

"Introducing undergraduates to the detection and interpretation of press variants in the First Folio" by Gabriel Egan

In the Centre for Textual Studies (CTS) at De Montfort University in Leicester, England we teach a final-year undergraduate course called "ENGL3096 Text Technologies". (By "we" I mean myself as Director of the CTS and the medievalist and fellow CTS member Dr Takako Kato.) This is a year-long course in which students learn about the technologies of writing from the earliest classical stone inscriptions, through the medieval processes of scribing ink onto vellum and parchment, the invention of movable type and letter-press printing in the fifteenth century, and on to digital encoding and publication in the twenty-first century. We study these technologies because they are the ones by which literary and historical texts have come down to us since the invention of writing, and these technologies shaped what got written, how it got disseminated, and how it is read. This year, as part of the course, I led a students' field trip to Meisei University in Tokyo to look at their collection of Shakespeare First Folios.

Much of the module is concerned with the two great transformations in writing technology: the printing press of the late-15th century and the Internet of the late-20th century. Printed books made in the 15th-18th centuries have peculiar features that readers familiar with later books do not expect to find. The most curious of these is that different copies from the same edition, printed as part of the same print-run using the same setting of type, are not quite identical with one another. The reason for this is what we call stop-press correction. During a print-run the accuracy of the text being printed would be checked, and if any errors were found the press would be stopped and corrections made to the type. Perhaps surprisingly, because paper was expensive the uncorrected sheets containing the discovered errors were not thrown away but rather were bound into copies alongside other good sheets, so that in principle each printed copy could comprise a random mix of corrected and uncorrected sheets.

The opportunities to see the effects of this process are rare because few libraries have multiple copies of a single edition of an early printed book. In this regard, the collection of 12 copies of the Shakespeare First Folio at Meisei University in Japan presents a unique opportunity for students on this course to see how stop-press correction affects the works of the most famous writer of all time. We simply do not have a single text of any of Shakespeare's plays, because even once we have agreed that a particular early edition--typically the first quarto, the second quarto, or the Folio--is the most authoritative, we find that stop-press correction introduces further subtle variations within that edition.

During Weeks 9 to 18 of the course the students learnt to set movable type and print with it using the CTS's 19th-century Albion iron printing press. Working in groups, the students typeset the first four of Shakespeare's Sonnets, imposed the pages (to make a four-page booklet), and printed them. Not surprisingly, the students made mistakes in their compositing. Aside from infelicities of inking and unevenness of pressure on the paper--requiring make-ready adjustments to the tympan--students typically make wrong-sort errors and omit or place out of sequence the various letters and pieces of punctuation. Fixing these errors entailed stop-press correction and because we retained the impressions of the type made before and after the correction the students had their own, hand-made evidence of the corrections they undertook.

Before turning to the First Folio, the course requires students to think about the way that stop-press correction affects an entire book by considering its effects on the heaps of sheets of paper in the printshop. This was approached by giving each student a pile of 10 sheets of paper representing a white-paper heap to be machined. Taking each sheet in turn, the student wrote on one side a version of her first name with a misspelling in it and then added this sheet, written-side up, to her growing heap of such sheets. At a randomly chosen point in the 'run'--say, after three sheets--the student ceased to make this spelling error in her first name (a cessation akin to stop-press correction) and she continued placing the newly written sheets on top of the existing heap. This made a heap of 10 sheets that may be represented thus:

Side-A-corrected
Side-A-corrected
Side-A-corrected
Side-A-corrected
Side-A-corrected
Side-A-corrected
Side-A-uncorrected
Side-A-uncorrected
Side-A-uncorrected

This heap was then inverted in one movement so that the sheets showing the corrected state of the first side were now (written-side down) at the bottom of the heap and the sheets containing the uncorrected state were at the top. The student performed the reiteration by writing her last name on each sheet in turn, first with a spelling mistake and then at a randomly chosen moment--say, after five sheets--with this mistake corrected. Again, as she perfected them, she placed the sheets into a new heap, in which the two sides of the sheets may be represented thus:

Side-A-corrected meets Side-B-corrected
Side-A-corrected meets Side-B-corrected
Side-A-corrected meets Side-B-corrected
Side-A-corrected meets Side-B-corrected
Side-A-corrected meets Side-B-uncorrected
Side-A-corrected meets Side-B-uncorrected
Side-A-uncorrected meets Side-B-uncorrected
Side-A-uncorrected meets Side-B-uncorrected
Side-A-uncorrected meets Side-B-uncorrected

The point of using misspelled first names and last names is that students were asked to identify the corrected and uncorrected states in one another's sheets. Although undergraduates typically know one another's names they do not always know how these names are spelt, especially last names which are more varied than first names. This uncertainty allows the exercise to replicate one of the problems of working with Shakespeare's language: it is not always immediately clear where to draw the line between acceptable spelling variations and error in the setting of type.

