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Becoming music

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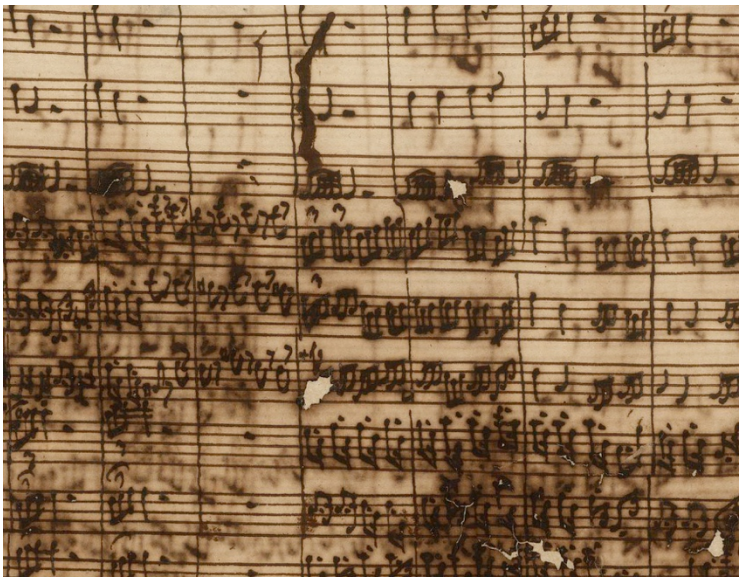

Fig.1: Bach, JS (1748-49), Mass in B minor, BWV 232, 111.Sanctus, p.3, Courtesy of Bach Digital Archive, Creative Commons Attribution-NonCommercial 4.0 International License, accessed 03/03/2018 at http://bit.ly/2H4fk8N, Leipzig DE

The working habits of my art studio are occasionally pried apart after encounters with the work of other people. These reordering events often seem to come from nowhere, which is part of their sweetness, and then long periods of good work may come from the seeds scattered across my workspace during the encounter. Some time ago, for instance, I was walking through the New York Public Library, which occasionally pulls items from its extensive archives, and installs them for visitors to examine. Among the things I saw that day, there was a small scrap of paper on the wall, a yellowed irregular parchment marked over with figures and fractured marks. The hand-sized fragment, attributed to the great German musician and composer Johann Sebastian Bach, was framed and hung as any painter's drawing might be, and it triggered in me the sort of moment of connection and clarity that we hungrily seek through experience with works of art and music.

While the purpose of the little page would have been clear to anyone with casual knowledge of the common Western staff music notation, what I also saw was a loose, compelling bit of play with pigment – a fluid, all-over marking that I recognized from my own practices of sketching, not to mention the graphic work of many others. This is to say that, while I knew what I was looking at, the utility of the thing momentarily sifted to the bottom of my recognition, leaving instead only its trace presence as Drawing.

As a revelation, this glitchy reading may not seem like much. After all, over the past century the manifold properties and potencies of music notations have been dissected and reimagined by creative reformers like the American composers John Cage and Earle Brown, or Karlheinz Stockhausen and many others. In the current post-recording and computational climate, in fact, international cultures of professional music composition seem to have entirely shed the need for the linear grammar of representation of the traditional staff system. Working composers now offer audiences and performers their scores as open-ended processes for construction, or algorithms for implementation, rather than merely as texts, so to speak, to be declaimed. Out of a confluence of well-understood social and technological developments, the reformations of listening and composing that have taken place in music communities over the past century have unmoored the notation from its role as a support for a pitch-centered palette of sound, and sequential protocols. It endures, of course, as a teaching tool and a visual method of analysis, a thousand years or so after its innovations were (basically) codified by the Benedictine monk, Guido d'Arezzo. But its primacy in musical culture is at least diminished.

However, in the library that day, in my sideways glance at Bach's drawing (the glance of a visual artist with a musical background), I saw something like the autographic percussion of a Cy Twombly, blended with the irresolution of a drawing by Anton Tàpies, rather than the crypticism of the staff notation, marked down with the mechanical consistency of an engraver's stylus. But what confusion underlay this momentary misperception? How and why did that small fragment speak so brightly in two voices?

In reforming my studio behaviors afterward, my curiosity about this conflationary response to a legendary composer's tracery persuaded me to take a more historically curious, less stubbornly *present* approach to the work that emerged from that space. As a painter and educator, I have worked with a wide range of drawing systems, of course, and as a serious amateur musician, I am at least familiar with the principles of the staff notation. So, how does a music drawing relate to other visualizing systems? And how is it that we are enabled to fix and re-fix the multi-dimensional complexes of musical performance onto a page? From a chance encounter with a scrap of handwriting, a n'est pas un pipe moment has become for me a stable feedback circuit of reflection and action, building a deeper, categorically detailed grasp of structure and function in drawing and drawing systems. And as he has done so often in my working life, John Cage contributed a playful simplicity to the framing of the problem: it is a matter of grasping 'the relations between paper and music.'

Wayfinding

To answer the small raft of questions that formed in the wake of that odd visual elision in the library, some clear definitional language is in order. I will avoid defining (but will not avoid using) the word 'image,' as that could interrupt the project before it even begins. We can, however, start with the mark, suitably defined by the psychologist William Ittelson as an inscribed artefact of human intention, 'decoupled' from the real-world surface on which it is etched[1]. Such a decoupled mark is not merely ornamental, or trivial, referencing nothing. It means to indicate.

