Connecting Logics: Data Mining and Keyword Visualization as Archival Method/ology

Oriana Gatta

Introduction

The logic of archival research is simultaneously inductive and deductive, with patterns of meaning emerging from the archived texts to which we bring our own questions based on presumptions about their significance. I am certainly not the first to notice the subjective, socially constructed character of archives. For Barbara Biesecker, Cheryl Glenn, and Jessica Enoch, archives do not represent a mimetic result of some capital "T" truth; rather, we invent the truths we "find" in an archive. Similarly, Robert Connors posits that archival data includes a researcher's own prejudices about an archive. The advent of digital technologies, however, offers historiographers and archivists new method/ological tools. And a small but growing number of rhetorical historiographers have begun to engage the theoretical, methodological, and practical implications of these technologies for archival work. Jessica Enoch and David Gold's introduction to their special issue of *College English* summarizes much of this work, including Alexis Ramsey-Tobienne's characterization of "Archives 2.0" as and "emergent and participatory archival form," Jessica Enoch and Jean Bessette's call to be both open to and critical of digitizing feminist historiography, and James Purdy's contemplation of the challenges digital archives pose to defining archives and archival work (107). Not included in this summary are Patricia Sullivan and Tarez Samra Graban's contemplation of the feminist potential of "digital-only searching," Janine Solberg's investigation of the assumptions underlying Google's search algorithms, Graban's argument for organizing archives via emergent taxonomies of discursive metadata—information identifying an archived text's rhetorical significance—or Royster and Kirsch's keyword search of Google.com, Amazon.com, and a university library's holdings as an initial step towards identifying "a convergence of rhetorical, feminist, and global studies" in Rhetoric, Composition, and Literacy scholarship (116).

Given the relative newness of digital technologies and their archival application, each of these pieces also calls for ethical consideration and careful articulation of digital historiography and archival research methods and methodologies. For Tara McPherson, Matthew J. Kirschenbaum, and Jessica Enoch and Jean Bessette, this means cultivating openness to new understandings of familiar texts and practices that digital methods and methodologies may provide. We may, according to McPherson, "understand [our] arguments and [our] subjects differently, even better, when [we] approach them through

multiple modalities" (121). This statement responds to an implied concern that new digital methodologies will replace familiar ones. Part of this concern may stem from extant relationships between digital and quantitative methods, and the undoubtedly positivist ends to which quantitative methods have been and continue to be used. However, as Richard Haswell notes, the "quantitative method assumes that dimensions can be created by humans, not only 'found' in nature" (187). Both quantitative and qualitative methods consciously engage in meaning-making and are, therefore, both "culturally situated and inscribed, never disinterested or impartial" (Kirsch 248). This means that both objects of observation *and* the "hard" data resulting from that observation are identifiable based on subjective processes of identification that are historically and culturally situated.

Furthermore, as Kirschenbaum explains, new methods and methodologies can be used as invention strategies: "The goal is not to use the machine to supplant the judgment and expertise of a human expert who has spent a lifetime reading Dickinson, but rather to see if [digitally-generated] classifications can 'provoke' new insight among a body of familiar texts" (n.p.). Digital methods and methodologies can be used to "provoke" what Royster and Kirsch call "strategic contemplation," or "the capacity to see both patterns and possibilities that may exist in support of knowledge creating and understanding . . . that may become visible when we stand back, observe, reflect, and meditate about the contexts of various practices and the choices that rhetors make" (90). As Tarez Samra Graban and Shirley K Rose note in the introduction to this special issue, a primary goal of the archive is to visibly trace engagement with McCutcheon's cartoons, traces that can then become part of the archive and provide provocations for continued archival invention. The archive, therefore, will enact a simultaneously ontological and hermeneutic definition of *archive*, where meaning-making as interpretation is *itself* the subject of interpretation, and where the reflexivity integral to feminist work will be made visible. Toward this end, I argue that digital data mining and visualization can be used to make visible a network of methodological interconnections composed by the contributors to this special issue. More specifically, I use analyses and visualizations of keyword frequencies and keyword concordances culled from the initial drafts of the first five essays in this issue to answer the following questions: How do these scholars interact with this archive? Or, what methods do these scholars employ in their interactions with this archive? What methodological considerations or assumptions guide these scholars' interactions with this archive? And what connections exist among these scholars' methods and methodologies?

