Original Johnston. Johnston Sans and the Roundel design seen here in prominent evidence on Charles Holden's Chiswick Park station of 1932

[*Photograph: Gerald Fleuss*

NEW JOHNSTON

EIICHI KONO

FIRST MEETING WITH JOHNSTON

Every year, half a million Japanese tourists visit London as it is evidently their favourite city in Europe. Almost thirty years ago, I was among them visiting London for the first time. I still recall that the 'Roundel' symbol for red buses and tube trains was a great help for getting round; the direct and simple design was easy to remember, and easy to recognise in the busy streets of London. The symbol was accompanied with a simple, elegant, slightly old-fashioned alphabet. At first, I thought it was Gill Sans; it wasn't Futura, and definitely not my then favourite, Helvetica. In the 1970s and 80s, Helvetica was rampant in Japan as in Europe and the USA. I was already interested in the roman alphabet typefaces, which was a good reason for deciding to study typography in London as a solution to my mid-career crisis.

I started a graphic design course at the London College of Printing in September 1974, and then came to know who originally designed the Underground map, and who did the alphabet. In 1916, Edward Johnston completed an alphabet design for the London Underground. This elegant display type became known as the first humanistic sans serif, in direct contrast to the ubiquitous, over-weight, heavy-handed, tortured-looking Victorian grotesque sans. With 'Johnston Sans' and the Roundel symbol, London Transport's corporate identity had achieved world fame by the 1930s.

Edward Johnston's well-known total commitment to legibility ensured that his finished design was easy to read as well as innovative. Johnston also attached great importance to the shape and proportion of his letters; his capital letters are recognisably inspired by the Roman inscriptions. Johnston's calligraphic influence may be seen in many lower case letters such as the hooked 'l' and the diamond shape dots on the 'i' and 'j'. Johnston Sans is privately owned by London Transport and is therefore not available for use by any other body. Nevertheless it has had a great impact on other typeface designers all over the world since its origination.

London: the first underground railway opened in 1863, and Tokyo in 1941

Edward Johnston, master calligrapher; centenary exhibition at RCA Galleries in 1972

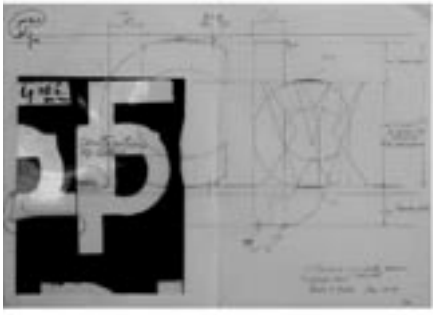
TIMES THEY ARE A-CHANGING

By the 1970s, the old letterpress and metal type era was almost gone, and the new photo-composition technology and modern publicity design created an increasing flow of new type styles, sizes and weights. The original Johnston Sans had only two weights, Ordinary (Regular or Medium equivalent) and Heavy (Bold equivalent). These were only available in metal or wood types which were

Original Johnston Sans, Ordinary and Heavy weights

Initial pencil sketches for New Johnston Medium, July 1979

Bold?, July 1979



Preparing artwork, December 1979

already forgotten heroes, uncared for and tired looking. As well-trained letterpress compositors/printers were becoming scarcer, Johnston Sans was unfairly made to look worse by badly executed letter-spacing; too wide and uneven. It was hard for London Transport's Publicity Department to produce striking and effective information posters and notices whilst maintaining their policy of using Johnston Sans to reinforce the London Transport identity. The outside agencies commissioned by London Transport to design marketing and advertising posters recommended and used alternative typefaces, such as Univers Bold or News Gothic Bold Condensed, readily available in different styles and weights. Unfortunately this damaged the integrity of the Johnston house style.

Something had to be done. London Transport consulted specialists like Berthold Wolpe, Walter Tracy, the Design Research Unit and Banks and Miles. The answer was clear and obvious; the Johnston Typeface family needed to be fitter and stronger, taking full advantage of the latest photo composition systems, more easily available in film and later in digital forms too. It needed more weights (light, medium and bold), more styles (upright, italic and condensed), more versatility in small text sizes as well as display sizes. Making new fonts for photo-typesetting systems was still costly and time consuming, though not as bad as making metal types. Even so, no major work had been undertaken by 1979.