The crucial mark, the mark that does so much work for us, is a line. Line is Euclid's 'length without breadth,' or in Paul Klee's narrative terms, line is a point gone for a walk. Lines connect and denote, they are grids and webs, or states and transitions; they are everywhere and nowhere, circumference and center. Furthermore, becoming words and numbers, lines both show and say, they transmit and translate. The anthropologist Timothy Ingold, in his wonderful book 'Lines: a brief history,' roughly classified our tireless and extravagant line-making urges in a cascade of metaphors, beginning with traces and threads. Here is a subtly expressed distinction between push and pull in the act of drawing, as well as a sensitive observation on the difference between leading and following. But in actually making drawings, lines rarely self-identify in terms like these, and the experience is never just the drawing drawn.

Making this very point in her vivid description of the Renaissance painter Raphael's consummate drawing, the Art-historian Erika Naginski characterized the network of marks she reads on the page as shifting 'disconcertingly between mimesis and semiosis, line and sign, geometry and letter, figuration and discourse'[2]. From the master's stylus, it seems, there emerge few clean categories of marking. Every trace is a thread, is also a crease, a fold, or even a type of narrative, playing out in the density of the contact between surface and artist. Every mark is a multiplicity, and we search pragmatically through the abundance for useful responses to often ill-formed questions. Is this early reflection not somehow suggestive of the disruptive moment that started all of this?

Building forward, lines link up to create compound orders of inscription, well-known in the extensive literature around graphic practices, namely pictures, diagrams and writing, each of which uses the same small set of elemental marks – point, line, plane, texture, colour – to serve a variety of needs. There are crucial (but never inviolable) differences between these three orders that are worth isolating, in order to fully understand the complex of a music notation, which is a visualization, after all, meant to permit its users to reach across sensory modalities.

Briefly, to make a picture is to engage with varyingly challenging drawing systems, in order to map the real world of spaces, objects, and light to the page. Pictures translate 'out there' into a virtual world of marks and surfaces. They are view-centered, showing us the thing from some crucially central position, even if that position is difficult to interpret precisely, as in a cubist space, or even the peculiar, zombie spaces of an A.I. generated picture. In fact, this density of interpretation is precisely the vacillation and puzzle of reading pictures, described in disciplinary terms by Naginski, where inchoate meaning takes shape from an index of potential. In contrast to pictures, a diagram maps sequence-relations to the page, rather than spaces or objects. Diagrams are schematic images of distribution, and to understand what they are meant to convey involves some foreknowledge of the schema, or a key target concept. In their more or less reductive linear displays, diagrams shed the interpretive potential of pictures, encouraging users to search their configurations, while limiting the mental moves necessary to interpret them.

'What matters with a diagram… is how we are to read it,' writes the philosopher Nelson Goodman, in his seminal 'Languages of Art.[3]' And as a very useful exercise in distinguishing pictures from diagrams, the philosopher asks us to consider two linear images: an electrocardiogram and a Hokusai drawing of Mount Fujiyama. In general terms, the two images resemble each other, presenting the viewer with shivering silhouettes, inscribed horizontally. But in the electrocardiogram, the lines trace paths through a field of data points, and that data is everything. Visual contingencies like line weight or color are just not relevant. In the Hokusai, however, these contingencies are all at play. Any line in the pictorial field has the quality of being freely, possibly endlessly interpretable, in the sense of Naginski's interactions with Raphael's paper.

Finally, in this abbreviated classification exercise, the practice of writing depends on the marked-up surface as much as pictures or diagrams, but unlike those spatialized images, writing builds meaning in consequence, across a grid-space (there are, of course, exceptionally beautiful and strange examples of calligraphic, pictographic, and hybrid writing, that undermine this miserably short analysis. Such scripts happily smear differences, while retaining some measure of their usefulness as writing. But for the sake of a general view on writing as a drawing practice, I refer here to plain alphanumeric systems like the one that shapes this very text).

Bertrand Russell, writing on the complications of verbal communication, dreamt of an impracticable 'accurate' language, where each word has one unique meaning. This is a well-understood problem in the study of words, where we often see utterly illogical relationships between word-signs and what they mean, that nevertheless encourage vital engagements with the world and each other, often in bewildering detail. In our readings of writing, meaning collects upon itself like a clumsily rolling snowball. It remains a practice

of lines, however, even if currently made from photons and bits, inscribed on immaterial surfaces of unimaginable dimensions.

Our long, complicated history as a species has left us with a mostly low-resolution view of many essential developments along the way, but what is clear, at least, is that our acquisition and configuration of languages reflects a deeply social stance. And as plastic enactments of this disposition, pictures, diagrams and writing each offers unique benefits in the dialogue. However, as suggested by Naginski the historian, Ittelson the psychologist and Russell the logician, our real-world uses of these inscriptions tend to collapse any categorical boundaries. And this is a feature, not a bug. We can easily confirm the promiscuous nature of our visualizing compulsions by watching a murmuration of birds then trying to draw what we have seen; or by walking with friends after dinner and discussing the things we see in the water stains on an exterior wall. In fact, this generative intuition is at the heart of my experience with Bach's notation.