Because the first five essays in this issue intentionally enact a networked approach to archival work by training several lenses on a shared set of cartoon

images, keyword analysis makes sense as one approach to identifying the network's methodological contours based on my assumption that the network operates in part via the language used to describe and enact it. Keyword frequency and concordance analyses identify linguistic patterns by quantifying linguistic presence (and absence). The answers to the questions above suggest points of intersection on which visual representations of the networked archive can be built. Further, they evidence data mining and visualization methods as potential avenues of provocative reflexivity regarding methods and methodologies for feminist theorists, archivists, and historiographers.

Network Deduction and Induction with AntConc

A deductive approach analyzes the contexts in which certain key terms identify the methods and methodologies that are used to address transnational women's suffrage in McCutcheon's cartoons. For example, the terms I associate with rhetorical, archival, and historiographical work based on scholarship mentioned in my introduction to this article include not only explicit references to "method," "methods," "methodology," and "methodologies," but also "rhetoric," "rhetorical," "analysis," "analyze," "archive," "archival," "archivist," "history," "historiography," "historiographical," "research," and "researcher." In this special issue, each writer's choice of methods and methodologies also relates to certain subjects of research and certain artifacts s/he may have selected for analysis, and so the contexts in which keywords referencing transnational women's suffrage and cartoons are found may also offer insight into different researchers' assumptions. Relevant context terms include "transnational," "transatlantic," "women," "suffrage," "suffragist," "suffragists," "cartoon," "cartoons," "image," "images," "frame," "frames," "panel," "panels," "visual," and "visuals." This list of keywords did not spring whole from my mind. I chose these subject-related terms based on my understanding of the key lines of scholarly inquiry outlined in this special issue and previously addressed during presentations on the McCutcheon Transatlantic Suffrage Cartoon Collection (MTSCC) at the 2013 Feminisms and Rhetorics conference. Additionally, I include singular, plural, noun, and adjectival forms in order to identify the largest number of methodological and subject-related contexts possible.

In general, I chose what I thought were the broadest encapsulations of the scholarly work being done, and the most productively contentious. In feminist rhetorical historiography, multiple definitions about of terms like *feminism*, *rhetoric*, *history*, and *archive*—indeed, defining and contextualizing these terms figures largely in questions for which feminist rhetorical historiography continues to seek answers—and the terms themselves are often the linguistic points of reference for these definitions. Similarly, while, we see multiple approaches to answering these questions, terms such as *research*, *method*, and *methodology*

are commonly employed to categorize these approaches. The stated or implied goal of research in general seems to be to make (or remake) meaning within a particular context, and so *analysis* is often used—across disciplines—to identify one or more points along the meaning-making continuum. Further, while research in rhetoric and composition studies often uses *analysis*, *reading*, and *interpretation* synonymously, I chose to include *reading* and not *interpretation* because I thought *reading* might get more directly at the methodological process though which scholarly interpretations can result.

In addition to the sets of terms I outline above, the term "comics" seemed a likely linguistic marker for McCutcheon's cartoons, given that they are analytical focal points for the first five essays in this issue. One defining visual characteristic of *comics* is the order or sequence of its panels. However, since many of the cartoons included in the archive and analyzed in the first five essays in this issue are single-panel cartoons, "panel" becomes a more useful visual descriptor for the cartoons than "sequence." I also included "frame" in my list of key terms because I thought it could function simultaneously as a visual rhetorical synonym for *panel* and as a linguistic marker for a panel's visual rhetorical function(s).