DAUNTING TASK

Monday 2nd July 1979, straight after five years of student life in the UK, was my first day at Banks and Miles, a London based graphic design company. That morning was a bit of a shock. I was given a few large broadsheets with litho printed Johnston type. I was definitely confounded by being asked straightaway to design a new Johnston family with three weights – Light, Medium and Bold – within a month or two. It felt like my first arrival at London Heathrow Airport, worrying about which way to go. Colin Banks, an external assessor for the LCP, had asked me if I would be interested in redesigning a typeface. I was grateful for the job because it would enable me to stay in the UK a bit longer, but the prospect was daunting because I had no experience in type design and very little English language. There had been no serious typeface design project in my design school days, and I expected that in the office there would be at least a kind of preliminary training or guidance for a novice designer – what drawing tools to be used, what size the original artwork should be, how to typeset with newly drawn letters. I remembered one college day in 1975 when our tutor took us to the drawing office of the Monotype Corporation in Salfords. They had impressive purpose-built drawing equipment, precision machines and many skilled draughtsmen and women. In contrast, my tools were very basic: pencils, felt tip pens, a Rotring pen with 0.1 mm nib, Winsor & Newton's fine brushes and some photographic equipment in the darkroom.

GETTING INTO TROUBLE

The broadsheets had a rather authoritative title:'Johnston Sans Serif Type – London Transport Executive', showing Johnston Sans in two weights, Ordinary (upper & lowercases) and Heavy (uppercase only), printed in display type size

called 'line'; 6 line delineating one inch cap-height, 12 line for two inches, 15 line for two and half inches, etc. I found that the 12 line size was most manageable for drawing a letter by hand, not too big, not too small, and that a landscape A3 size sheet could accommodate all A to Z in four rows; or all a to z; or all 0 to 9 plus some essential characters, such as &, £, (), !, ?, etc. In each row I drew a set of thin pencil lines to indicate 48mm cap-height, 32mm x-height, baseline and 16mm descender-depth.

Since lowercase Heavy did not exist, I was the creator, as far as I knew! First, drawing outlines with a pencil by fattening up the lowercase Ordinary, next going over the pencil lines with a rotring pen, and filling in with a black felt tip pen. Then photographing the A3 a to z sheet, making many duplicates in half or quarter the size, cutting individual letters with a 10A scalpel, pasting them up, using a pair of tweezers and 3M Spray Mount, onto a blank sheet to make lines of text. Then photographing the text, retouching it, photographing it again, and retouching it again. By the time I was getting a clean looking sample setting, the images often became fuzzy and inaccurate. The whole thing was extremely tiring and boring, but I thought it would pay the rent, as long as I could stand it!

Hand drawn on A3 sheet

Enlarged 200% by PMT

Working details with a fine Rotring pen, a fine magic marker and a scalpel…

…and sticky tape

GETTING OUT OF TROUBLE

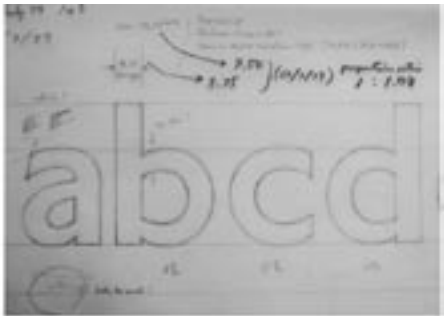
In order to save time and limit exhaustion, I asked my old friends to send me some optical tools from Japan (I used to work for an optical company in Tokyo before I came to Britain); one was a small concave lens to see drawings and specimens in much reduced image sizes, and one was a small microscope (x20 magnification with 1/100mm scale) to see small printed type specimens and text in much enlarged image sizes. Another good tool was a PMT (photo-mechanical transfer) camera which was introduced around that time by Agfa and Kodak. They were relatively cheap, easy to operate, capable of reproducing extremely accurate bromide or film copies, and quickly became the essential tool for every design practice in this country, the USA and Japan in the 1970s and 80s. It was the era before the advent of the Mac and the PC.

I had first used the camera at the University of Texas Press for designing book covers and jackets, and later for a type legibility research project with David Kindersley's letter-spacing theory at the Royal College of Art. So I insisted on getting one when the first New Johnston Medium prototype was successfully presented at the end of July. Equipped with cartridge A3 pads, tracing pads, draw film pads, a concave lens, a soft microscope, and a PMT camera, I proceeded to make the initial upright in three weights, Medium, Light and Bold, and two other styles, Medium and Bold Condensed, by the end of September 1979. Each font for the presentation consisted of about one hundred characters, slightly less than the ASCII character set.

Guidelines for the preparation of artwork were provided by Alphatype Corporation, a US manufacturer of the up-and-coming digital photo-typesetters. Ascender/Descender Height (overall character height) was required to be confined within just over 6 inches (say, 156 mm). Since my original drawings on A3 sheets happened to have the ascender/descender height as 70 mm or so, all that was needed was simply to enlarge every A3 sheet by 200%; that is, equal to A1 or a set of four A3 sheets bearing 140mm ascender/descender height.

