Digital Poetry and Critical Discourse:
A Network of Self-References?

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Abstract

This article emerges from macroanalysis of several works of critical writing in the field of digital poetry, which have been documented in the ELMCIP Knowledge Base. The problems addressed in this context are the self-referentiality exhibited by authors who are both practitioners and theoreticians, and the need for a wider selection of digital poems in critical discourse. The dataset consists of monographs and Ph.D. dissertations on digital poetry (1995-2015), which have been exported into visualization software. Macro and network analyses enable new debate concerning the outlined problems and new findings. My findings suggest that criticism in this domain is chiefly endogenous and that a limited number of poems is being canonized. Therefore, a meta-discourse perspective can pave the way for an external view of the field, concerning its epistemology and evolution. The dataset is available online for download and can be tested and reconsidered by other researchers. **Keywords:** electronic literature; digital poetry; network analysis; literature and technology.

Resumo

Este ensaio macro-analisa várias obras teóricas, publicadas na área de poesia digital, que estão documentadas na ELMCIP Knowledge Base. Os problemas aprofundados neste contexto fundamentam-se na autorreferencialidade revelada por autores que são poetas e críticos e na necessidade de uma seleção mais vasta de poemas digitais no discurso crítico. A amostra de dados é composta por monografias e dissertações de doutoramento acerca de poesia digital (1995-2015) e foi exportada para *software* de visualização. Os métodos macro-analíticos e de teoria de rede permitem um debate renovado em relação aos problemas delineados e, por conseguinte, novos resultados. Os resultados aqui apresentados sugerem que, nesta área, o discurso crítico é maioritariamente endógeno e tem vindo a canonizar um escasso número de poemas. Desta forma, uma perspectiva meta-discursiva poderá favorecer uma visão externa sobre a evolução e epistemologia da poesia digital. A amostra de dados está disponível para transferência em livre acesso de modo a ser testada e reconsiderada por outros investigadores. **Palavras-chave**: literatura eletrónica; poesia digital; análise de rede; literatura e tecnologia.

Identifying Problems

In one of Ernesto Sábato's *El Túnel* (1948) digressions, Juan Pablo Castel, the first-person narrator, invokes the analogy between the practice of a doctor and that of a painter to question the fact that an art critic, who has never been an artist, can assess a work of art in a profound manner:

> LOS CRÍTICOS. Es una plaga que nunca pude entender. Si yo fuera un gran cirujano y un señor que jamás ha manejado un bisturí, ni es médico ni ha entablillado la pata de un gato, viniera a explicarme los errores de mi operación, ¿qué se pensaría? Lo mismo pasa con la pintura. Lo singular es que la gente no advierte que es lo mismo y aunque se ría de las pretensiones del crítico de cirugía, escucha con un increíble respeto a esos charlatanes. Se podría escuchar con cierto respeto los juicios de un crítico que alguna vez haya pintado, aunque más no fuera que telas mediocres. Pero aun en ese caso sería absurdo, pues ¿cómo puede encontrarse razonable que un pintor mediocre dé consejos a uno bueno? ([1948] 1997: 22)[1]

Sábato's character's point of view is legitimate but does not acknowledge a more refined and sensible distinction about critical thought and inquiry, which has to do with broader intersection lines, and so it can be read in a reductive manner.

In fact, there is a different mode of knowledge production put forward by artists or writers—practitioners—who themselves are theorists, and by critics who are not practitioners. The same is the case for poets who write about poetry and poetry critics who are not poets. Stephanie Strickland and John Cayley develop a poetic practice and also theorize on their own and others' works. This practice-based critical view, seen from inside of the writing process, allows them to consider issues that are sustained and, in many cases, arise from questioning and engaging with their own writing program and processes—what Strickland (2006) calls *poietics*. In American literature, especially following the L=A=N=G=U=A=G=E lineage, this means thinking (*poetics*) through doing (*poiesis*) and doing through thinking. Thus, poetry assimilates poetics and poetics assimilates poetry. However, critical inquiry