Similarly, I thought "suffragist" could function as both adjectival descriptor of the political movement and linguistic marker of individuals involved in the movement. Unlike "suffragette," *suffragist* does not gender the participants, and while women did form the largest contingent of Suffrage workers, I wanted to leave open the opportunity to identify suffragist work across gender(s). In hindsight, I realize this choice to forgo *suffragette* was guided by my own feminist orientation toward the derogatory connotation implied by the "-ette" suffix, despite its historical use in describing the movement's participants in Great Britain. Surely, had I asked the editors or other contributors of this special issue to deductively generate their own lists of keywords, they would have produced lists different from mine based on the degree to which our scholarly training, interests, and expertise might vary.

While this deductive approach can help scholars understand the significance of keywords they *assume* to be representative of certain methods, methodologies, subjects, and objects, an inductive approach can serve to validate that significance. The extent to which our scholarship shares methodological approaches suggests that these methodological intersections can used to visualize the McCutcheon Archive as an interpretive network. Identifying the list of most commonly used words in these first five essays, and comparing this list to my deductively generated lists of key terms, provides a better sense of the relative significance of an initial set of key terms for doing research into the MTSCC.[1] Further, focusing on the keywords that appear in all five scholarly texts, as well as the deductively and inductively generated lists, will give us the opportunity

to identify the extent to which our scholarship actually shares methods and methodologies.

Network Visualization with AntConc and ManyEyes

While keyword frequencies give us some indication as to which words are significant, understanding how and why they are significant requires a more involved process of "assaying" (Royster and Kirsch 16). Creating and analyzing key word concordances is one way to do this. Bridging computer science, artificial intelligence, and linguistics, Key Word in Context (KWIC) is a method of natural language processing that indexes concordances, or co-incidences of keywords and words within an established proximity of those keywords in a specified textual corpus. More specifically, KWIC concordances index specified words, along with those words preceding and/or following a specified word, thereby identifying the specific linguistic contexts in which identified terms are used. Using AntConc, a free digital concordance tool that allows me to adjust the number of words shown before and after an identified term, I created concordance indexes for each of my key terms. Given the small size of my corpus (five journal article rough drafts), this also involved close reading as a method through which I categorized individual references associated with each of the key terms. Figure 1 shows an example of a concordance index
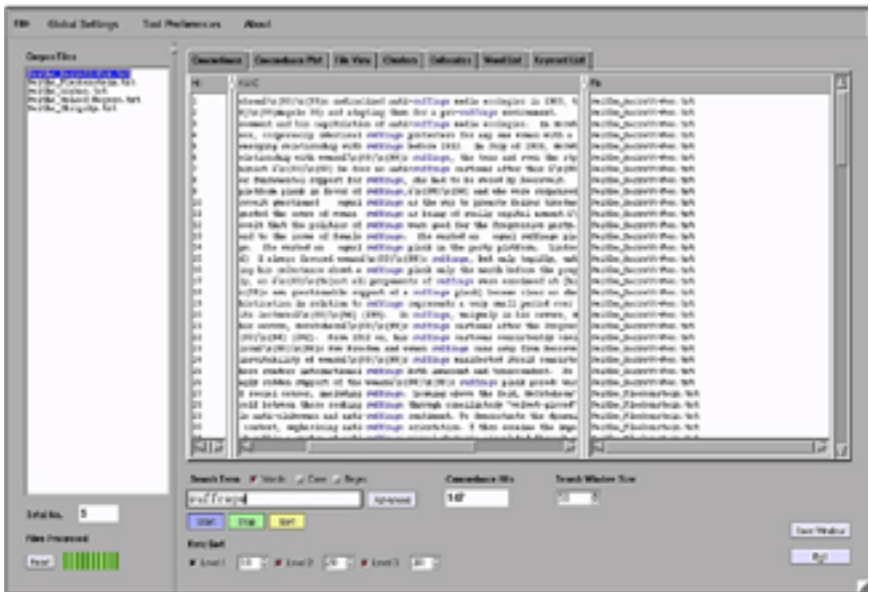

