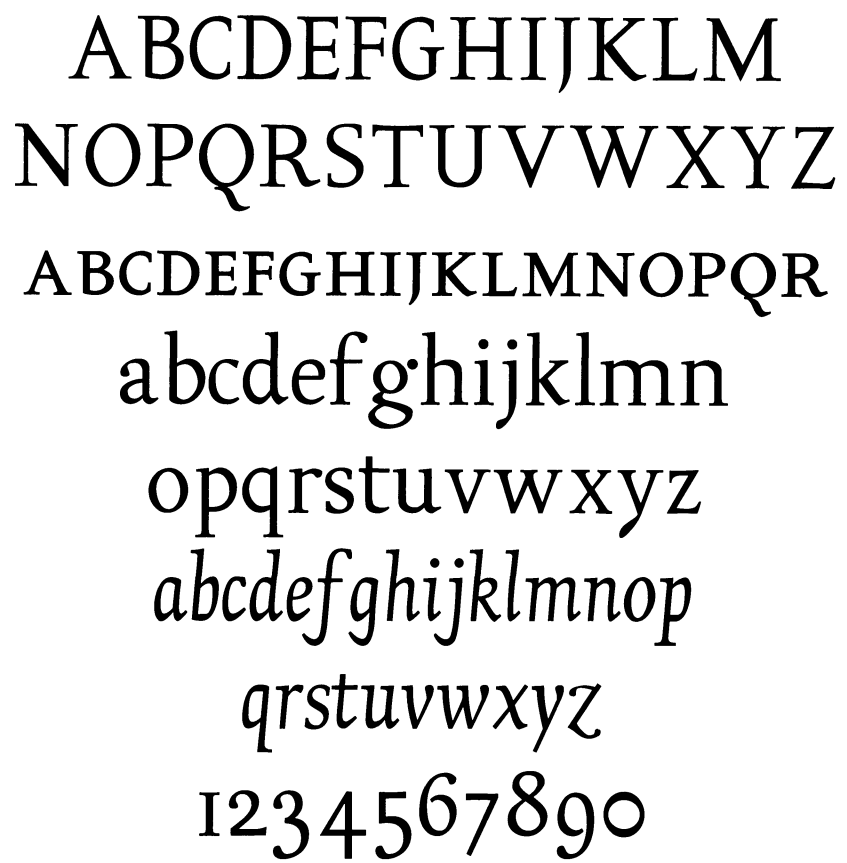

Figure 2. The William C. alphabetic font family.

the character and word image. This type is called William C. Stokoe Senior; figure 3 provides character examples in size 36. The appendix presents a table matching the newly produced fonts with the *BSL/English Dictionary* characters.

Note that the handshape characters *(dez)* are the alphabetic small caps; this means that, as frequently occurring handshape symbols, they integrate better with the rest of the type because they have similar body height and alignment.

This set of characters aims to provide a reasonably balanced complement of BSL Stokoe notation characters while retaining much of the original design intentions: It represents an intermediary step in

