SHOW AMBIGUITY

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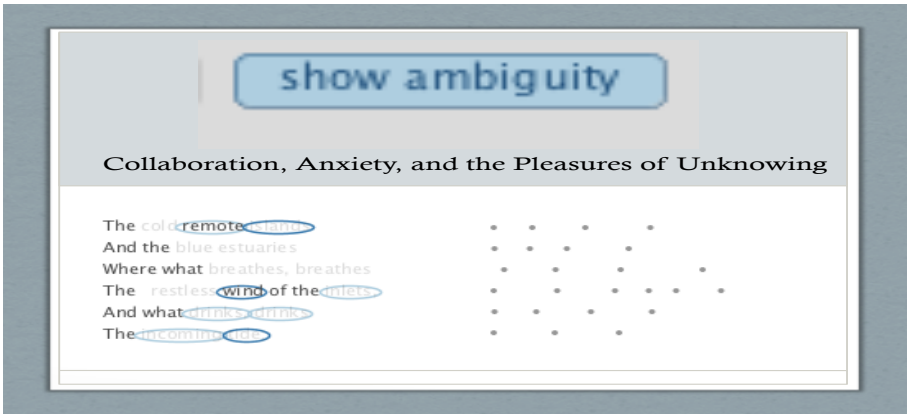

Fig. 1. The ambiguity button.

Abstract—This position paper describes the Poemage [1] project, a collaboration between computer scientists and poets that has resulted in a tool for analyzing and visualizing complex sonic relationships in poetry; discusses various ways poets and poetry scholars are using the resulting tool in scholarly and creative work; and uses this discussion to illuminate disciplinary differences that have the potential to impede but may ultimately enhance the research potential of such collaborations. The author ends by proposing new, humanities-oriented ways of thinking about such issues as methodology and evaluation in projects like this one.

Index Terms—Digital humanities, poetry, aesthetics, visualization, rhyme, sound, collaboration, assessment, evaluation, methodology

INTRODUCTION

Late in 2012, two visualization scientists, Miriah Meyer and Nina McCurdy, and two poets, Julie Gonnering Lein and myself[1], decided to collaborate on the development of a tool, Poemage[2], to identify and visualize complex sonic relationships in poetry. From the beginning of our work together, we have engaged (and often struggled with) what it means to collaborate meaningfully across two such widely disparate disciplines, as well as with questions not only about what but about how we might learn through such a collaboration. The visualization scientists were anxious to identify problems in analyzing and visualizing poetry that would allow them to make breakthroughs in their own field through the development of new computational strategies, frameworks, or paradigms. The poets, concerned that much Digital Humanities research at the time was driven by technology and the desire to extract data from or quantify texts or their features rather than to engage the kind of qualitative, aesthetic experience we considered central to our work, worried that the project would require us to subordinate our deepest values to accommodate ourselves to what the machine could already do.

The result of the research, the close reading tool Poemage, which visualizes a poem's sonic elements as they play out within the space-time of the poem, has satisfied both contingents in the collaboration. It is being used not only by poetry scholars in close reading but also by poets in composition in ways that we did not predict and that are more fully outlined below. Likewise, in order to create a tool that could engage questions of real interest to poets, the computer scientists were able to make novel research contributions in their own domain.

In spite of—or perhaps because of—the initial successes of the tool, the work continues to raise new questions for our group, including the pressing question of how to evaluate our work and according to what disciplinary standards. Do results have to be replicable? Does subjective experience actually "count," and if so how? How do we value and judge aesthetics? How does creativity come into play? Simply posing such questions within the group illuminates a whole new set of disciplinary differences.

My own view, as expressed in this position paper, is that, as a field serving the Humanities, Digital Humanities must incorporate Humanities-based values and methods not only in its inventions but also in its assessments of those inventions, even while ensuring that assessments meet the standards of the scientific disciplines involved. Though I make my argument here in the first-person singular in part because it represents my own views as my colleagues and I begin to fully engage this conversation, it is rooted in the Poemage project itself, in the values we have developed together, and in ongoing discussions involving all of the team members.

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[2] *Poemage can be downloaded and many of the resulting papers found at www.poemage.org.*

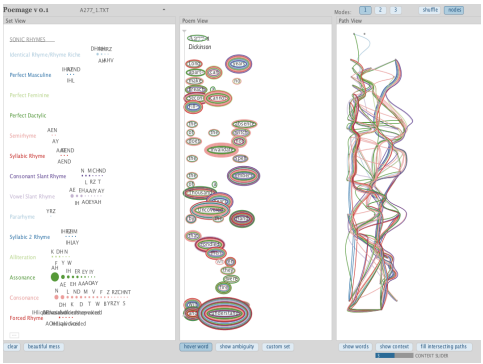

Fig. 2. Visualization of "Long Years Apart," fascicle layout.