There are two sides to each sheet and two possible states for each side. The students were asked to predict how many states of the entire sheet would be found across their heap, and almost universally they predicted four states: uncorrected-uncorrected, uncorrected-corrected, corrected-uncorrected, and corrected-corrected. (In binary: 00, 01, 10, and 11.) This is incorrect as the heap will show only a maximum of three states for the sheet, as seen in the above representation and as the students discovered when they were asked to decompose their heap into smaller heaps each combining all the sheets in the same state. (If the student chose to make the stop-press correction at the same point during the white-paper run as during the perfecting run, there would be only two states: uncorrected-uncorrected and corrected-corrected).

Asked to explain in words why the fourth state that seems possible never occurred, students were unable to do so until it was pointed out that the states are the consequences of transitions from corrected to uncorrected type and that a transition from a corrected to an uncorrected form never occurs. In binary, this is the same as saying that no bit can go from one to zero, so the two rounds of correction produce transitions that follow either the left- or right-hand downwards path in this diagram:

00
/ \

10	01
/	\
11	11

Following either path, only three states emerge. We pursued this topic a little further to calculate the maximum number of states that could emerge in a three-sheet booklet for which there was one round of stop-press correction on each side of each sheet. (Answer: 27, being the 3 states for each sheets raised to the power of 3 as the number of sheets in the booklet.) The above calculations assume that the integrity of the heap of sheets was maintained when it was turned, as indeed Joseph A. Dane's meta-study has shown that it normally was, at least for the quartos for which press variants have been investigated (Dane 1996).

With the students thus prepared for the topic of stop-press correction by making mistakes of their own in compositing and by reconstructing the management of heaps of paper in the printshop, we turned to the evidence of stop-press correction in the Shakespeare First Folio. The list of press variants of each copy that is given in Eric Rasmussen and Anthony James West's recent census of the Folios is the obvious starting point (Rasmussen & West 2011). Digital images of sections of the same page from the Meisei copy #1 (shelfmark MR774) and the Brandeis University copy of the Folio were loaded into the free open-source graphics manipulation package GIMP and made semi-transparent. This allowed us to superimpose an image of one copy's impression of that page (or a section of a page) onto the image of the other copy's impression of the same page, thus replicating digitally the process that Randall McLeod developed using photocopied transparencies in the late 1970s (McLeod 1979). While the images are semi-transparent and residing in different 'layers' in GIMP, it is possible to scale, rotate, and stretch (independently in the *x* and *y* dimensions) one of them to make its contents line up perfectly with the contents of the other in a process called registration. Once this is done, the images should reinforce one another and appear solid at all places where the type is identical in the two images and should appear fuzzy where the type was altered.

When one is sure that the two images are perfectly aligned, one can switch from the McLeodian method of superimposed transparencies to a replication of Charlton Hinman's method--based on the astronomers' blink comparator-- in which first one image and then the other is presented to the operator (Hinman 1947; Smith 2000) and the differences between them are revealed as pieces of type appearing to shift before the viewer's eyes. In GIMP, this is achieved by making the images in the two 'layers' non-transparent and then switching off and on (several times) the visibility of the top layer so that the one beneath is briefly revealed and then again obscured by the one on top. We practised this exercise several times using sections of pages from the Folio where there are known to be press variants, but without the students being told in advance just where they are located on the page. Their job was to find the already-known variants, and then to try to answer the following questions for each one:

Is the difference an intentional change to the type, or just an accident (such as type shifting in the press)?

If the difference is an intentional change, which is the 'before' and which the 'after' state of the type?

If the difference is an intentional change, what was the point of making it? (For example, was it to correct a compositing error?)

If the difference is a correction of error, would the printer have to consult the copy in order to make it?