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[1] "THE CRITICS. If I were a great surgeon, and some fellow who had never held a scalpel in his hand, who was not a doctor, and who had never so much as put a splint on a cat's paw, tried to point out where I had gone wrong in my operation, what would people think? It is the same with painting. What is amazing is that people do not realize it is the same, and although they would laugh at the pretensions of the man who criticizes the surgeon, they listen with nauseating respect to the charlatans who comment on art. There might be some excuse for listening to the opinions of a critic who once painted, even if only mediocre works. But that is just as absurd; because what could be reasonable about a mediocre painter giving advice to a good one?" ([1948] 2012: 6-7)

that solely focuses on one's own creative work can lead to very subjective appreciations, narrowing down criticism and forcibly fall on an apologia of one's own standards. From a different angle, critics such as Katherine Hayles or Roberto Simanowski hold an external critical view, from the outside of the poetic writing process. This position allows them, perhaps, to be less partial and to try to have a more comprehensive approach, but it can also drive some critics, at moments, to be inflected by over-theorization, that is, paying more attention to the surface than to code, and not reading the inner mechanics of a piece and critically engaging with a practice-based knowledge of what is being reviewed.

Reflecting on the problems of self-referentiality and canonization—by studying a field as a system that can be considered from a macro perspective—I try then to investigate how digital poetic work is being referenced by these two ends of the critical spectrum and what works are being more referenced. These problems originate from an attempt to provide an external or meta-discourse perspective on the field and a concern regarding the need for a wider selection of digital poems in critical discourse.

From Singular and Multi-Documentation to Plural Observation

In order to explore these problems, I have mined data about critical writing on digital poetry documented at the ELMCIP Electronic Literature Knowledge Base (http://elmcip.net). I have extracted a dataset consisting of monographs and Ph.D. dissertations, published between 1995 and 2015, along with their referenced creative works, the majority of which are digital poems. Then, I analyzed those relations by performing network visualizations.

The macroanalytic observation suggests that digital poetry is a domain that has produced a significant corpus of creative works and critical discourse. However, how is critical discourse affecting and selecting the corpus of digital poems? One needs to problematize the difference between practice-based critical writing and critical writing developed by scholars who are not poets, since their frameworks diverge, even though it does not mean that the diversity of case studies is richer. Thus, the two questions I pose are: Is there a prevalence of self-referenced creative works in critical writing? Is there a set of digital poems which is more referenced than others?

ELMCIP is a collaborative and open access knowledge base on electronic literature and one of the most comprehensive databases in the field. Its model allows for users to contribute with new records or edit pre-existing ones. As a database being continuously updated, ELMCIP maps not only the field but also its literary antecedents, both critically and creatively.[2]

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[2] For further information see the white paper "The ELMCIP Knowledge Base" by Scott Rettberg with Eric Dean Rasmussen (2014).

The research presented here originated in three related activities: the Gephi workshop on ELMCIP's visualizations led by Scott Rettberg and the Electronic Literature Research Group in 2013 at the University of Bergen (UiB); my work as editor at the ELMCIP KB, and the course "Digital Humanities in Practice" that both Scott Rettberg and I taught during Spring 2015 at UiB. The data compiled from the ELMCIP KB is a truly collaborative endeavor and it would not have been possible without all the records added and edited by hundreds of researchers and writers across the globe, as figure 1 attests. Moreover, the reflection on digital poetry considered from a macro perspective builds upon Franco Moretti's notion of "distant reading" (2003, 2005, 2013), and the analysis of the selected corpus applies visualization and network methodology developed in the field of electronic literature by Jill Walker Rettberg (2012, 2013, 2014) and Scott Rettberg (2013, 2014).

Figure 1. Revision table showing the different versions of a record as it is edited and reedited. This example highlights the edition history of node 3267, Chris Funkhouser's *New Directions in Digital Poetry* (2012), during three years (2012-15) (screen shot). Source: http://elmcip.net/node/3267.

As of January 2015, ELMCIP already contains more than 11,000 records. Despite its quite significant size as a database of digital literature, it hosts a small sample when considered in the context of big data analyses. As Lev Manovich argues:

At the moment of this writing, the largest data sets being used in digital humanities projects are much smaller than big data used by scientists; in fact, if we use industry's definition, almost none of them qualify as big data (i.e., the work can be done on desktop computers using standard software, as opposed to supercomputers). (2012: 461)

Manovich's statement on how the humanities are still far from natural sciences' big data analyses is accurate. However, the question here is not whether the data sample is big enough to "qualify as big data," but rather if it is big enough to be extracted and benefit from macroanalysis methodology. We can be certain that, for our purpose, we now have a significant amount of entries for data mining, visualization and qualitative reflection. That said, close content analysis of particular works is not to be dismissed, but the possibility of developing new questions—based on patterns or findings that result from network theory and visualization—can surely prompt comple-mentary extrapolation that would be difficult or impossible to reach using only traditional methods.