Transformation

With respect to our insistent, ancient interest in representing music without playing it (which flowers promisingly along multiple paths in our computational era), here is where it begins to get interesting. The following paragraphs will very briefly review recent writing on drawing as a proto-linguistic activity, and a thinking practice that encourages transformations across disciplinary boundaries. I will make references to drawing-related research from the world outside of this article, so there may not be anything very new for the reader here. But as we are seeking to build towards a richer understanding of music notations, qua drawing, it is worth reviewing not only the shared underlying structures and capacities of graphics, but also the higher-level operations they enable in the messy world of human labor.

It is a common enough observation among any of us who do it, that drawing is a dynamic, synthetic interface between making and thinking, encouraging at the very least a provisional understanding of what it is that we may be after. In this view, the artist-scribe does not merely output some reactionary contours in response to a problem, rather, she works with pencil and paper to generate moments of analysis and re-construction in the problem space, nurturing insights and re-visions of potential answers, given the goals of the work. The neuroscientist Vinod Goel, in fact, has explained the vitality of drawing in design professions in terms of its providing a kind of handheld dialectic across symbol systems[4.] Working with multi-view orthographic projections, for example, all of client, designer, fabricator and shop-floor personnel can commiserate over their common project, on multiple levels of complexity, along the production line.

Similarly, in her research into drawing as an essentially cognitive performance, Barbra Tversky has remarked that 'Automatic translation between descriptions and depictions ought to be possible when the same conceptual structure underlies each[5].' In this view, drawing offers a special class of conversion process, driven by play at the tip of a pencil. And finally, the literary translator Richard Pevear has described that discipline as the moderation of a dialogue, in a threshold space, between languages[6]. For a translator, writing offers a visual machine for finding and stitching together comparable meanings from disparate expressions. The transformative qualities identified here by Goel, Tversky, and Pevear allow us to render familiar but unequal aspects of our worlds executable, calculable, but above all, legible across social barriers.

To be clear, I use the word language here to mean symbolic systems in general, rather than just speech or writing. The language-like properties of drawing have been credibly described by Tversky, who has pointed to its combinatorial nature, and thus, the compositional nature of its uses. And barring pedantry, there is no other word but 'reading' for the feedback and forward of our interactions with images. Reading is a constructive interaction with language, and a skill in which anticipation certainly plays a role. This rough assessment happens to echo Gabriela Goldschmidt's keen observation on the stochastic performances of sketching, that in its under-specification, we are enabled to gather 'more information than was invested in its making.[7]' The logic of literacy therefore always has conjecture as some portion of it: we read into, as much as off of the page in front of us.

At work in my own studio for many years now, wayfinding through its generous mess, I have also understood drawing to be a metalanguage, a symbolic method for exploring symbolic methods, most especially in the sketch, where the user plays with the very tics, flourishes and hesitations in the act of drawing itself, in a search for salience. From all these perspectives, the mechanism of drawing has value both as verb and noun, as conversations with the material and metaphysics of the studio, simultaneously structuring those conversations, for the record.

There is an inference to be made from all of this that drawings are always in some sense underdone, and that this is a source of their vitality, as practices within practices. In evaluating this critical feature, with sketching as the supreme practice of incoherence, scholars like Tversky and Goldschmidt have succeeded in amplifying our understanding of drawing's generative power as a tool for combing a signal out of (self-generated) noise. For real-world confirmation, just leaf through the pages of a working sketchbook, next time the opportunity presents itself. A sketchbook is a crucially durational document, where fragments become ideas, where ideas become plans, and where plans find routes to completion. Each page is a blend of lines and shapes, colours, numbers, smudges, creases,

words and elisions, and collage. Those of us who use sketchbooks seriously in our work tend to fill them with notes, doodles, glimpsed figures, and odd corners.

And scientists and engineers use sketchbooks in exactly the same way that an artist uses them. Just have a look at the sketches of the physicists Paul Dirac or Richard Feynman, or the graphical abundance in the pages of the mathematician Charles Sanders Peirce. Only consider Leonardo da Vinci's notebooks, as an important historical example. In its hodgepodge pages, that remarkable polymath probed not only the things of the external world, but also the invisible things of his own thoughts. Unless I am simply baffled, arguing from incredulity, the pages of Leonardo's notebooks show us things that simply could not have been imagined without the diagnostic mechanism of drawing. Searching through the marks, we arrive at points that would be difficult to get to without the integrating pathway his practice provided.