Having performed this digital process of examining the variants before leaving the UK, the point of examining the paper originals was to see what kinds of analysis can be performed only by having sight of the actual paper copies. This was the point of the trip to Meisei University in Tokyo.

The first of our three classes in the Rare Books Room at Meisei was devoted to orienting the students to the Shakespeare Folio so that they could make sense of it as an object. To achieve this we started by leafing through a Folio, opening by opening, with each student in the group assigned to one of the following tasks as we proceeded: i) checking whether the Folio's "Catalogue" is a correct statement of its contents, ii) compiling the data for a collational formula by recording each gathering's identifier and how many leaves it contains, iii) recording obvious space-wasting activities such as printing large ornaments and leaving blank pages as well as the presence or absence of prologues, epilogues, and dramatis personae lists, iv) recording irregularities in page numbering and running headers, and v) recording the presence or absence of act and scene divisions. These features are not all bibliographical, but capturing them helped the students get a sense of how the contents vary across the volume and reinforced their habits of looking closely and systematically at particular objective features.

Leaving aside the preliminaries as too tricky for beginners, our attempt to record the gatherings we found as we came across them produced the following raw data:

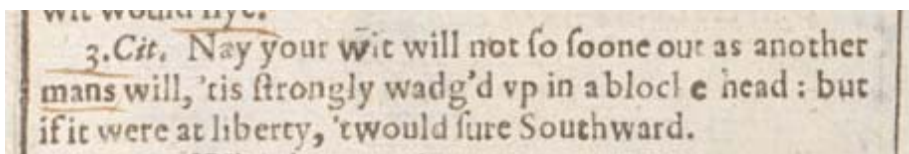
A⁶ B⁶ C⁶ D⁶ E⁶ F⁶ G⁶ H⁶ I⁶ K⁶ L⁶ M⁶ N⁶ O⁶ P⁶ R⁶ S⁶ T⁶ V⁶ X⁶ Y⁶ Z⁶ Aa⁶ Bb⁶ Cc² a⁶ b⁶ c⁶
d⁶ e⁶ f⁶ g⁶ λgg⁸ h⁶ i⁶ k⁶ l⁶ m⁶ n⁶ o⁶ p⁶ q⁶ r⁶ s⁶ t⁶ v⁶ x⁴ ¶¶¶¶¶¶¶¶¶¶¶¶¶¶¶¶ aa⁶ bb⁶ cc⁶ dd⁶ ee⁶ ff⁶ gg²
Gg⁶ hh⁶ kk⁶ ll⁶ mm⁶ nn⁶ oo⁶ pp⁶ qq⁶ rr⁶ ss⁶ tt⁶ vv⁶ x⁶ yy⁶ zz⁶ aaa⁶ bbb⁶

In a follow-up session this was then regularized by removing redundancy to produce the familiar Folio formula:

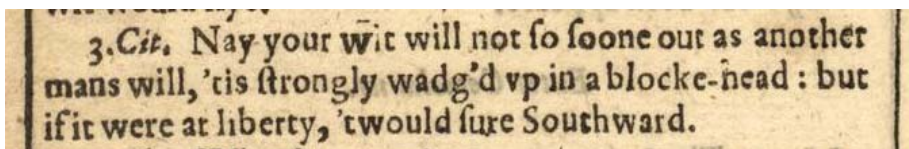
A-Bb⁶ Cc² a-g⁶ λgg⁸ h-v⁶ x⁴ ¶-¶¶¶¶¶¶¶¶¶¶¶¶¶¶¶¶ aa⁶-ff⁶ gg² Gg⁶ hh⁶ kk-⁶bbb⁶

Having first encountered this last formula as a theoretical entity in discussions of the First Folio, the students were delighted to find that they could derive the same thing simply by recording the gatherings as they found them in the book. And so to the stop-press corrections.