1 Exposition

1.1 Origins of the Poemage Project

The Poemage project began late in 2012 with the goal of the creating a computational tool to aid poets and poetry scholars in close reading. When we began, the best available reading tool was, in the poets' opinion, Myopia [2], which relies on making available, through meticulous hand coding, the existing knowledge of one scholar, Laura Mandell, about a pre-selected poem by naming numerous figures and devices in use. Because Mandell's knowledge is thorough, Myopia is extremely useful as a pedagogical tool. Likewise, the Poem Viewer tool [3] that preceded this project, designed by a team led by Min Chen at the Oxford e-Research Centre and myself, is useful in the number of features it identifies and visualizes in real time and in how it acknowledges the poem's engagement of the reader's body. However, despite the breakthroughs they represented, in our minds neither tool succeeded in enriching the reader's real-time, qualitative reading experience. Thus, we sought to create a tool that opens the possibility for the kinds of exploratory investigations experienced scholars of poetry most value and try to communicate by engaging the richness and ambiguity of a poem and the reader's interaction with it. To this end, Poemage permits users to load poems of their own choosing and visualize sonic elements in real time. Rather than replacing or reconfiguring the poem, the visualization retains the poems' spatial and temporal integrity (what we call the "poem space"), honoring complex and evolving poetic relationships while also allowing the poem itself to remain visible and legible.

Obviously, to quantify the operation of even a single poetic device (metaphor, rhyme, meter, etc.) across a poem's space while fully honoring its complexity is not a simple task. We identified *sound* as a single poetic device that, while finally not separable from other components within the poem, could at least be pulled out and looked at in its own terms. Sound also had elements that were potentially subject to computer analysis through quantification.

Still, it took some time for the group to determine first which sonic features (assonance, consonance, exact rhyme, etc.) were necessary to include in the tool and second, even more importantly, which were actually *interesting*. While of course the tool needed to identify perfect end rhymes, for example, these are rhymes that 1) an experienced reader can identify as quickly as she can create and interpret a machine visualization, and 2) are not in and of themselves necessarily illuminating. As we worked, we came to define as "interesting" those sonic relationships that define the space-time of the poem by enacting sonic movement and change within the poem, a dynamic we have come to describe as the poem's "flow." Most interesting, we then realized, are places where sonic and other poetic devices rub against each other or overlap in unexpected, even uncomfortable ways, rather than reproducing themselves—and, not surprisingly, these are precisely the places where we find what we call "turbulence," the overlapping sonic intensities that create a poem's evolving sonic identity. These turned out to be the very movements that couldn't be detected using off-the-shelf linguistic dictionaries and existing algorithms. To capture the progression of sonic clusters as they repeat in different and evolving combinations across syllables, for example, presented a computational problem that required our technical team to develop a new system, RhymeDesign [4], which allows users to query a broad range of sonic patterns within a given poem. RhymeDesign enables Poemage, which is built on top of it, to allow users to explore the interactions of sonic patterns within the poem space. In other words, the insistence of our poets that we visualize something complicated enough to be of interest to us in our work as we actually practiced it didn't impede but enabled the computer scientists in their quest to move their field forward into previously uncharted territory.

1.2 Aesthetics and Discipline

Though the project was intellectually engaging and productive for both teams from the beginning, disciplinary differences also soon asserted themselves. Early in the design process, the technical team reassured the poets that they would avoid creating mere "pretty pictures," as if aesthetic content might risk distracting us from attending to the (data) content that really matters. At first jokingly but then with increasing seriousness, we responded, "Please give us pretty pictures." This conversation illuminated the depth of our disciplinary differences as well as the extent to which they were inherent to the assumptions we all brought to the table.

Among these were assumptions about motivation: the scientists assumed that any user of such a tool would be primarily seeking *information*, grounded in data, while we poets assumed that users would be interested in an *experience* in which aesthetic pleasure plays a major part. Likewise, the scientists, deeply embedded in a tech culture, took for granted that potential users of a computational tool would be motivated to try the tool because they were interested in the technology itself. But poets live embedded in a culture that often sees technological tools as necessary annoyances. Viewing the intervention of technology between the reader and the poem not as an attraction but as a potential barrier to adoption, we considered a user interface designed to draw users in through aesthetic pleasure to be essential. What none of the team members foresaw at the time was that the aesthetic qualities embodied in the visualizations—which bear a striking (and, to the poets, perhaps comforting) resemblance to a hand-created mark-up of a poem, would help provide not only aesthetically-enriched experience but also insight.