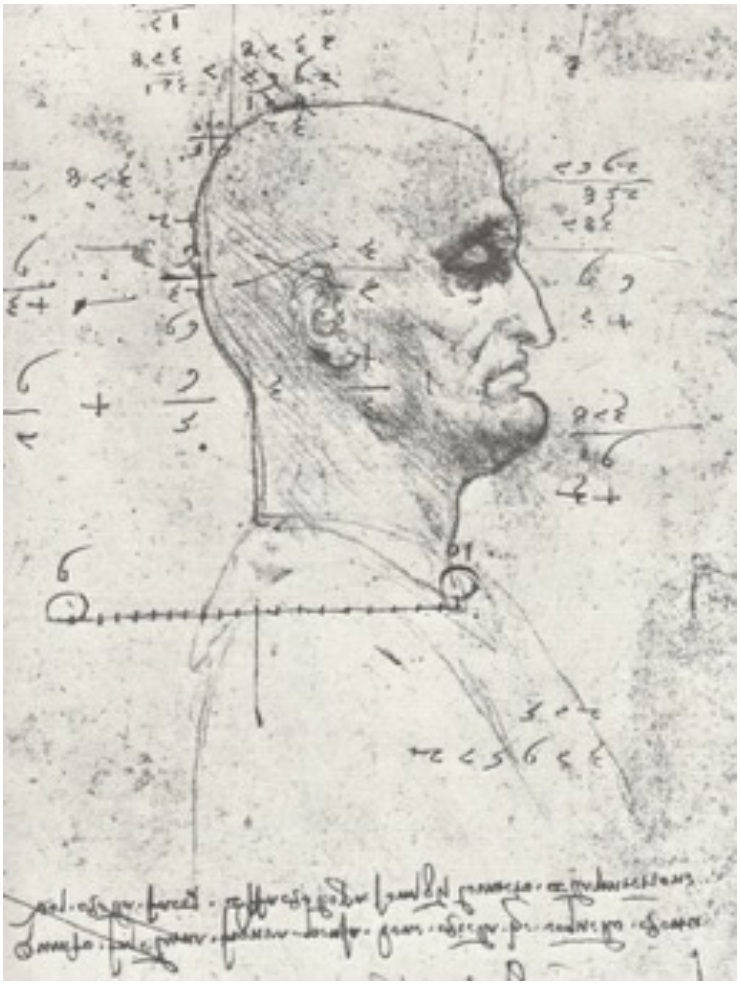

Fig.2: da Vinci, L (1490) Leonardo's Notebooks (2011), 1:236, Plate LI, courtesy of Dover Publications, Mineola NY USA

For one more immediate example of discursive drawing, the archaeologist Helen Wickstead has written of her experiences with Stratigraphy, a uniquely collaborative visualization system used to plot the dimensions of an archaeological dig site, to arrive at plausible narratives which could account for its contents, relative to the current state of knowledge[8]. Recalling the ultimate purpose of the article you are now reading, there are wonderfully clarifying correlations in Wickstead's account between stratigraphy and music notation. As the team works together around the drawing, slicing through the space and time of the site, a conditional record emerges of the things that may have filled the earth in its heyday, but also of the span of the creation of the document itself. An effective on-site drawing actually depends on fluid cross-talk amongst its collaborators and their shared pages, where description and interpretation emerge together. 'We draw contexts,' she writes, and those at work in the field attest to the superiority of drawing for that purpose: the thing is simply better understood by the laying on of hands, to (re)construct narratives beyond the frame of the page.

The purpose of any form of inquiry is understanding, and understanding is achieved in a cloud of information. Drawing/diagramming/mapping/annotating/sketching reflects this cloudy dynamic. We work from simplicity to complexity, and back, searching for answers in the promiscuous tracing and threading, performed on the worlds that comprise our realities. We see some feature of the world (flocking starlings, phases of the moon, transactions, and each other), and we record the experience, using marks on surfaces. With this portable system in hand, we can then show and tell, annotate or seek explanation, or transform, performing some impressive cognitive feats through the drawings themselves as proxies.

'Comprehension and creation go on together,' writes Goodman, as a general principle of human cognition, and drawing embodies this continuity: it is a method for discovery, and a knowledge-generation process. Now, whatever the word 'discovery' may mean in our contemporary environment, it certainly endures as an objective for artists and designers (or physicists and archaeologists), loitering as they do at the corner of comprehension and creation. We surely appear to be working in a kind of gerrymandered commons of technologies, an exceedingly dense ecosystem of images, texts, and image-texts that favors propagation rather than knowledge-generation. Yet drawing retains its value as a critical-creative practice in the training and evaluation of student-artists and designers, and other disciplines. Its resilience is undoubtedly bundled up in its efficiency of use, and its plasticity. In a working sketchbook, for example, or a stratigraphic drawing, or a music notation, under-specification and indeterminacy become tools for understanding, driving the directions of the user's work in surprising ways, and as matters of fact, thus embodying the 'world-making' ambitions described in Goodman's aesthetics.

But ultimately, the achievement of any inscribed document results from how it hews to its objective: does it illuminate, does it amplify? Can we see ourselves in its tracery? Does it support or hinder our desires? Speaking from experience, as one who draws, a poor drawing is inert, a good one reforms and clarifies.

A calculus of the body

The art historian James Elkins has written that 'Pictures both stand for and exemplify… objects and quantities, and for that reason representation is also numeration[9].' Elkins' pithy subtlety confirms what I understand from my own uses of drawing over decades, that metric motivations underpin all drawing practices, even if only in the optics-dependent gesturing between hand and eye, the thing drawn, and the paper drawn upon. Really, to make any drawing is an act of evaluation that is essentially digital, in spite of its deteriorating, fleshly source.

The most explicit application of the measurement impulse, of course, is found in geometrical drawing, that partly visual mathematical method developed to gauge reality in the graphical terms of wireframe illustrations of dimension, incidence and potential. A well-constructed bit of geometry exploits psycho-physical abilities of the human visual system, displacing challenging logic, memory, and search requirements (for interpreting written text, for example) with a spatial-perceptual approach for assessing meaning in the display. The mathematics scholar Reviel Netz distinguishes this powerful performative characteristic of our uses of geometry, writing that

> …the circle of the proof is drawn, not imagined to be drawn. Thus, the action of the proof is literal, and the object of the proof must be the diagram itself, for it is only in the diagram that the acts of construction literally can be said to have taken place.[10]

Whereas a character-string formula writes forward, line by line, or a picture puts too much on the table in terms of potential, a well formed geometrical representation will show us problem and solution together, allowing induction into the deductive logic of a math problem. By thinking over and through such graphics, we have moved from Euclidean studies of natural principles, to computational visualizations and networks, meant to allow us a sensate experience of a different species of organic system, which is to say, information. Geometrical drawing is as much speculation, therefore, as it is analysis. Through the inscription, we may step through natural dimensions into more nuanced spaces; or we may insert a wedge into moribund thinking and discover something new.