Figure 1. "Feminist" KWIC in AntConc

for the term *suffrage* generated using AntConc, offering ample evidence with which to establish the significance of individual instances of a key term. This index shows us every instance in which the word *suffrage* was used in each of the rough drafts of the first five essays in this issue, as well as the first fifty characters preceding and following each instance of *suffrage*. For example, the tenth indexed instance of *suffrage* reads "both genders. Yet Teddy Roosevelt questioned equal suffrage as the way to promote fairer treatment of women." This tells us that in Jason Barrett-Fox 's rough draft, he addresses former President Roosevelt's perspective on the level of fairness in offering women the same voting rights as men, a perspective that suggests an intersection of presidential politics and personal ethics. In contrast, identifying the contexts of other indexed instances of a key term would require a larger character radius. AntConc's view reveals up to one-thousand characters before and after a key word's appearance, and its index lists keyword instances in order of appearance, creating possibilities to identify the extent to which an author's use of a key term changes over the course of her draft.

Word trees can also be used to visually render concordance indexes, and the insight these trees offer into a key word's context results from how instances of key words are grouped together, rather than for the contexts of individual instances of a key word. In a concordance word tree, each concordance is grouped into like concordances based on the character or word immediately following the key term. Figure 2 depicts a word tree for *suffrage* generated
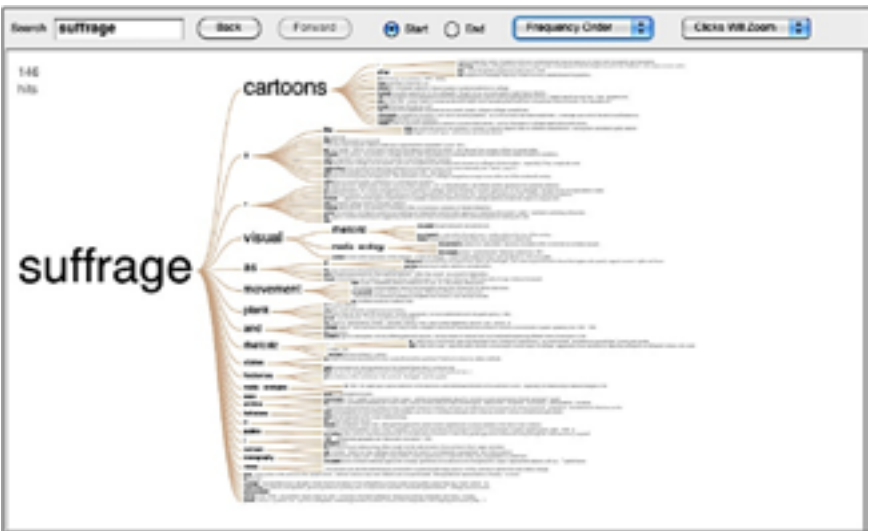

Figure 2. "Suffrage" KWIC in ManyEyes

using Many Eyes, another open-source data mining and visualization tool, illustrates this function. Unlike AntConc, we can only see the words following an identified term, which limits the visible contexts for individual terms. However, ManyEyes does allow us to organize these concordances by the most-to-least used words or characters directly following the identified keyword. In Figure 2, we see that the word *cartoon* creating the largest branch off of *suffrage*. This means of all the words to follow *suffrage* in all of the rough drafts of the first five essays in this issue, *cartoon* appears directly after it more than any other word. This is not surprising since suffrage cartoons are the focus of this issue. If we move further down the branches, past two punctuation marks (a comma and a period), we see that "visual" is the next most common word to follow *suffrage*. And of the words to follow *suffrage visual*, "rhetoric" is the most common. Again, this is not surprising given the focus of this issue. However, if we look at the words following *suffrage visual rhetoric*, as seen in Figure 3, what begins to emerge is some sense of how one of Kristie S. Fleckenstein defines *visual rhetoric* in relation to *suffrage*. If "suffrage visual rhetoric circu-
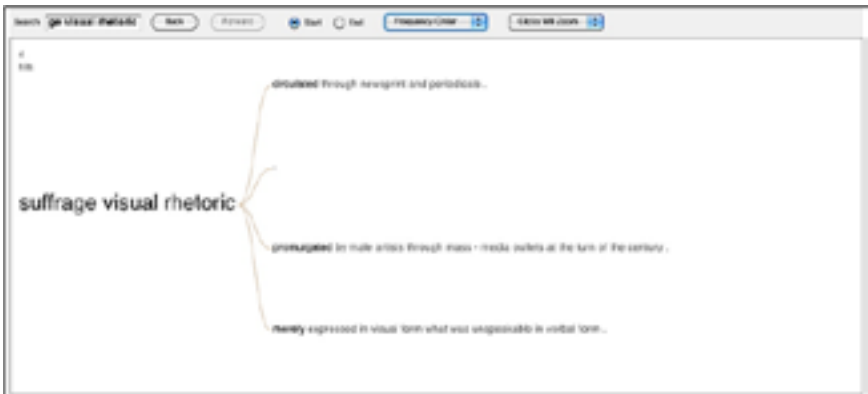