1.3 How Poemage Is Being Used

On the Humanities side, Poemage has given rise to or been included in presentations at major humanities and creative writing conferences as well as conferences in the digital humanities [5], [6], [7], [8], [9], [10], [11], [12]. These have included talks presenting

Fig. 3. Visualization of "Long Years Apart," standardized layout.

the tool itself, giving readings of poems that have relied on the tool, theorizing the potential importance of technology to close reading practices and similar practices at the heart of the humanities, and presenting poems and revisions made using the tool. For last year's IEEE-VISAP "data improvisations" section and also for a paper forthcoming in *Leonardo*, Julie Gonnering Lein, Nina McCurdy, and poet Amanda Hurtado created 3D visualizations of various poems, again working toward giving viewers a conceptual and aesthetic apprehension of the poems' space-time. This activity rightly suggests that the tool, even within its limited scope, is successful, in that poets are actively using it and audiences within their field are interested in viewing and in hearing and reading about these uses.

This is not to say, though, that we are using the tool in the way the computer scientists expected we might—what Professor Meyer has referred to as *actually* using the tool—based on their experiences creating visualizations for researchers in the sciences. For much of Poemage's conceptualization, design, and prototype period, both Dr. Gonnering Lein and I wrote and presented extensively about Poemage, but our thinking at the time was rooted not in reading with the tool but in our consideration of what the tool needed to be and do, and therefore what we needed to teach the tool to make it an effective lens for reading poems. This re-theorization of close reading itself was a necessary step in the design process, since figuring out both what sounds and relationships to visualize and how to teach the computer to identify them involved a productive shift in the way we engaged poems, but it wasn't a step that the computer scientists would necessarily expect to encounter with hard scientists, who may not in the 21st century need to re-theorize their research to accommodate a technological intervention. But perhaps even more revealingly, once we were actually using the tool to read poetry, we did what the poets had predicted: relied on the tool not to gather and analyze data as an end in itself, but rather to indicate places in the poem we should look at more carefully—by returning to the text.

One perhaps especially revealing exception to this inevitable return to the text relates to our earlier observations about aesthetics and involves a comparative analysis I made of two versions of an Emily Dickinson poem. First, with Nina McCurdy's help, I created a text file in which the poem was laid out as Emily Dickinson had formatted it herself in her handwritten fascicle, newly available. Here, the poem's space owes less to the conventions of poetic form than to a shape suggested by the interaction of the text with the envelope (including flap, address, and ornament) on which it was written (fig. 2). By the time I took the poem to the tool, I had already performed a close reading based on the richness of meaning that inheres in how the poem occupies the envelope, a richness lost when the poem is standardized, so I was interested in seeing what the sonic relationships looked like. Then, I visualized the poem as her most famous editor, Ralph Franklin, had laid it out for print, its "space" defined by a block in which line breaks were determined by conventional metrics and the poem's rhyme scheme (fig. 3). What surprised me then—and continues to surprise and compel literary audiences who see the two visualizations together—is how much more aesthetically appealing the visualization of Dickinson's original poem is than that of the standardized version, and how much more powerfully apparent the sonic relationships being visualized are. This visualization confirms that standardization, perhaps meant in part to emphasize and clarify sonic relationships in the poem, actually obscures them—and that Emily Dickinson had deep understanding of what she was up to before Franklin intervened.

But this very visualization, one that marks for the poets and their audiences a striking success for Poemage, illuminates a problem facing our team, probably alongside other similarly situated teams. If the ways in which we poets use and experience the tool deviate to this extent from expectations of how such tools "should" be used—from, one might argue, the dictates of the scientific method itself—how must we adjust our assumptions not only about design and use but therefore also about evaluation to accommodate the ways the tool is actually being deployed? How do we assess an argument based even in part on the assertion that the visualization of one version of a poem is more aesthetically appealing than that of another? How does a computer scientist weigh the "truth value" of such a judgment? If she publishes it, what happens to her career?