With these observations of metric drawing in mind, if at least one objective of Raphael's turning stylus was to represent human figures in motion, in space, then perhaps the sums

of his heterogeneous marks might yield something in our reading that is not very much different from the musical autography of Bach, or Beethoven, in spite of structural differences between pictures and other types of inscription. In Raphael we see an image of bodies and light coalescing from a dynamically marked system of potential. In the music manuscript, there is a comparably loose and expressive handling of the pen, but there is also an evident ordering of the marks, in a frontal display underpinned by an elongated grid.

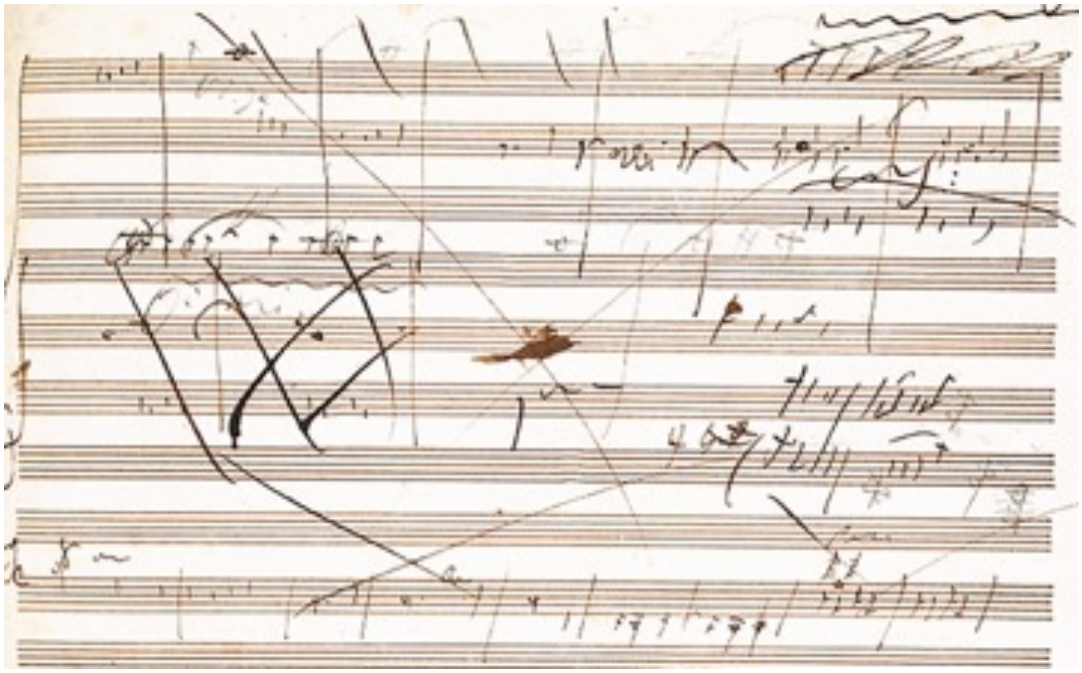

Fig.3: van Beethoven, L (1862) Miscellaneous sketches of musical compositions in the hand of Beethoven, courtesy of the British Library Board (ADD MS29997). London UK

If we follow any particular line across the musician's paper, we see a kind of consistency that is absent in the eruptions of Raphael's visual poetics. In Beethoven's notoriously eccentric scrawl across this page, the marks appear wildly interwoven, suggesting things like glyphic bridges, buildings, or moving pedestrians. But the marks also appear regulated in a way that is unlike the painter's woolly, replete picture-making. Perhaps, with our earlier brief taxonomy in mind, we should say that the lively fluctuation between figure and ground in Raphael is nowhere found in the notation. Instead, there is notching and nicking along the page, regulated by trembling intervals between the marks. But if we are tempted, then, to turn around and label the music notation a species of diagram, the denotative restraint we would expect is just as absent as Raphael's fluid light and shadow.

Moreover, while there are recognizably diagrammatic and pictorial qualities to the notation, there is also something else at play. Typically, a diagram has a specific referent for

its schematic image, some external target in either physical or logical systems. But if a music notation is just a species of diagram, then its referent is something that has not yet occurred and may not occur at all. Its target is coming. Take a moment now to revisit Tversky's description of the combinatorial aspects of drawing, and Netz' performativity in the graphic, superposed on the irresolute sense of periodicity in the notching and nicking of Beethoven's manuscript. We hold what appears to be an image of cadence.

Drawing across disciplines

All the observations we have seen so far on the pragmatic and irresistible porosity of drawing beautifully connect the haptic, emotionally loaded life-drawing experience with more analytical systems such as Venn diagrams, linear perspective, or Euclidean geometry. Reinforcing that congruence, while treading water in the wake of my moment with Bach's restless hand, I had a painter's insight that the staff notation is a species of design-drawing, in fact expressing the same objectives of organization and execution as multi-view Orthographic Projections, just directed at a different sort of output.