Figure 3. "Visual Rhetoric" Branch of "Suffrage

lated through newsprint and periodicals," then visual rhetoric has a material existence (Fleckenstein 16, this issue). If "suffrage visual rhetoric [was] promulgated by male artists through mass-media outlets at the turn of the century," then visual rhetoric's material existence can also be gendered, mediated, and historicized. And if "suffrage visual rhetoric merely expressed in visual form what was unspeakable in verbal form," then visual rhetorical communication is both similar to and distinct from verbal communication. ManyEyes' word trees, therefore, offer us one way to quickly categorize a keyword's contexts in ways that may reveal larger patterns of meaning.

Articulated as a comprehensive approach, then, keyword analysis and visualization involves three distinct stages to the scholarship on McCutcheon's digital archive. First, one would deductively generating key terms associated with each researcher's methods, and inductively identify the words used most frequently in all five texts using open-source textual analysis software (such as AntConc). Then, one would identify overlap between the deductively and inductively-generated lists of key terms using open source data analysis and visualization software (including AntConc and Many Eyes) to identify the contexts in which this list of overlapping keywords is used. Finally, one would reflect on the potential significance of shared methodological approaches to McCutcheon's suffrage cartoons for the MTSCC in particular, and for feminist archival and historiographic methods more generally, in turn considering new key terms to generate.

Inductive Keyword Frequency and Deductive Significance

There were 135 words common to all five scholarly texts. Not surprisingly, this list includes articles, prepositions, relative pronouns, conjunctions, subordinating conjunctions, and to be verbs, none of which, on their own, offer much insight into the methods and methodologies of the scholarly texts analyzed. After removing those words, I was left with a total of 100 key terms common to all five texts, a convenient number for noticing several patterns. Of this number, the largest portion, 14, appear to identify some aspect of the methods and/or methodologies employed, and 13 appear to identify some aspect of the subject of transnational women's suffrage. The smallest number, 5, appear to identify the objects of analysis—or, the cartoons themselves. The bar charts shown in Figures 4, 5, and 6 itemize the terms related to methods and methodologies, transnational women's suffrage, and cartoons, which are all also organized from the least to greatest number of cumulative instances in all five texts. "I" and "we" are the two most frequent terms that appear to refer to some aspect of methods and/or methodologies, which suggests that in their rough drafts, the authors of the first five articles in this issue actively identify themselves as agents in their methodological processes. Of all 100 words in common across the first five essays, "McCutcheon" was the most frequently used, making his work a focal point for our exploration of transnational women's suffrage. "Cartoons" and "cartoon" appear much more frequently than any particular visual component of a cartoon, which also suggests that McCutcheon's cartoons are more often addressed as complete visual renderings than visual parts or aspects.