Dataset Description and Selection

Each record in the ELMCIP KB is assigned with a unique identifier (ID), or a Node ID (NID), which can be viewed on the bottom of the record's page or in the URL path. The fact that the Drupal platform was configured to allow for cross-references of content-types (http://elmcip.net/knowledgebase) —creative works, critical writing, authors, platform/software, teaching re-sources, publishers and journals, organizations, events, databases and ar-chives, and research collections—enables, among other possibilities, instant access to critical and creative works on a person's record, to creative works referenced by each piece of critical writing (articles, books, etc.), or to critical writing that make reference to a specific creative work.

Therefore, one can track the critical reception of a specific creative work through time and, moreover, understand which creative works have been referenced in a particular piece of critical writing. This network of actors and relations allows for an understanding of key concepts, such as field overview, community development, gender patterns, reception, central and marginal practices, knowledge and creative production, publishing progress, thematic, aesthetic and rhetoric approaches, working platforms, geographic and linguis-tic similarities and oppositions, and so on.

Data Export Method

An XLS button inserted in the record webpage of each person, creative work or critical writing allows the export of comma-separated values (CSV) tables of cross-referenced content from the ELMCIP KB. The same property is supported for filtered queries on content-type "critical writing." Accessing the URL http://elmcip.net/knowledgebase with "all critical writing" retrieves a webpage (figure 2) with a table of all the records of critical writing documented at the ELMCIP KB. Moreover, on the top of the page, one finds filtering queries menus—language, year and publication type.

Figure 2. All critical writing documented in the ELMCIP KB, displaying 2,882 records, as of May 14, 2015 (screen shot). Source: http://elmcip.net/critical_writing.

On May 14, 2015, the ELMCIP database contained a total of 2,882 records of critical writing and 2,548 records of creative works. Given the scope of my research, I had two parameters to interconnect on the content-type critical writing: year and publication type. I decided to examine the field of digital poetry during a specific time frame, the past twenty years, for two reasons: first, all monographs and Ph.D. dissertations on the theme and domain were published after 1995; second, 1995 marks an important shift in digital culture and the practice of digital arts, as it signals the emergence of the World Wide Web and Web-based digital poems, a fact that has been highlighted as a turning point by, among others, Katherine Hayles (2008) and C.T. Funkhouser (2007). Thus, filtering all critical writing by time period,

between 1995 and 2015, and by publication type "book (monograph)" re-trieved a total of 175 records.[3] Additionally, filtering all critical writing by time period, between 1995 and 2015, and by publication type "book (Ph.D. dissertation)" retrieves a total of 77 records.[4] Exporting the CSV file from each of these critical writing publication types and aggregating the CSV files of both book types—monographs and Ph.D. dissertations published between 1995 and 2015—compiled a total of 252 records.

Now, the next step was to unravel which of these records were critical writing pertaining to digital poetry. In order to discriminate which records fell under the category of "digital poetry," I have algorithmically and manually cross-searched and queried the words "poetry" and "poetics," and the ex-pressions "digital poetry," "electronic poetry," "e-poetry," "cyberpoetry," and "new media poetry" in the titles (all languages). In addition, I inspected equivalent tagging vocabulary in the taxonomy and folksonomy of the 252 records, since filtering the database by frequency disclosed diverse tag re-sults—the taxonomy "digital poetry" hit a higher frequency, 109 records. This higher frequency implies that "digital poetry" is the most used tag for an umbrella describing a variety of practices that unite computation and poetry. At the same time, this tagging has its own limitations, and filtering this way would not retrieve a valuable sample for my questions—neither all the rec-ords that may concern the field are tagged in a useful way (some folk-sonomies were edited as back-work), nor does the total of 109 records solely refer to monographs and dissertations (journal articles, conference presenta-tions, reviews, interviews, forums, lectures, workshops and other categories were also part of this filtering mode).