Because we had explored some of the well-known stop-press corrections using digital imagery, we took the opportunity to see the originals as a chance to find out what could not readily be seen on the computer screen. We chose to focus on particular cases where analysis of the digital files had proved inconclusive. Take the variant in *Coriolanus* at aa6v:a38 "'tis strongly wadged vp in a blocke head" (uncorrected) and ". . . blocke-head" (corrected), which looks like this:



(Meisei #1, uncorrected state)

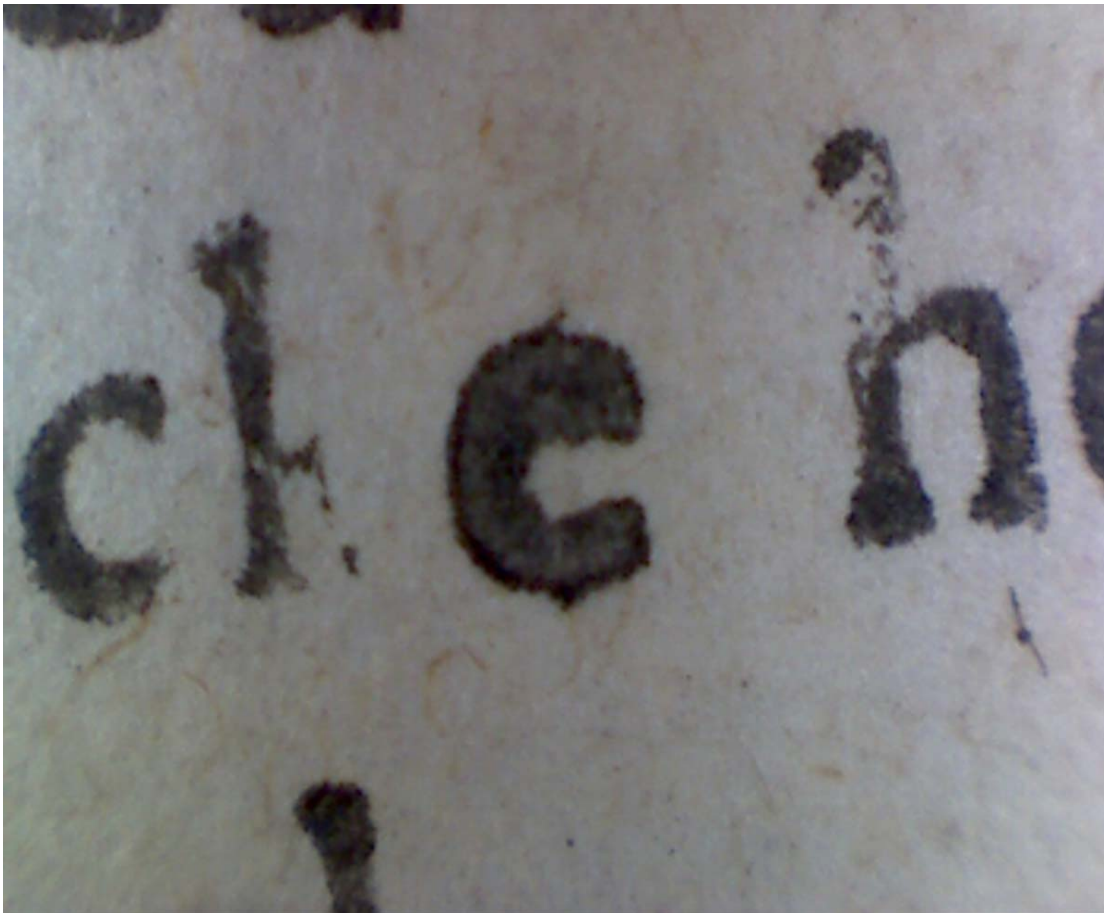


(Brandeis University, corrected state)

Although consultation of Rasmussen & West told the students which was the uncorrected and which the corrected state, they set this knowledge aside to see if they could ascertain for themselves just why this is the orthodoxy. The students first determined--using a mocked-up folio-in-sixes gathering--that the forme-mate of page aa6v is page aa1r and they used Rasmussen & West to find that there are no known variants on page aa1r and no other known variants on page aa6v either. Thus this is a case that would have to be decided in isolation and on its own merits rather than by bringing in other corrections made at the same time on the same forme to help decide the 'before' and 'after' state.

On their own, the readings "blocke head" and "blocke-head" seem poetically and linguistically indifferent: the hyphen was not an essential piece of punctuation between these words in early modern English. Why, then, had a hyphen either been removed or inserted to make this variant? Supposing for a moment that the Brandeis reading is the earlier, the students rightly determined that there was no sense in stopping the press to remove an inoffensive hyphen. The students noticed that in Meisei #1 the "e" in "blocke head" is darker than the surrounding letters and wondered at first if it had simply been over-inked. Then they observed that in Meisei #1 the "k" before the "e" is so light that little more than its stem can be seen. Could these facts be related? The students decided that it would be implausible to suppose that the distinctively dark "e" in Meisei #1 simply happened to appear at just the point where Brandeis shows a difference in reading (the added hyphen), so the alteration to the type had to be connected to this "e".