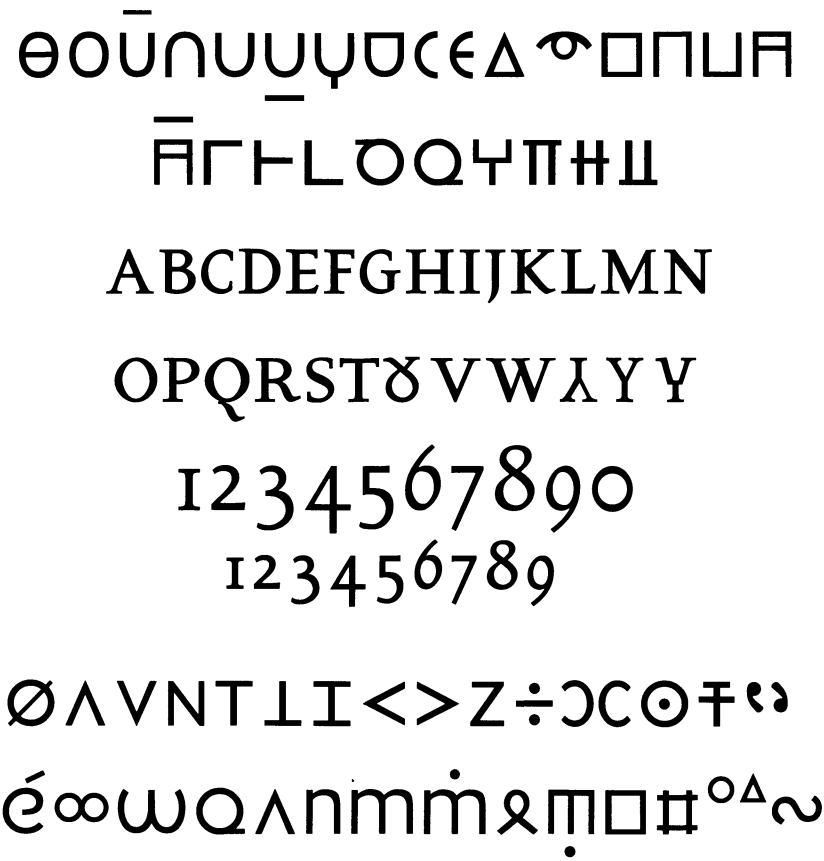

FIGURE 3. The William C. Senior notation font, retaining many of the original Stokoe notation character designs.

the project outcome. Even so, a number of character designs were changed, mostly in order to make characters more visually discriminating—they include the triangular shape for "nose" and the neighboring eye shape for "eye." More generally, curved (circular) location symbols center around the face, whereas predominantly square (straight) symbols center around the trunk (or upper body) and the hip, although exceptions exist.

The double sets of diacritics above the handshape symbol (to denote handshape) variants are an insurmountable problem in typography. In earlier designs diacritics were separate characters with a

negative spacing (the zero point being in between two characters), while the handshape symbols were all set on the same width (monospaced). Typing a diacritic after a handshape symbol therefore placed it above that character. However, most typographers control the spacing of type in DTP software, which destroys the precise alignment of the diacritics above the handshape symbols. The diacritics have therefore been substituted by a single superscript number after the handshape symbol (see the appendix).

Because the movement *(sig)* symbols are a diverse set somewhat lacking in organization, their design adaptations were minimal. Changes concern designs that in their original versions suffered construction flaws. Some were clearly insufficiently discriminating, such as the characters representing "toward each other" and "joining together," whereas, for example, the character representing "flex at the knuckles" was impossibly wide and that representing "circular" too dense—it had insufficient interior space. As is so often the case, there is room for improvement where there is room for compromise.

Sign n°	English Reference	BSL Stokoe Sign Notation
sign 1	grip	ϴAQ⊥_°⊥V
sign 2	compulsory	ϴAO⊥_°ᴬ<VQ
sign 202	holy communion	Q> Aᴵ O⊥_°ć⊥>, °V,× ¦ ϴ+BQ>ₓBQ<_ʌT
sign 460	distance	ϴGᴵQ⊥_(•ć Q>V)⊥V
sign 609	fire a rifle	-G⁷Q⊥ eG⁷<⊥ᵩ_ṁ)ᴬTV
sign 758	carol	⊡iVT<_×,(°•ć⊥ʌ)V⊥>
sign 1000	fishcake	U5Oʌ_×ጸ ¦ +BO>5⁵O⊥_•∾
sign 1500	academic	∩B²<ʌ_□×,[B³]
sign 1739	discuss	ϴEᴵO⊥₁Eᴵ⊥_•ωT

William C. Stokoe Junior

The final design proposal is a much more rigorous intervention in the shape and construction of the various notation symbols. Instead of following the original Stokoe designs, the design process logically continued exploiting the existing character strokes of the alphabet version, using antecedents in type design as guiding principles. A

clear example of this approach appears in the characters that indicate the five fingers of the hand: In BSL Stokoe notation these derive from the *a, e, i, o,* and *u* of BSL fingerspelling. Figure 4 shows these characters in William C. Stokoe Junior for thumb, index finger, middle finger, ring finger, and little finger respectively.