These charts also evidence my own assumptions about rhetoric and composition scholars' archival work. Archival work is a meaning-making process
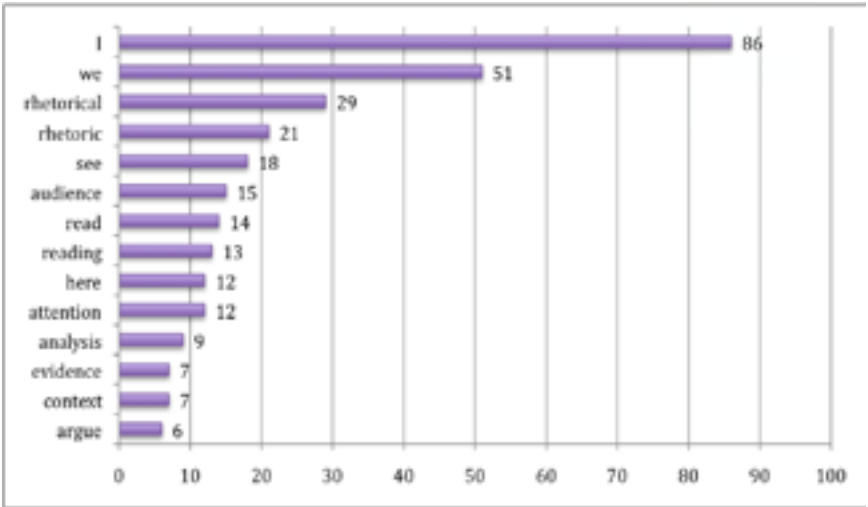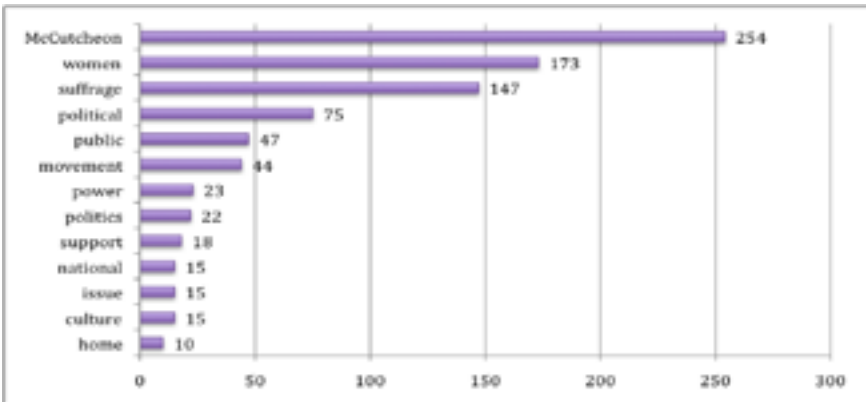
Figure 4. Methods and Methodologies

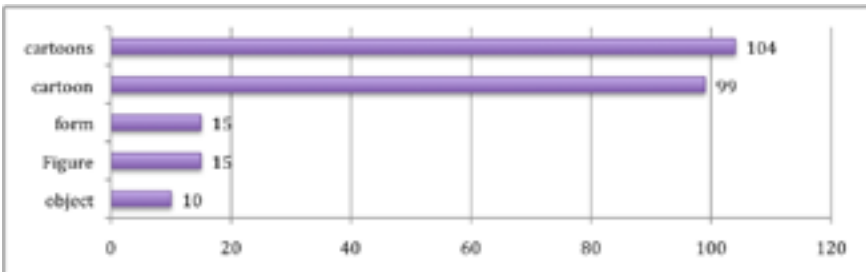
Figure 5. Transnational Women's Suffrage

Figure 6. Cartoons

that, as a rhetoric and composition scholar myself, I understand to be "rhetorical." Audiences are essential to rhetorical meaning making, and their meaning-making often results from one or more forms of "reading" or "analysis," i.e., paying "attention" to the "contexts" out of which meaning has and can be made. Also, as a feminist scholar, I am most interested in "cultural" and "political" contexts, which I assume to be aligned with the McCutcheon Suffrage Cartoon Digital Archive's framing of women's "suffrage" as a movement of "national" and transnational significance. In other words, my own scholarly positioning has deductively informed my selection and categorization of the words inductively identified as present in all five scholarly texts.