But had there in fact been an alteration in the type at this point? The students decided that since the "k" of "blocke" had not left a complete impression of ink on the paper, they ought not to suppose that the absence of a visible hyphen within "blocke head" means that there was not a piece of type for a hyphen in the printing press. Perhaps there was and it failed to take or impress ink. If this were true then we might hope to see an uninked impression of this hyphen in the paper. Using a portable USB microscope the following image was taken:



(Meisei #1, uncorrected)

As can be seen, there is no sign of indentation between the "e" and the "h" in "blocke head"; if there was a piece of type holding a hyphen then its 'bite' into the paper (if it made one) is no longer visible. This was confirmed by looking on the opposite side of the leaf for any bump where the hyphen would have been and also by shining a light obliquely across the page to see if any shadows appeared to give sign of an indentation. They did not.

The students were inclined to assume that the "e" in "blocke head" was too dark because the piece of type containing it stood proud of the surrounding type, meaning that it was raised perpendicularly to the plane of the forme. For this reason, the "e" took more than its share of the ink and 'bit' into the paper more

deeply than it should have. The "e" standing proud would have made it more difficult for the "k" before it to receive ink and, when the bar was pulled, it would have made the paper press less heavily against the "k". Either or both of these effects could account for the "k" being incompletely impressed on the paper.

Assuming that the heavy "e" was the problem that the stop-press correction was intended to fix, an obvious supposition is that the forme of type was loosened and the "e" either tapped down or else replaced with another "e". While making this correction the space to the right of the "e" might easily have been replaced with a hyphen, which is the slightly more usual way of connecting two words that are operating as if one. But, concluded the students, we cannot assume that a hyphen was in fact introduced at this point since there may have been one there all along. Just as part of the "k" seems to have been prevented from impressing ink onto the paper by the "e" standing proud, so too could a hyphen after the "e". That there is no sign of this "hyphen" in the printed book does not mean that there was none there, given the proud "e".

The students concluded that without further evidence, this variant cannot fully be explained. We can be comfortably certain that Meisei #1 represents the earlier state of the type since although loose type may shift in the plane of the forme during machining it would be unusual for a piece to rise and stay proud under pressure from the platen as Meisei #1's "e" clearly did. At the very least this piece of type was lowered (more likely replaced) during stop-press correction but whether there was a hyphen after it in the first setting of the type (the Meisei #1 setting) cannot be determined. That is, "blocke-head" might have been what was in the press when both sheets--the one that ended up in Meisei #1 and the one that ended up in Brandeis--went through it; the difference may be essentially an inking variant only. Access to the printed book did not dispel the uncertainty about this case but rather it proved that what seems uncertain when looking from afar using digital surrogates can remain just as stubbornly uncertain in the presence of the materials themselves. Some cases simply are, on present methods, impossible to determine. Thus is advanced the sum of concretely held human ignorance, or to employ Donald Rumsfeld's useful terminology, this apparent variant is something we should value as a known unknown rather than an unknown unknown.

This kind of examination of the minutiae of early printed Shakespeare is not at all usual work for undergraduates studying English Literature at British universities. Indeed, it is unusual even for graduate students to get the opportunity to undertake this kind of work. In introducing the course on "Text Technologies", De Montfort University leveraged the opportunity presented by having in one research centre a medievalist, Dr Kato, and a early modernist (Egan) both interested in hands-on teaching approaches including the making of quill pens and ink to recreate the activities of late-medieval scribes and the practices of letter-press printing using movable type. The opportunity to take this hands-on work further by having students examine First Folios for themselves was one that Kato and Egan seized upon. It is remarkably generous of Meisei University to make its Folios available to us for this teaching purpose, and all the more so for the teaching of undergraduates. For our part at the CTS, we are grateful to Meisei University for letting us use these material and to De Montfort University for its far-sighted DMUglobal initiative that provides the funding to enable undergraduates to take such rewarding field trips in pursuit of their studies.

Works Cited

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