Once titles and tags had been scrutinized, 26 records that were about digital poetry were manually filtered and reassembled in a new CSV file (mas-ter file). At this point, I had to download all the creative works referenced in each (figure 3) of the 26 critical writing records, assembling 26 CSV files (figure 4), and then manually sort them out, eliminate duplicates, and export them into the master CSV file. This process extracted 401 unique creative works referenced by 26 books, that is, it gathered a dataset sample of 427 nodes.

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[3] Source:
http://elmcip.net/critical_writing?field_language_tax_tid=All&field_number_value[min]=1995&field_number_value[max]=2015&field_pubtype_tax_tid=1590
[4] Source:
http://elmcip.net/critical_writing?field_language_tax_tid=All&field_number_value[min]=1995&field_number_value[max]=2015&field_pubtype_tax_tid=1592

Title	Author	Year
in absentia	J. R. Carpenter	2008
Know	Jason Edward Lewis	2012
M.U.C. Love Letter Generator	Christopher Stratchey	1952
Notes on the Voyage of Owl and Girl	J. R. Carpenter	2012
Sea and Spar Between	Nick Montfort, Stephanie Strickland	2011
Shadows From Another Place	Paula Levine	2004
Speak	Jason Edward Lewis, Bruno Nadeau	2010
Still Standing	Jason Edward Lewis, Bruno Nadeau	2005
Stochastische Texte	Theo Lutz	1959
STRUTS	J. R. Carpenter	2011
Taroko Gorge	Nick Montfort	2009
The Broadside of a Yarn	J. R. Carpenter	2012
The Two	Nick Montfort, Serge Bouchardon, Natalia Fedorova, Carlos León	2008
There he was, gone.	J. R. Carpenter	2012
TRANS.MISSION [A.DIALOGUE]	J. R. Carpenter	2011
TRANS.MISSION [UN.DIALOGUE]	J. R. Carpenter	2013
Voyage Into the Unknown	Roderick Coover	2008
Wanderkammer: A Walk Through Texts	J. R. Carpenter	2011
Whisper Wire	J. R. Carpenter	2010

Add a new creative work.

XLS

Critical writing referenced

Title ▲	Author	Year

Figure 3. Detail of ELMCIP's node 9865, record of J.R. Carpenter's Ph.D. dissertation *Writing Coastlines: Locating Narrative Resonance in Transatlantic Communications Networks* (2014), showing the XLS export button with all the referenced creative works (screen shot). Source: http://elmcip.net/node/9865.

	Title	Title Nid	Author	Author ID	Year	Language	Tags	Tag ID
2	Wanderkammer: A Walk Through Texts	6893	J. R. Carpenter	271	2011	English	hypertext	200039
3	Wanderkammer: A Walk Through Texts	6893	J. R. Carpenter	271	2011	English	HTML	2000245
4	Wanderkammer: A Walk Through Texts	6893	J. R. Carpenter	271	2011	English	walking	2000786
5	Along the Briny Beach	1748	J. R. Carpenter	271	2011	English	performance	2000115
6	Along the Briny Beach	1748	J. R. Carpenter	271	2011	English	performance writing	2000660
7	Along the Briny Beach	1748	J. R. Carpenter	271	2011	English	e-poetry	2000676
8	Along the Briny Beach	1748	J. R. Carpenter	271	2011	English	generative poetry	2000867
9	Along the Briny Beach	1748	J. R. Carpenter	271	2011	English	intertextuality	2000227
10	Along the Briny Beach	1748	J. R. Carpenter	271	2011	English	remix	2000617
11	STRUTS	2302	J. R. Carpenter	271	2011	English	narrative	200013
12	STRUTS	2302	J. R. Carpenter	271	2011	English	RSS	20001523
13	STRUTS	2302	J. R. Carpenter	271	2011	English	place	2000546
14	STRUTS	2302	J. R. Carpenter	271	2011	English	javascript	2000508
15	Whisper Wire	3189	J. R. Carpenter	271	2010		generative	2000110
16	Whisper Wire	3189	J. R. Carpenter	271	2010		poetry generator	20001551
17	Whisper Wire	3189	J. R. Carpenter	271	2010		haunted media	20001971
18	Whisper Wire	3189	J. R. Carpenter	271	2010		media archaeology	20001972
19	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	generator	2000859
20	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	generative narrative	20001297
21	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	narrative	200013
22	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	dialogue	20001887
23	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	performance	2000115
24	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	script	20002221
25	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	javascript	2000508
26	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	network archaeology	20002222
27	TRANS.MISSION [A.DIALOGUE]	3892	J. R. Carpenter	271	2011	English	media archaeology	20001972
28	TRANS.MISSION [UN.DIALOGUE]	9322	J. R. Carpenter	271	2013	French	computer generate text	20004442
29	TRANS.MISSION [UN.DIALOGUE]	9322	J. R. Carpenter	271	2013	French	electronic literature translation	20004396
30	TRANS.MISSION [UN.DIALOGUE]	9322	J. R. Carpenter	271	2013	French	translation	2000181
31	TRANS.MISSION [UN.DIALOGUE]	9322	J. R. Carpenter	271	2013	French	transmission	2000195
32	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	networked narrative	20002547
33	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	narrative	200013
34	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	multimodal	2000875
35	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	performative	2000206
36	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	map	20002441
37	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	generative	2000110
38	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	QR code	20002583
39	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	dialogue	20001887
40	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	literature	2000335
41	The Broadside of a Yarn	4671	J. R. Carpenter	271	2012	English	performance writing	2000660
42	There he was, gone.	4181	J. R. Carpenter	271	2012	English	generative	2000110
43	There he was, gone.	4181	J. R. Carpenter	271	2012	English	narrative	200013
44	There he was, gone.	4181	J. R. Carpenter	271	2012	English	dialogue	20001887