Cleaning up ragged edges of enlarged letters and many speckles was a night-

Original two weights



Taking notes before applying ink

mare. I was introduced to Robert Norton, the most innovative expert in font making for any new typesetting systems, as well as being a lover of good food, wines and spirits. He taught me how to make clean artwork and extra letters very efficiently: cutting a film letter in pieces, sticking them together by Scotch tape onto a blank film sheet, making a new contact, and retouching it by a thin black Magic marker, with a nice drink as extra. I was continuously making more textsetting samples for posters, notices, panels, and even small timetables by Norton's cut-and-paste and the darkroom techniques, moving onto design of the Italic and Condensed, completing all the eight different fonts towards the end of 1980.

HOW MANY WEIGHTS?

Back to the early designing stage in the summer of 1979. I was making lowercase letters for Heavy first. A big question was in my mind. Does the family of New Johnston (or revised Johnston as first called) need three weights; Light, Medium and Bold? Would the existing two weights, Ordinary and Heavy be sufficient, or not?

Looking at some type specimen catalogues, I assured myself that a minimum of three weights are common and necessary for a sans serif family, whereas two weights are adequate for a serif family. In this case, should I make a new Light, regarding the existing Ordinary and Heavy as Medium and Bold; or should I make a new Bold, regarding the existing two as Light and Medium? I made sketches of lighter than the Ordinary and sketches of heavier than the Heavy, only to confirm my belief that the uppercases of original Ordinary and Heavy were so well proportioned. How could one ever touch them? But, would they work in textsetting with upper and lowercase together?

I examined details of other typefaces by using the microscope; height ratio of upper and lowercase letters, weight ratio of vertical and horizontal strokes, wedges (crotches), etc. I decided to use Helvetica and Gill Sans as benchmarks because they were at that time the most popular and successful sans serif typefaces in both text and display composition. Compared with these two, Johnston Ordinary was lighter in weight, had a smaller x-height and had wider default letter-space. I began to see why Johnston Ordinary did not work well in small text sizes compared with Helvetica Regular (and Medium) and Gill Sans Medium. I could see that Johnston Ordinary would need more weight, larger x-height, and tighter spacing, otherwise it would look meek and feeble in text setting and display setting in upper and lowercase.

I made sketches of lowercase letters in various degrees of weight and x-height which were between those of the original Johnston Ordinary and Heavy. As these elements were adjusted or distorted to a certain degree, Johnston would still look like him or become someone else. At last, I felt that I had a reason to make Johnston Medium. The next question was: how much weight could be tolerated?

HEIGHT-TO-WEIGHT RATIO

Edward Johnston adhered to a rule that the height-to-weight ratio of cap height to stem thickness should be 7 to 1. I measured text sizes of Helvetica Regular, Univers Medium, Gill Sans Medium and Johnston Ordinary: they all had 7 to 1

ratio, and Helvetica Medium had 5 to 1. It was obvious that Helvetica Medium as opposed to Helvetica Regular had stronger visual impact in large display sizes and was more durable (legible) in very small text sizes. The height ratio of upper and lowercase was another decisive factor for visual impact and legibility.

To begin with, I thought that New Johnston Medium could have the height-to-weight ratio of 5 to 1, and New Johnston Light the ratio 7 to 1. The problem was that Johnston Heavy had the ratio 4.5 to 1 which was too close to the ratio 5 to 1, resulting in almost no weight difference between Medium and Bold. Ratio 6 to 1 looked too close to 7 to 1. Finally New Johnston Medium looked OK with the ratio 5.5 to 1, helped by the larger x-height giving a slightly lighter impression than with smaller x-height because of the larger counters. I increased the original x-height 7.5% on average. Too much increase of x-height (say, more than 7.5%) would make any typeface look like the ITC fonts in the good old days.

Comparison of height-to-weight ratio (cap-height : stem-thickness = x : 1)

Helvetica	**Univers**	**Gill Sans**	**Original J'ston**	**New J'ston**
Bold 3.5	ExtBold 3.5	ExtBold 3	.....	Bold 4.5
Medium 5	Bold 4.5	Bold 4	Heavy 4.5	Medium5.5
Regular 7	Medium 7	Medium 7	Ordinary 7	Light 7
Light 11.5	Light 11.5	Light 11.5	.....	.....

Comparison of x-height/CAP-height of 50mm:

36.5/50	35/50	32.5/50	32.5/50	35/50

to see the difference in x-height

Examining Walter Tracy's masterly experiment on some characters

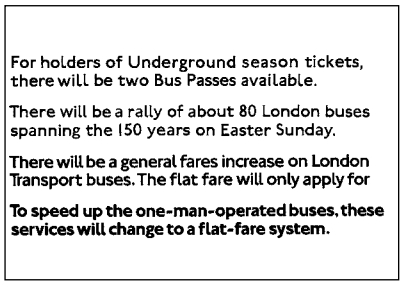
Only a Japanese designer can do this!