Both of these robust drawing systems developed their conventions in the cooperative pursuit of creating and disseminating articulate documents, in their domains. To that end, both systems generate images for the manufacture of some-thing (in the one case, a music performance, in the other, a teapot, or a steam engine). But rather than merely depicting or describing their target objects, they generate blended views – image-texts that serve up a compositional discourse, as loci for creation, analysis, annotation and production. As always, however, there are key differences between the two systems that present opportunities for reflection in and out of the studio, in order to understand how music notations work.

In its outlines, projective orthography has a long history, but is currently practiced primarily as an industrial design drawing method. The system is analytical, showing users a set of views of some proposed object's sides, such that a fabricator can read it, and make the object in accord with the compound needs of designer and client. The system works by flattening the faces of its target-object into 'true shapes,' denuding them of detail, and mounting the inscription on an infinite (indeed, impossible) orthogonal structure. Ultimately, a multi-view projection presents its users with a fortunate truncation: a set of 2-dimensional slices of 3-dimensional objects, bootstrapped with connective guideline geometry and mechanistic instructions for making the object it depicts.

Much of this descriptive language could easily be ported over to a review of the workings of the staff music notation, which is likewise intended for use by multiple users, for analysis, instruction and performance. Like orthography, the notation presents users with a

truncated representation, with phatic additions useful in constructing the final outputs. But instead of the multi-view format – essentially a time-factored, virtual walk-around – the music document is a paginated image, written across a timeline grid of staves and bars, reducing music to sets of manipulable objects, with properties that belong to thinking musically. Also unlike the orthographic projection, the image itself is spatialized in the elastic sense of a diagram, where deforming the display will not change a reading of its meaning (except in the case of folding or tearing the page, which are perfectly fine contemporary interventions, but unacceptable in Brother Guido's world).

It is worth noting at this point that a thousand years ago, Guido (generally credited with the invention of the staff system) saw a surprising, practical consequence of his graphic innovations. Previous music visualization systems, like the plainchant-directed Neumes, which used autographic flourishes marked above a lyric, to show performers the desired shapes of their vocal intonations, required lots of time and effort to learn. In Nelson Goodman's terms, such notations were 'replete,' with simply too much interpretive potential in the curls, dots, and other marks to be truly efficient, at least as pedagogical instruments. The explicit instruction and physical presence of the musical director who drew the score was absolutely necessary. However, using Guido's geometry, with its interval-scaling timeline and vertical pitch space, vocalists were able to learn new performances in far shorter periods.

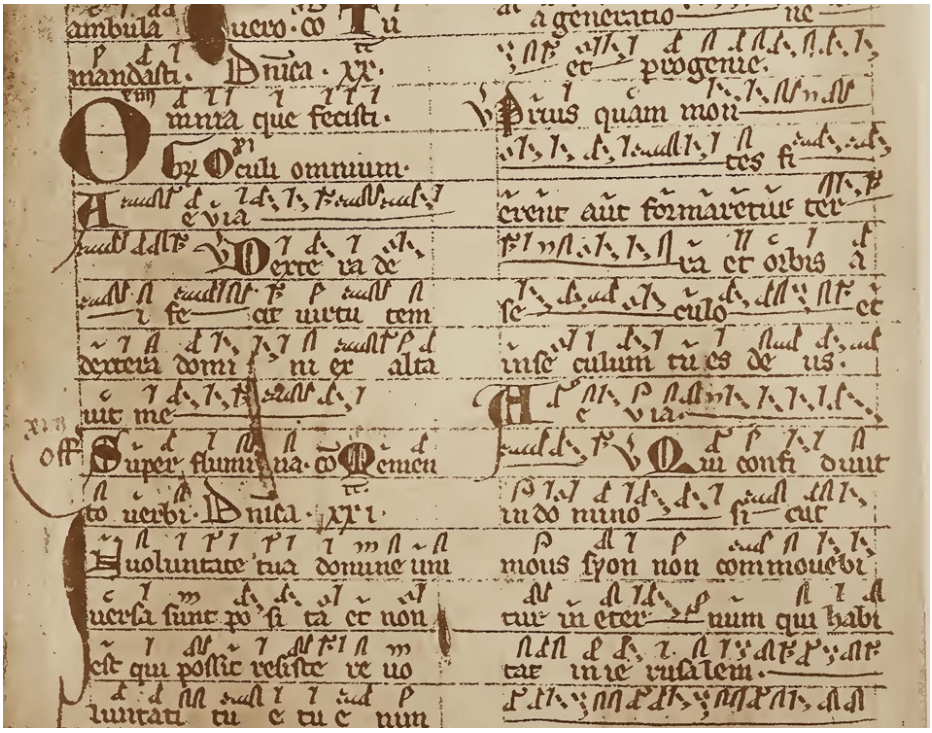

Fig.4: Anon. (1889) Pl.129 / p.151, Paléographie Musicale, Gajard, J (ed) 1889, Abbaye Saint-Pierre de Solesmes, Publisher Tournay, courtesy Trustees of the Boston Public Library, accessed 03/04/2018 at https://archive.org/details/palographiemus1892gaja, Boston MA USA

Here is a real-world case-study of the power of external representations in matters of education. The controlled lexicon of dots and lines, written into a grid, converts music into information, with the added properties of easy reproduction and portability. Any particular instance of the staff notation marks-up a suggested performance using visual primitives, encoded in simple metaphors which propose that some particular pitch is above, below, or across, and that pitches are responsive to each other, that sound can swell and diminish, that rhythm is transition, and that music is something to be organized. Once more we arrive at a point that would be tricky to get to without the integrating pathway provided by drawing.