Sheet1 +

Figure 4. Detail of a CSV file exported from ELMCIP's node 9865, record of J.R. Carpenter's Ph.D. dissertation *Writing Coastlines: Locating Narrative Resonance in Transatlantic Communications Networks* (2014), showing all the referenced creative works with title, title NID, author, author ID, year, language, tags and tag ID (screen shot). Source: http://elmcip.net/node/9865.

Data Import Method

The most time-consuming and demanding part of the method has been editing, processing and composing the master CSV files, as they aggregate different search queries. The master CSV table of 427 nodes (figure 5) contains the nodes ID, label, type (book, monograph or Ph.D. dissertation, and creative works), and year (Seiça 2015a). In the case of critical writing nodes, labels were identified with the author's surname and year of publication, whereas in the case of creative works labels were identified as "title/author's surname." This kind of refinement would facilitate a quicker visualization of certain aspects of the bipartite network, e.g. whether a creative work by a specific author had been self-referenced.

In order to establish the relations of cross-references explicit in the ELMCIP KB a master CSV table with edges needs to be created (Seiça 2015b). The spreadsheet contains 572 connections, also known as edges in network graph theory. The source nodes represent 26 works of critical writ-

ing, while the target nodes represent all the 401 creative works referenced by each monograph or Ph.D. dissertation.

In order to analyze the dataset, both the nodes and edges master CSV files were imported into Gephi, an open-source network visualization software. In Gephi's data laboratory, the ELMCIP's NIDs are created as nodes and the links between nodes—in this case, a source critical writing directed to a target creative work—are created as edges, that is, they provide the network relation between discrete events.