The proposed construction derives from adding the ascender element of the lowercase *f* (of "finger") as ascenders to the lowercase characters; in type design, such a construction might count as an odd kind of ligature, such as the more common pairs in ordinary type (see figure 5, shown in Times New Roman).

It is clear that the reference used in determining the character shape is also different. Instead of aiming for iconic transparency, the designs reference the English descriptions of the notation symbols, based on the antecedents of handshape characters and finger locations in the original BSL Stokoe system. All of the constructions in William C. Stokoe Junior follow similar design logic, although some characters are less transparent in meaning. Nevertheless, transparency in meaning is not of great concern: After all, what is the visually iconic meaning of an *a*? Our alphabet, like most spoken language

FIGURE 4. The BSL Stokoe notation fingerspelling vowels as represented in William C. Junior.

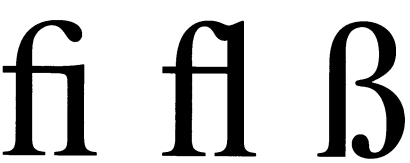

FIGURE 5. Common ligatures in Times New Roman.

words, consists of arbitrary assignations, but they are, crucially, systemic and follow language rules; this is equally the basis of the design proposal.

Hence, the characters in figure 6 stand respectively for "wiggle fingers," "away and toward," "alternate," "enter," "rub thumb across fingers," and "flex at the knuckles." Of course, not all characters in the system are ligatures; these are constructed only where necessary or visually helpful.

The advantages of such a design approach are clear: William C. Stokoe Junior is closely matched to the alphabetic versions since it shares their strokes and character constructions, so a typographic arrangement of English text and sign notation examples loses nothing of the page's clarity, regularity, and balance. This is instrumental in offering maximum typographic control to the author and book designer (the original version imposes only constraints). Since, as Westerners at least, we are familiar with alphabetic constructions and recognize characters effortlessly and at first glance, one might imagine that learning these new characters and their meanings requires no particularly greater effort than learning original Stokoe from scratch, whereas the reading process should be much better supported.

Most important, the two fonts, William C. Stokoe and William C. Stokoe Junior, are perfectly compatible sets of type: To move from one description to another, one simply selects the typed notations and changes the font. Both sets furthermore include the standard set of punctuation and brackets.

Finally, the advantage over the "limited ASCII BSL Stokoe" solution presented next is that the two sets require far fewer characters: The system retains the parsimony that is lost in ASCII notation. As

Figure 6. BSL Stokoe notation ligatures in William C. Junior.

one consultant commented about using limited ASCII in the course of email discussion on this topic,

> I was always told that [parsimony] was a non-negotiable goal for all kinds of communicative systems, and I'm . . . "not yet convinced" that this system either (a) stands up well relative to Stokoe in this respect or (b) does all it can even on its own terms to push that issue. (email message by a project consultant to the author, December 11, 2001)

Sign n°	English Reference	BSL Stokoe Sign Notation
sign 1	grip	nAp̂t_°td
sign 2	compulsory	nAp̌t_°^ldp̂
sign 202	holy communion	p̂r A^I p̌t_°ć́tr, °d,x ¦ n+Bp̂rxBp̂l_ua
sign 460	distance	nG^Ip̂t_(•ć́p̂rd)td
sign 609	fire a rifle	-G7p̂t ɛ́G7ltJ_iŋ)^ad
sign 758	carol	ɵʃval_x,(°•ć́tu)dtr
sign 1000	fishcake	o5p̌u_xß ¦ +Bp̌r55p̌t_•an
sign 1500	academic	oB2lu_ôx,[B3]
sign 1739	discuss	nE^Ip̌t1E^Ip̌t_•w̃a