2 Discussion

2.1 Poets, Close Reading, Data

The success of Poemage was made possible because, even when doing so was hard and the way forward wasn't clear, the computer scientists on the team prioritized the disciplinary needs of the poets as they worked on creating a tool for us to use. Likewise, as poets we took seriously the need to identify poetic elements and issues that were computationally tractable as well as the need of the computer scientists to tackle problems that were of interest to them—needs that caused us to seriously reconsider theoretical questions about how poetry actually works, which turned out to be highly productive for us. And so on. Along the way, this process has revealed and turned our attention toward thinking about the fundamental differences in the nature first of the kind of data being visualized in a tool like this as opposed, say, to one that visualizes gene expression, and second to the relationship of the researchers to that data.

The domain scientists with whom Professor Meyer usually works are largely interested in tools that will help them make sense of complex data that is at the heart of their research but opaque to them without the use of tools. Because the data and its organization are made available to them through a given visualization, the visualization inhabits a place at the center of their work. Once they have loaded raw data into their tools, they are likely to focus for extended periods on the visualizations and draw important inferences and conclusions based on what they see there. As we can see from the example of the Dickinson versions, we poets may also draw inferences from what we see on the screen—and, assuming that these inferences tie into or illuminate an existing close reading, they may even mark the end-point of a given reading. But we will far more frequently take what we've seen back to the poem, where it begins or catalyses rather than concluding an exploration.

This is because our poets, as I told a Digging Into Data Conference in Glasgow earlier this year, are not interested in data as such, though I have gained a healthy respect for its power. Data interests us only insofar as it can help us enrich our experience of the poem. Because we are after engagement over results, we also, unlike our scientist counterparts, don't seek to save time, at least not in reading, unless a tool can help us see something in a poem we wouldn't have noticed over a working lifetime.

2.2 Poetic Method: Experiment and Ambiguity

And we use the word "experiment" differently.

A poetry scholar's relationship to the hypothesis, for example, may or may not be as different from that of the real-world scientist as our ideas of how the scientific method is supposed to work might lead us to believe. Still, the poet's relationship to the hypothesis does position itself explicitly outside that method as generally depicted. A close reading is not meant to pose a specific question and generate a conclusive answer; it is, as E.D. Hirsch says, "a probability judgment . . . supported by evidence" [15]—and a strong poem provides "evidence" for many interesting readings, none of which a strong reader would be able to articulate in advance of its performance. In doing this work, readers seek not, as Stephen Ramsey says, to "solve" a poem then move on, but rather to continue to read it [16].

Thus, a reader's relationship to the methods that drive the sciences is inherently skewed. For a poetry scholar engaged in close reading, the hypothesis (or "probability judgment") is a moving target. A good close reader will enter a poem (often one she already knows well) with an intuition or an idea or simply a plan to begin with a word or phrase that has been working at her, but that intuition is subject to development and revision quite literally on a word-by-word, moment-by-moment basis. The formulation with which the

reader emerges from the poem will be quite different than the provisional notion she carries into it; this evolution of the reading in time is considered inherent and essential both to the process of reading and to the written product we call "a reading."

Likewise, any given intervention takes its place as a moment in a long conversation in which observations and arguments not only compete with but also elaborate upon and support each other, and in which an argument's strength is judged not through quantitative but through qualitative tests that unfold slowly, across years and even centuries, through the evolving force of readerly consensus. I have confidence in my judgments about the aesthetic qualities of the Dickinson visualizations in part because I have long experience in making aesthetic judgments and also because not a single member of the audiences of experts to whom I have shown the images, experts also attuned to aesthetic issues by their daily practices and more than most communities given to argument over aesthetic questions, has quarrelled with my judgment.

Thus, when, at the aforementioned Digging Into Data Conference, computer scientist Tom Crick claimed that research that isn't "replicable" in the scientific sense also "isn't research," I was intrigued, not to say taken aback, that the claim would be made at a conference dedicated specifically to the Humanities, albeit of the digital sort. As Tom and I have continued our friendly and so far informal discussion, I've argued that close reading and the long literary experiment does enact a form of replicability. I once told my mathematician father, in response to his query, that we know *The Odyssey* is great because we are still reading it after 3000-odd years. (Also for the reason my father knows a theorem is true: because it is beautiful.) Of course, questions of whether research can or cannot be validated through the faster-acting scientific method are pressing to people whose work may be of practical, even mortal consequence: bridge-builders and cancer researchers, and even economists or political scientists (often included under the "digital humanities" umbrella) trying to figure out why we spend or vote as we do. Still, the many anthropologists and social scientists who sidled up to me during Glasgow conference breaks to confess they didn't care about data either led me to suspect that most researchers, like me, care more about what data might give them access to than the data itself.