Ultimately, the notation is built for legibility. We trace paths through the scheme, forming an image of experience, and communicating performance parameters, to enact its content in the real world. Its users are presented with constellations of points, lines and shapes, legible in the same way a ship's navigator might read the night sky. This visual-spatial gestalt has been the source of the staff notation's robust persistence, even in our age of digital tools, where learning itself seems to be under pressure from automation as a cultural imperative. It retains its values as an aid to learning, listening and understanding, encouraging individuals to participate in the wide range of communities that benefit from its use.

Over the centuries of its primacy, the system (which so amplified Bach's quiet voice) has also tended the growth of musical traditions like harmony and counterpoint, by allowing users to see music as a category of experience, apart from the grander rituals of its performance; to perceive pitches and instrumental sections as belonging to a tradition, and to approach music as an enterprise of literacy: to read music, and moreover, to write it back.

A Space of Time

There has been increasing interest in drawing as a research method in the West, for its roles in communication, creativity and pedagogy, through the freewheeling feedback of sketching, the utility and calculated restraint of diagrams, or various unfolding human histories of marking. Much of the content of this very journal, in fact, underscores the cognitive advantages of drawing as a knowledge-constituting act, with important social and semiotic entailments, and as a deliberate/distracted thinking tool. Looking back, I can surely say that my fraught response to Bach's fragment may have been a tangle of misconceptions, but untangling it all in the studio has answered many of the questions that lingered afterwards.

For example, how and why did the manuscript fragment speak to me that day in two voices? Certainly, all of the drawing methods reviewed here, from sketching to orthography, give users mechanisms for design, analysis and performance, encoded for their disciplines. But we also see everywhere the extravagance described by Naginski, in reference to Raphael, pervading even the most articulate of methods, and feeding our compulsions for the perverse guessing-game of interpretation. Perhaps all drawings are polyphonic. Perhaps polyphony is the point.

Drawings speak to each other, and to their makers and other readers, and that cross-talk is the source of their flourishing in human industries. Just compare the wireframe computations of the geometer against the scores of the composer, in the notation. Both systems offer a heuristic for understanding phenomenal experience through performance (this is not to say that music is somehow mathematical, though that theory persists, in my view mostly because of our use of the notation). Both music notations and geometrical drawings, or for that matter the noisy-signal that one finds in the pages of an artist's sketchbook, represent incidence and change, through quantitative operations performed on qualities. But while geometry allows its users only to explain their meditations and interpolations, a music notation's real significance – what a score is for – is to illuminate an indeterminate future.

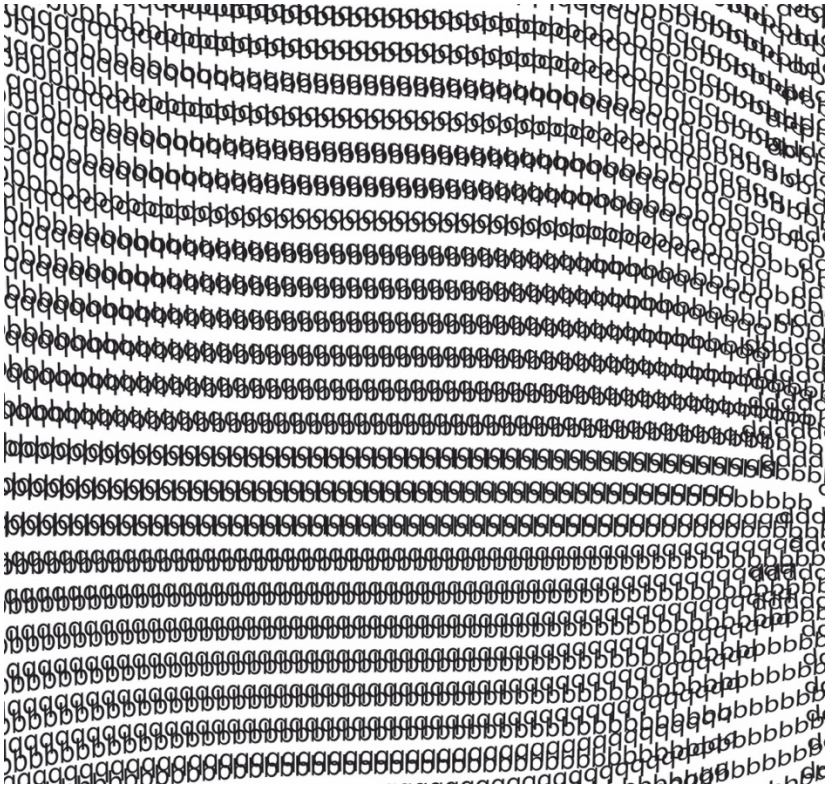

Fig.5: Griffin, D (2012) SPQR, hybrid digital/analog drawing,
from "Interference: a notation for silent singing," courtesy of the artist

How is it that we are enabled to fix and re-fix the multi-dimensional complexes of musical performance onto a piece of paper? The composer Edgard Varèse memorably captured something about our modern understanding of music, suggesting it is best understood as 'organized sound.' Mapping that organization onto the page, the staff music notation wonderfully exemplifies the mongrel spirit of drawing. The system blends pictorial, diagrammatic and textual schemes, allowing users to represent principles, rather than merely the entities of pictures, or the relations of diagrams. Orienting its users to potential, Guido's method channels evanescence up, down, and across the phlegmatic page, and then back. In blending visual concision with a combinatorial discourse, it bursts through mere denotation, to become a connotative drawing system, where passages of great poetry can form in the relations between the tracery and its performance.