Notating BSL Stokoe in Limited ASCII

Although not at all in answer to the preceding criticism, a number of recognized problems exist with using specific type and symbols for BSL Stokoe notation. A major concern for many IT users is the fact that the characters to be typed are hidden: They do not appear on the keyboard. Tables are required to show which keyboard character one needs to hit for any specific notation character. In most systems, these tables are elaborate. The fonts I have produced were all designed on an Apple Macintosh, a platform that uses a relatively clear keyboard layout. To some extent it is possible to assign the parameter sets of characters to keyboard "layers" on the Mac. For example, hitting single keys produces locations; shift + key, handshapes; alt + key, orientations; and shift + alt + key, movement characters. Although this works on the Mac, the much messier Windows keyboard organization wreaks havoc with that system. Quite sensibly, the Windows OS therefore includes an operating system crutch, an "insert symbol" command that bypasses the keyboard restrictions.

Under Windows the only way to arrive at some keystrokes, straightforwardly available on the Mac OS, is to type in a matching Unicode number in the "insert symbol" communication window.

As suggested earlier the alphabetic characters are also much more familiar to users than the very different and diverse character designs of the Stokoe system. Although a few iconic relations exist here and there between character designs and their meanings, those starting out in notation still have to learn most of these relations. Indeed, following an initial period of familiarization with the symbols' character shapes, the function of the design characteristics shifts from revealing character meaning to ease and speed of both reading and writing. Remember that the alphabetic character set is arbitrary in its referential functioning, but not in its design.

For reasons such as these, it seems attractive to match the Stokoe notation set of symbols to the set of alphabetic characters and, more specifically, to that of limited ASCII, so that the set is platform independent. Mandel realized the potential of this very early, in the late 1970s, and he succeeded in mapping the ASL Stokoe set of symbols to the limited ASCII alphabet. He wrote an excellent and detailed description of his proposals (1993).[7]

The great accomplishment of the proposal, and at the same time the problem with it from a design point of view, is that Mandel has logically mapped one symbol to one ASCII character. Although this one-to-one mapping appears to fit ASL Stokoe, BSL Stokoe requires far more characters, far exceeding the ninety-four available in limited ASCII. I imagine that this may similarly hold for other Stokoe notation variations. Therefore I worked out a slightly variant proposal on the basis of Mandel's original formulation. The appendix includes a detailed character-mapping table, although I refer interested readers to Mandel's original proposal for its greater sign linguistic and systemic detail than the current preoccupations allow for here. Mandel also resolved the issue of the stacks in his linear ASCII proposal in anticipation of problems it would produce in typesetting:

> *DASL* expresses no more than two simultaneous movements in a single stack; sometimes three simultaneous movements are written

> as a stack of two followed by the third one alone (e.g., the second and third variants of the sign glossed as 'be busy' at the top of p. 92, O'O/ex@ and O'O/ex=). This limit of two is apparently due to printing restrictions. ASCII Stokoe imposes no limit on the number of movements that can be written as simultaneous, though three may be the maximum occurring in ASL. (Mandel 1993)

The alternative ASCII solution presented here, deriving much from Mandel's original work, equally addresses that system limitation but conveniently restricts the use of the ASCII characters to those that are most common and legible, that is, A–Z, a–z, 1–9, and a few accented characters. This can easily be done by categorizing the symbols by their parameter and by matching a capital letter to this parameter as follows:

L	location
H	handshape
O	orientation
A	arrangement
M	movement
N	nonmanual features

BSL Stokoe currently does not include a set of descriptors for nonmanual features, but it serves as an indication of how this solution is extensible—the system could alternatively be extended to include discourse markers, *D,* for example, without changing the basic formulations. Next, the symbols of the parameter are each assigned a lowercase a–z character. For orientation, the lowercase *p* is followed by a character, then *f* (finger) is followed by another character.[8] A full sign description (let *x* stand for any particular notation symbol, an a–z character) globally reads as follows for a one-handed sign, for example:

Lx Hx Opxfx Ax Mxx Nx

The usual Stokoe configurations can be applied for two-handed and compound signs. Note that in order to save more characters, I have added characters for the three planes of circular movement (see the appendix). With examples taken from the *BSL/English Dictionary,* this approach produces the following results, for example:

Sign n°	English Reference	BSL Stokoe ASCII Sign Notation
sign 1	grip	Ln Ha Opufa Mbd:ab
sign 2	compulsory	Ln Ha Opdfa Mgo:b
sign 202	holy communion	+Hb Opufr Haa Opdfa Mo-h:a,bx:a / Ln +Hb Opufr Ab Hb Opufl Mae
sign 460	distance	Ln Hga Opufa Mad(n-v:ad)
sign 609	fire a rifle	Ln (-Hgg Opufa Hgg:e Oplfa Ac Mt) Mbe:b
sign 758	carol	Lhj Hv:i Optfl Madh(o-v:a):d
sign 1000	fishcake	Lhk H5 Opdfl Mxu / +Hb Opdfa Mx:d
sign 1500	academic	Lhe Hbb Oplfu Mxw[Hbc]
sign 1739	discuss	LnHea Opdfa Mrdgw[Hba]

Other major advantages of this proposal are the visual clarity of the sign configuration, the ability to perform IT-driven searches, for example, on a handshape by searching for "Hx" in a given set of sign descriptions (without needing a particular font), and being able to "see" the keystrokes. Additional advantages will present themselves with use. There will also be disadvantages, such as the earlier reference to parsimony makes clear, and the fact that the system contravenes one of the earlier suggested "rules": The meaning of a lowercase character is dependent on the capital letter that precedes it because the capital letter defines the parameter. In addition, many characters attempt to reference English symbol descriptions, but this fails entirely for characters under the movement parameter; a combination of two characters to represent one symbol (in emulation of the Stokoe Junior ligatures) is not allowable here because the use of two characters logically means two different but simultaneous movements.

However, my intention at this point is not in the slightest to persuade the reader of the merit of any particular alternative or to present the fait accompli of a closed system. After all, it is not up to any one type designer to alter a writing system—this would merely replicate in inverse the sign linguistic mistakes of the past. The point

is exactly that while further development of the system is necessary, further development must draw upon sound design principles as well as sound linguistic principles.

Conclusion

Close Encounter

> [It] seems to me that the explication of printed language needs the expertise of both typographers and linguists, in order to provide a complete description of its forms and structures and a satisfactory explanation of its functions and effects. I therefore very much welcome opportunities to engineer a close encounter between the two fields. (Crystal 1998, 7)

Crystal claims that linguistics is all about explaining how we communicate meanings to each other, using the "spoken or written medium" (ibid., 9). I am sure that the omission of the signed medium is less than accidental, even if it is unselfconsciously so, because it reflects the general tendencies of most mainstream linguistics in its singular focus on spoken languages.

If, as Crystal claims, "*pin* is different from *bin,* and *bin* from *bun,* and *bun* from *bus*" (ibid.), then his rather lengthy linguistic assessment of the differences later on in his presentation is a partial one. Even children who cannot yet read can give him a better answer based on simple facts. The italicized words are different because they are made up of different characters—the difference is first of all a visual one. Whether fricatives come into it at all depends on whether I'm looking at substrings of BSL ASCII notation or at English words. If the characters suit the language of the author, then so be it. If not, the author must ask the typographer to show different pictures. Typography is not reducible to a "contributing factor" of strictly linguistic concerns; typography makes language visible, and so it has concerns properly of its own. Therefore the idea of a typographical linguistics is not so much an opportunity for typographers to emulate the nomenclature or analytical toolkit of the so-called science of linguistics; it should also not be considered an opportunity for linguists to project their existing schemes of analysis onto a "new subarea" of mainstream linguistics. Whatever the concerns of a typographical linguistics may be, its project must be an example of another type of science

altogether; the design of sign language notation systems is a particularly acute example of the overlapping yet distinct concerns of type design and linguistics.