I wish not to make light of the question of replicability, only to trouble it, especially as it relates to our ideas of what might be "true." Scientists require replicability. Poets care whether another reader can follow our readings as they are performed in talks or papers, but we would actually prefer that a reader query or even deform a reading than that she reproduce it. We are not even necessarily averse to being told what our own poems are about by strong readers with no access to our intentions beyond what we've put on the page. Because validation lies in the success of the reader's interaction with the poem, ambiguity of meaning represents a kind of truth we value.

That the poem, and so its reading, live in an ambiguity that is a function of language, the matter from which the poem is made, has made an emerging subfield of computer science, uncertainty analysis, of particular interest to our poets. While it is increasingly the practice of visualization scientists to incorporate uncertainty into their data visualizations in order to prevent, say, a brain surgeon from relying on a model of a patient's brain to be an exact representation and so cutting with too much confidence, the same kinds of tools can be used in a Poemage visualization to reveal ambiguities that add to the richness of the poem by opening interpretive space—as when, in one poem, the tool misread/misheard "wind" with a short "i" as "wind" with a long "i" and opened a pocket of ambiguity. In this sense, our tool's "show ambiguity" button, from which I have taken the title of this paper, represents not caution or a weakness in the visualization but rather its opposite.

2.3 Across the Divide

I don't intend to undermine the validity of practices and values undergirding the sciences. Anyone wants a brain or heart surgeon about to cut into her own body to have access to visualization software that will help her do her work with accuracy and precision. Even poets, if we are going to use visualizations to help us read poems, want the visualizations to direct us to something real—and also to tell us how sure we can be of the reality of what we are looking at. The point is, rather, to help illuminate why scientific values, even if they apply, may not give us all the answers we need, so that we can have a meaningful conversation about what we want from our work and why, and therefore about how we will assess and evaluate its products.

To make such assessments, we need to ask which questions are scientific questions, which humanities questions, where the two kinds of questions hitch up, and, when they do, which is the cart and which the horse. Returning to the intervention of aesthetics, for example, poets and poetry scholars are deeply interested in what mathematics in particular may be able to reveal about why one visualization is more beautiful than the other. But though we might turn to the sciences to explain the "why" of the case, we wouldn't to learn its facts. Aesthetic judgment is inherently human; no algorithm can convince us that something is beautiful if our human judgment doesn't find it so. To replace that human judgment with a computer's judgment would be to beg the question.

When we are applying digital tools to humanities problems that are essentially qualitative in nature, then, humanities values must weigh equally with—even outweigh—scientific values. They must be weighed not as afterthought or ornament but as driver. If a scientific assessment of a visualization begins with the question of whether it is visualizing what we say it is and turn to whether a poet can consistently make heads and tails out of what it shows her, its final success inheres in her desire to use it. If humanities scholars need to pay due attention to assessment as the scientists practice it because our scientists need us to, there should also be ample space, even within the sciences, to recognize that the primary value of a digital tool *to the people who actually use it* may not be measurable in conventional scientific terms.

3 Conclusion

Any assessment of a tool or practice that digital humanists offer to researchers, poetry scholars among them, who adhere to the kinds of qualitative, experiential practices and values that remain at the heart of the humanities, must honor those values by incorporating them into the entire research process, from design to evaluation. This means, for example, taking aesthetics seriously as a design principle and also as a standard of evaluation—and trusting the experts in the fields to decide what is aesthetically pleasing, even valuable, and what not. It means incorporating questions about creativity – measured both objectively and subjectively—and creative practice throughout the entire research process. It means not only making quantitative assessments but asking—and trusting answers—about user perceptions of their research experience, and using domain experts to assess the quality, originality, and persuasiveness of the arguments and other research products arising from these experiences. In many cases, it will mean valuing narrative assessments as heavily as the quantitative data that is unlikely to capture what to our domain scholars is most central and important.

When our group first began to work together (and for quite a long time after that) the poets would occasionally find themselves pressed to say how they expected, or wanted, people to use Poemage. Hard pressed, they might say, since they felt the pressure of having to invent a desire they did not feel, an expectation they did not have. What they wanted—and want—was for the tool to open spaces of opportunity, even of dreaming, and for the user to want to enter those spaces in her own way. They took to saying they wanted users to "break" the tool, by which they meant to use it, and even redesign it, as they would never have predicted.

This is already happening—which alone reassures the poets that their fears that it might be impossible to design a computational tool that would engage poets and poetry scholars at the heart of their work were mistaken. This may not be all the evidence we need of the tool's success, but takes us a long way.

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