Methodological Indirection and Historically, Culturally, and Socially Situated Meaning

A comparison of the deductively and inductively generated lists reveals five shared keywords: "analysis," "women," "suffrage," "cartoon," and "cartoons," and the contexts in which "analysis" appeared did not as clearly indicate or suggest the methods and methodologies employed in each of the scholarly texts as the contexts in which "suffrage" and "cartoon" were used. This finding suggests that, for the rough drafts of the first five essays in this issue, strong relationships do exist between their methodological approaches and subjects. Also, because references to methodological approaches in the contexts for "suffrage" and "cartoon" are more indirect than direct, they exemplify Barbara L'Eplattenier's claim that methods are not often directly identified in rhetoric and composition's archival and historiographical scholarship (67).

Indirect references to methods and methodologies included in a researcher's identification of her subject matter, however, do not mean that she is not using specific methods and methodologies. Also, because my analysis visualized some of what was indirect, e.g. connections between subject matter and methodology, my analytical methods could be useful on a larger scale to continue bringing archival methodologies to the surface for strategic contemplation. For example, the linguistic contexts for "suffrage" evident in the concordance results appear to reinforce a prevalent assumption in rhetorical, archival, and historiographical work that the relationship between methodologies and analytical subjects is historically, culturally, and socially contextual. History itself is "discursive," can be recast via evolving "interfaces," and is the product of archival researchers' "desires…to mirror political and strategic use of" historical, cultural, and social conflict (Graban 84, this issue). So, while the McCutcheon Transatlantic Suffrage Cartoon Collection might visually render "methods" and "methodologies" as categories of user-interaction, "history," "culture," and "society" could visually represent some of the contexts in which these interactions occur.

The linguistic contexts in which "analysis" appears neatly summarize the overarching methodological approaches of each scholarly text analyzed, suggesting that both the term and work of "analysis" typifies methodological approaches to the digital archive of McCutcheon's suffrage cartoons and archival work in rhetoric and composition more generally. This suggestion creates a synonymous relationship between analysis and history—both of which are characterized in the above-mentioned keyword contexts as culturally, socially, and individually contingent methodologies for meaning-making. Thus, it is also possible for others, using their own methodological parameters, to consider the significance of the methodological approaches I identify using keyword analyses and visualizations. If we think about the MTSCC as an interactive network, then the indirection we see in the first five essays regarding methods and methodologies can be visually rendered as potential categories of user-interaction with the network.

The contexts in which "cartoon" appear also highlight the relationship between a researcher and her methodologies in somewhat active terms. Researchers have "expectations," recognize "irony," and empathetically "attach" metadata tags; also, we begin to see what forms of action these methods and methodologies take: cartoons are "read" and "explored" in order to "recognize" characters and identify rhetorical contexts such as the "irony . . . [of] a transnational" metadata tag or the cultural tensions of "British-German relations" (Graban 84 this issue). These contexts also begin to suggest that one goal of methodological action is to "determine" a cartoon's "publics ," i.e., identify who has engaged with these cartoons and to what purpose(s).

The other contexts in which "cartoon" appears offers additional insight into the methods and methodologies used to engage with these archival artifacts. Significantly, the context for many appearances of "cartoon" can be categorized as references to the cartoon's visual representation and/or rhetorical construction. A cartoon's visual rhetorical construction in the keyword contexts for "cartoon" appears to be defined primarily as a semiotic "code" or "visual vocabulary" in need of deciphering (Fleckenstein 29, this issue). A key feature of this deciphering process is the ability to identify semiotic over-simplifications in the form of "stock characters " or "stereotypes ." Once the code is broken, cartoons reveal their 'true' intentions: to "inform, reform, . . . amuse ," "invoke ," "intensif[y] ," and "work ." These intentions frame the cartoons themselves as meaning-making agents. In the McCutcheon Collection's interactive network, these codes can be visualized by enabling thematic hyperlinking, i.e. providing an option to create and position coded nodes, e.g. "stereotype" or "humor," within the network.