But a further conclusion can be drawn from this short project. Given the visual nature of their subject matter—sign languages—sign linguistic and deaf studies research demands a *different* overall attention, one based on a different visual ethics and one that would not, especially not unselfconsciously, play down the importance of any visual characteristic—such as the form of a notation system. This attention to visual ethics concerns the relations that hold between the senses and language, between language arbitrariness and motivation, between awareness and thought, between representation and meaning, and even a reconceptualization of what "deaf" is; there are of course one or two parallel concerns in Stokoe's later work (e.g., Stokoe 1992, 1994; Armstrong et al. 1995).

In other words, those working in sign linguistics and deaf studies need to recognize their subject's current antiocular outlook and how this affects subject concerns. Elsewhere I have suggested that the danger of a denigration of vision (blindness to the fact that vision itself is both *particular* and *social*) is the real drama of deafness, in the sense that attention to vision is located in an intellectual vacuum (Thoutenhoofd 2000). The history of BSL Stokoe notation design is a reminder that sign linguistics is not exempt from this observation. If ever better notation begins to occupy its tiny corner of that vacuum in the typography of sign linguistic texts, then the project reported on here is a success.[9]

Notes

1. A printed and folded sheet, so called because it is identified by a letter or letters—also known as a signature—at the foot of its first page (cf. Williamson 1983).

2. A monospaced font (such as most typewriter fonts) is type in which each letter occupies the same character width, most often derived from the capital *M*. In type design and typography this is an important relative size unit often referred to as the *m-square*. Because some characters are obviously much narrower (such as the *I*), the letter spacing of monospaced fonts is rarely optimal, making large texts uncomfortable to read.

3. The increasing acceptance of Unicode, the spread of new-generation font design software such as FontLab, and its new encoding mechanisms

(moving beyond eight-bit encoding) will mean some of these objections will become outdated in due course.

4. This is also because in HamNoSys orientation is indicated by a character rotated according to orientation; the same character shape can therefore have a range of slightly differing appearances.

5. Cf. Man (2000).

6. Many early Greek texts are written boustrophedon—"as the ox ploughs the field": written left to right, the next line right to left, and so on. Characters could equally be written upside down (Man 2000, 223–24).

7. I am much indebted to Susanne Bentele for pointing me to Mandel's article. It is a great pity that the article was never published: Mandel wrote to me that "I have never taken the time and effort that I feel would be necessary to make it rigorous enough" (email message to the author, November 29, 2001).

8. I am personally convinced that both *p* and *f* can be dispensed with, so the orientation description would read: *O* (the palm is facing) *x* (if the fingers were opened, they would face) *x*.

9. All of the fonts discussed in this article are protected by copyright laws; distribution of these fonts without the explicit consent of the font designer is therefore unlawful unless prior agreements exist. Those interested in the new William C. Stokoe notation type should therefore contact the author.

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Appendix

Key to the BSL Notation Symbols: Three Proposals

The following table matches a BSL Stokoe notation symbol, as used in the *BSL/English Dictionary,* to characters in each of three new design proposals separately. For a description of how to use the original BSL Stokoe, see the *BSL/English Dictionary.* For more information on linear Stokoe, see the linguistic descriptions in Mandel (1993).