PLASTIC SURGERY

The original Johnston Sans was designed for display setting, so inevitably its letter spacing would be too wide for text setting. The strong vertical axis and circular curve (as against oval) made the original Johnston difficult to set tight. To make it more suitable for narrower/tighter spacing for setting text in smaller sizes, some lower case letters had to be modified. In fact, some lower case letters of the original Johnston Ordinary had already been replaced with ones redrawn by Walter Tracy in the mid 1970s: for example, 'a' was given a wider counter and wider width; the bottom of 'g' was made lighter; the tail of 'l' was shortened; the top of 'y' was narrowed to blend better with other letters.

These modifications provided a valuable guide: I did not feel uncomfortable about making stroke endings (terminals) shorter, such as those of 'l' and 'r'; narrowing the characteristically wide counters of 'h, m, n, u, w and y', but not too much so as not to make them look like Helvetica or Univers. The lower case 'o' could not be made narrower (or upright elliptical shapes) because its visually perfect circle was one of Johnston's key characteristics. Because of this roundedness, the lower case letters, b, d, p, q were bound to have awkward joins where bowls and strokes met. It was very difficult to make the join thinner without losing Johnston's circular and mono-line characteristics.

JUSTIFIED



From top: Ordinary, Walter Tracy's version of Ordinary, New Johnston Medium and New Johnston Bold

Comparison, from top: Ordinary and New Light; Ordinary and New medium; Heavy, Granby and New Johnston Bold

New Johnston in three weights, eight fonts in all

Tube maps. From left: 1979, mid- and late-1980s

New Johnston Medium proved to be extremely legible in small sizes. Tim Demuth of the London Transport Publicity Office was thrilled that even 4 pt worked so well for timetables (useful for small print of disclaimers, or maybe not?!), and looked strong and confident in display sizes.

I spent up to six months or so on all the required eight different fonts: New Johnston Light, Medium, Bold, Light Italic, Medium Italic, Bold Italic, Medium Condensed and Bold Condensed. Much finer adjustments were necessary for the preparation of artwork ready to be digitised for photo-composition, which took me a further twelve months to complete at the end of 1980. If the project had happened in the 1990s, I would have used the Mac or PC with Fontographer or FontLab to finish it within six months easily… perhaps.

UNJUSTIFIED

Japanese tourists still come to London. I feel very glad to have had the opportunity to contribute to the continuing life of New Johnston alongside the original Johnston (still lots of old enamel signs, etc) for London Transport. I think that the difference between the old and new is subtle enough. I was pretty certain that no Japanese tourists would see any difference. However, my friend, Naoaki Sakamoto (aka. Paper Nao), a Japanese artist with a keen eye, saw the difference straightaway. He preferred the old one because it had more flavour, so he said. I defended myself by saying that the old one was the original masterpiece whereas the new one provided up-to-date functionality. We saw a dictionary definition cut in slate at the Kindersley Workshop in Cambridge saying, 'manufacture, man-û-fakt'yar, v.t. to make, originally by hand, now usu. by machinery: to produce unintelligently in quantity'. This made him more convinced that the original was better than the new. I understand that, but it was rather annoying!

To appreciate such a subtle difference, 'taste' may be a useful word, as Matthew Carter gave his answer to my question some time ago. Having lived in England for long enough, I think I know the taste of lukewarm beer at a drizzling football pitch. I also enjoy seeing a can with 'real draught bitter' printed on it.

WHICH WAY TO GO NOW?

Finally, I would like to come back to my big question once again. How many weights does the New Johnston family really need? I think that New Johnston needs Extra Light and Extra Bold. I am sure that the total of five weights would make New Johnston much more functional… provided they were manufactured by the right hands!

EIICHI KONO

Eiichi Kono began his working life in the photo optical industry in Japan, and became fascinated by the universality of the Latin alphabet. This brought him, in 1974, to study at the London College of Printing and on to the Royal College of Art for Information Graphics, linked with the Readability Print Research Unit. His first paid job was a White Paper diagram for the London Clearing Banks! Then the redesign of Johnston Underground for text setting as well as display use, and the BT telephone directory space saving and legibility feasibility study. He has taught typography at Middlesex, and been engaged in much graphic design work, corporate identity, publishing design (Pearson, *The Economist*). He is currently directing a team developing optimal legibility for Japanese onscreen fonts, for Microsoft.