Action-oriented "Women"	
• in politics • in domestic politics • in society • in public life • in reform • in mobs demanding rights • are uniting against war • are urging him to recognize their civic are presence and participation • to join their cause • to join in suffrage • to unite • to use liberty's torch • to attend university • to cause trouble • to make the point • are uniting against war • are urging him to recognize their civic presence and participation • assembled to show a placid Emmeline Pankhurst "what we've done by orderly methods"	• voters • suffragists • bustle agitatedly around the room • stampede toward his windows • travel, shift, and change • activists • decide problems for the wage earner • Rarely ventured into this arena • achieve power • gain strength through suffrage • will sweep politics clean of any male presence • cartooning for suffrage • agitation imperial in its scope • who seek such power • who want votes • who represent the ten suffrage states • making history • discovered or guessed that they oppose suffrage

Figure 7. Action-oriented "Women"

Action-oriented "Suffrage"
• a dangerous movement • a process deserving public attention and admiration • acts of exposing perspectives that might be flattened • as linked to foolishness and violence • a way to promote fairer treatment of women in society • -- the majority of Canadian suffragists disagreed that militancy was the way forward • women from the inception of the woman suffrage movement incorporated visuals • not all proponents of suffrage were convinced at [McCutcheon's] sudden conversion to their cause

Figure 8. Action-oriented "Suffrage"

Directions for Future Action

A closer look at other contexts in which "women" and "suffrage" were used reveals a methodological predisposition in the five scholarly texts analyzed toward action-oriented agents and agendas. This is not surprising, given that *women's suffrage* accounted for a complex political movement whose aim was tied to social change. However, what is provocative about this focus on action-oriented agendas and agents, is that it presents a contrast between actions and agents that are directly identified objects of analysis, and the methods and methodologies that are indirectly used to address these actions and agents. *Methods* are the actions we take to make meaning, and *methodologies* establish reasons for these actions. If as much time were devoted to identifying our methods and methodologies as to identifying the rhetorical significances of our objects of study—if we more often made methods and methodologies our objects of study—we might increase the possibilities for shared, connected, networked meaning-making.

Based on the small size of my corpus and the brief time frame it represents, my keyword frequency and concordance analyses can offer only a snapshot of the corpus's methodological interconnections. However, the same methods could also be applied to a larger corpus representing a longer period of time—for example, all previous issues of *Peitho*,[2] all drafts of a landmark text like Royster and Kirsch's *Feminist Rhetorical Practices* and the texts on which it draws, all accepted abstracts for every Feminisms and Rhetorics conference, the Coalition of Women Scholars in the History of Rhetoric and Composition keynote addresses at all past CCCCs,[3] or syllabi for all graduate-level research methods courses in rhetoric and composition—providing an opportunity to create a sequence of panels that tell us a story about how methodological approaches to feminist historiography have (not) changed over time. Although these analyses would not—and should not—be the only ways to strategically contemplate the past(s), present(s), and future(s) of feminist rhetorical historiography, as I hope my own analyses have shown, they are indeed productive ways.

Notes

1   Again, this assumes that the significance of a term correlates with the frequency of its use.

2   For example, Derek Mueller's analysis of citation frequencies during a 25-year period of *CCC*'s publication history sets a precedent for this type of study in rhetoric and composition.

3   Derek Mueller's word clouds—created from 35 years of CCCC Chairs' addresses—also sets a precedent for this type of study in rhetoric and composition.

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About the Author

Oriana Gatta is Assistant Professor of English/Writing Studies and a Women's Studies affiliate faculty member at Indiana University of Pennsylvania where she teaches Composition 1 and 2, Advanced Composition, and Editing and Publishing. Her research explores intersections among visual rhetoric and culture, feminist theory and rhetoric, comics studies, critical pedagogy, and digital archival methodologies. Her professional portfolio can be viewed at http://ediblesymbolism.wordpress.com.