column 1 = William C. Stokoe Junior
column 2 = William C. Stokoe Senior
column 3 = BSL ASCII Stokoe

locations	1	2	3	
neutral	n	ɵ	L+	n
whole head	o	o		hw
above head	ō	ʊ̄		ha
upper head	ʊ	∩		hu
lower head	ɑ	∪		hl
below head	o̲	ʊ̲		hb
throat/neck	ɋ	⋎		th
mouth/lips	ɵ	ʊ		hm
cheek	c	⊂		hc
ear	ϵ	ϵ		he
nose	∆	∆		hn
eye	e	⊶		hy
trunk	r	□		t
upper trunk	r̄	⊓		tu
lower trunk	r̲	⊔		tl
shoulders	s	⊓		s
on top of	s̄	⊓̄		st
upper arm	ā	⊢		au
elbow	a	⊢		e
lower arm	a̲	⊾		al
inside wrist	w̄	ʊ		wi
back of wrist	w̲	ɑ		wb
hip	h̲	⊬		i
upper leg	l̄	⊓		lu
knee	ł	⊬		k
lower leg	l̲	⊔		ll
to left/right of	*	*		:l :r

Handshapes and fingers				
A	A	A	H+	a
B	B	B		b
C	C	C		c
D	D	D		d
E	E	E		e
F	F	F		f
G	G	G		g
H	H	H		h
I	I	I		i
J	J	J		j
K	K	K		k
L	L	L		l
M	M	M		m
N	N	N		n
O	O	O		o
P	P	P		p
Q	Q	Q		q
R	R	R		r
S	S	S		s
T	T	T		t
headless cat	ʊ	ʊ		u
V	V	V		v
W	W	W		w
upside-down Y	ʎ	ʎ		x
Y	Y	Y		y
square Y	Y	Y		z
-	O	O		0
-	I	I		1
-	2	2		2
-	3	3		3
4	4	4		4
5	5	5		5
-	6	6		6
7	7	7		7
-	8	8		8
-	9	9		9
thumb	ɐ	A		:a
index finger	ɛ	E		:e
middle finger	ɾ	I		:i
ring finger	ɔ	O		:o
little finger	ʊ	ʊ		:u
between t/i finger	æ	ɪ		:ae

between i/m finger	ɕı	²		:ei
between m/r finger	ʊ	³		:io
between r/l finger	ɑı	⁴		:ou
handshape variants (former diacritics)				
1	A^1	A^1	H...+	1
2	B^2	B^2		2
3	C^3	C^3		3
4	D^4	D^4		4
5	E^5	E^5		5
6	F^6	F^6		6
7	G^7	G^7		7
8	H^8	H^8		8
9	I^9	I^9		9
Hand arrangement				
contact	x	×	A+	c
side by side	ı	ı		s
nearer body	ȷ	ʔ		n
inside other	ṅ	⊙		o
interlinking	$	∞		i
crossing	ŧ	∓		x
(hand) below	-A	-A		-
(hand) above	+B	+B		+
Orientations, movements, and articulation				
up	u	∧	M+	a
down	d	∨		b
up and down	ɯ	N		c
away	a	⊥		d
toward	t	T		e
away and toward	ǽ	I		f
left	l	<		g
right	r	>		h
left and right	ɬ	z		i
away from each other	ŝ	÷		è
toward each other	š	ɔc		é
join together	$	∞		j
enter	ɲt	⊙		k
cross	ŧ	∓		l
change place	ɸ	ʊ		m
circular, clockwise	ć	ɕ		n
circular, counterclockwise	č	è		ñ

touch	x	×	x
twist at wrist	w̃	ω	o
palm up	p̂	ɑ	p
palm down	p̌	ɔ	q
bend at wrist	ŋ	ɲ	r
bend at knuckles	ɱ	m	s
flex at knuckles	ṅŋ	ṁ	t
wiggle fingers	ſs	ʁ	u
rub thumb and fingers	ft	m̥	v
open	ô	□	w
close	ǒ	⌗	z
short/small	°	°	:a
sharp/firm	▵	▵	:b
alternate	a͡n	≈	:c
repeat	•	•	:d
no movement	ø	⌀	:e

Planes

horizontal plane	-h
vertical plane	-v
parallel plane	-p