Bach's music-drawings, as examples of that poetry, are widely regarded as having contributed to reformations of professional practices in Western art music (and as conveyed in this short article, to reformations of my own work). In his music drawings, Bach exploited marks and surfaces in a stirring unification of method and intuition, composing novel feats of multi-modal, graphic thinking. Just consider, for example, his explorations of psycho-physical experiences like symmetry. His use of the system becomes a discursive practice between the primary spaces of audition, and the secondary space of the paper surface. The cognitive tool of drawing brings the logic of literacy up against the physical experience of air pressure waves: we are enabled to read and write with them.

Surely, as Bach watched himself drawing his musical compositions out onto the page, might the composer not have had a similar experience to the one I had that day in the library? Answering this question is pure speculation, I suppose, but if we allow ourselves to answer 'yes,' then Bach was simply involved in the same call-and-response that anyone experiences by marking-up a surface, in pursuit of making oneself understood.

At this late point I will adapt, with great respect, Deanna Petherbridge's inspired parsing of architectural sketching practices: Composition in a music notation amounts to drawing in 'a future conditional, or subjunctive tense.[11]' A musical score directs us to some segment of an uncertain future, and proposes potential routes through it, with the value-added capability of being played-back, either on or off of its readout. It is thus also a true space-time drawing, and probably the only such inscription, in spite of cycling art-world jargon.

This is to say that in any form of music notation (even the astonishing densities of the musical images in John Cage's seminal book 'Notations,' a survey of the graphical profusion produced by his peers and colleagues), time is not merely that existential, inescapable dimension in which we find ourselves growing, playing, making and dreaming. Nor is time

just some target concept, or axis of measurement, as in a histogram or scatterplot graphic. Rather, in a music notation, time is a character in the scheme.

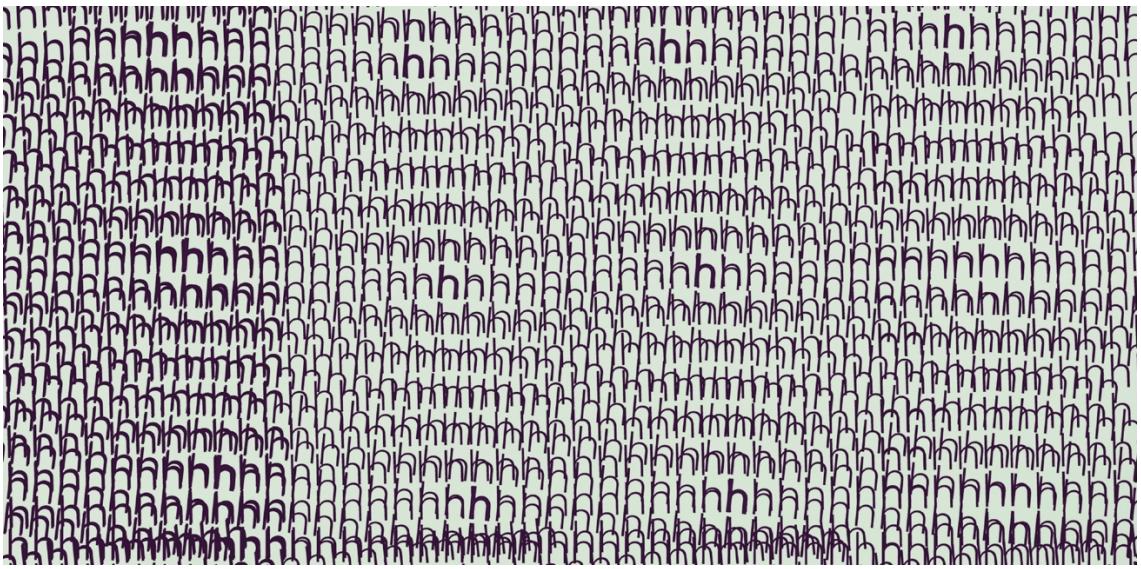

Fig.6: Griffin, D (2012) h net, hybrid digital/analog drawing,
from "Interference: a notation for silent singing," courtesy of the artist

Is there any conflict in saying that a music notation gives us a visual method for both calculation and poetry, together? No: the time-factoring semantic constructions and meter in the drawing play out in breath and the body, transposing vision and audition out along the limbs, fingers and in the vocal chords.

Now we may return to Cage's question about the relations between paper and music. Paper is obviously a material substance, and music is somehow not, although all musical performances depend on material things from sticks and skins, to eardrums and hairs, abdomens, laptops, walls, ceilings, and more. In the intersection of paper and music, aspects of our experiences are explored quite by hand, through cultured re-visions taking place in a true space-time conjunction. Ultimately my response to Bach's manuscript reflects three simple desires, alive in the past, present and future: to embrace the abundance of drawing, to hold and trace performance, and to think of ways to make more. Music notations are used to build futures on a present of plotted variables. They are images of becoming.

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