Id	Label	Type	Year
8275	Barbosa 1996	Book (monograph)	1996
6563	Pawlicka 2012	Book (monograph)	2012
3696	Reither 2003	Book (monograph)	2003
3728	Eskelinen 2012	Book (monograph)	2012
775	Simanowski 2011	Book (monograph)	2011
966	Glazier 2001	Book (monograph)	2001
7447	Bootz 2001	Book (Ph.D. dissertation)	2001
679	Hayles 2008	Book (monograph)	2008
2872	Stefans 2003	Book (monograph)	2003
3267	Funkhouser 2012	Book (monograph)	2012
782	Funkhouser 2007	Book (monograph)	2007
9302	Emerson 2014	Book (monograph)	2014
8342	Portela 2013	Book (monograph)	2013
3504	Hartman 1996	Book (monograph)	1996
3732	Jhave 2011	Book (Ph.D. dissertation)	2011
1968	Engberg 2007	Book (Ph.D. dissertation)	2007
1962	Howe 2009	Book (Ph.D. dissertation)	2009
7667	Xiaomeng Lang 2008	Book (Ph.D. dissertation)	2008
4092	Gattass 2011	Book (Ph.D. dissertation)	2011
7449	Mette Sárensen 2013	Book (Ph.D. dissertation)	2013
3567	Memmott 2011	Book (Ph.D. dissertation)	2011
3739	Rosario 2011	Book (Ph.D. dissertation)	2011
5859	Dupej 2012	Book (Ph.D. dissertation)	2012
5762	Naji 2012	Book (Ph.D. dissertation)	2012
844	Flores 2010	Book (Ph.D. dissertation)	2010
9865	Carpenter 2014	Book (Ph.D. dissertation)	2014
236	afternoon, a story/Joyce	Creative Works	1990
360	Hypertext Hotel/Coover	Creative Works	1992
2360	Sintext/Barbosa	Creative Works	1993
6854	Tape mark/Balestrini	Creative Works	1961
1539	ELIZA/Weizenbaum	Creative Works	1966
8852	Der XLI. Libes-Ku_/Kuhlmann	Creative Works	1671
4694	Cent mille milliards de pomes/Queneau	Creative Works	1961
7940	Ficciones/Borges	Creative Works	1962
8884	Un Coup de D_s Jamais N'Abolira Le Hasard/Mallarm_	Creative Works	1897
8014	Poemas V2/Carmona	Creative Works	1976
5430	Stochastische Texte/Lutz	Creative Works	1959
6922	La machine _crire (The typewriter)/Baudot	Creative Works	1961

Figure 5. Detail of the CSV file with 427 nodes (screen shot).
The full dataset is available for download in open access, under a CC-BY license, at
http://figshare.com/articles/Digital_Poetry_1995_2015_427_Nodes/1428661.
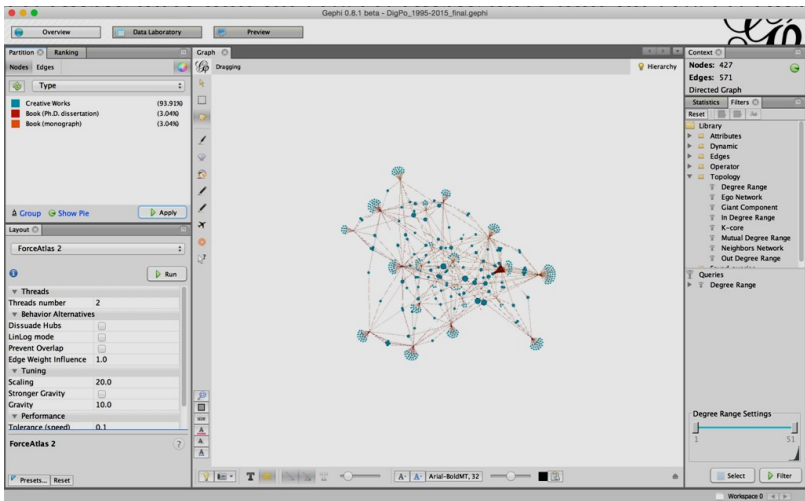
Figure 6. Gephi's interface overview menu displaying (top left corner) the partition of nodes by type and selected color. Creative works are colored in blue, book (Ph.D. dissertation) in red, and book (monograph) in orange. The graph, which is shown in the center, can be customized in different ways, e.g. layout (bottom left corner). The context (top right corner) shows 427 nodes and 571 directed edges (screen shot).

Merging Quantitative and Qualitative Critical Analysis

The bipartite network needs to be conceptualized before importing the dataset into Gephi, as its output is determined by the decisions made when editing the dataset and its labels. Once the software's interface (figure 6) is loaded, the user is able to sort the nodes' partition by type and "automatic" (default) color. Color plays a major role in the functional, semantic, aesthetic and political value of a graph. Creative works were colored in blue, book (Ph.D. dissertation) in red, and book (monograph) in orange. This decision—which can and should be questioned, but would lead us into a digressive discussion—reflects a need for strong contrast and clarity in the network, as most nodes are creative works. As the tonality of selected blue is lighter and cold, it helps us locate these units in relation to darker and warm nodes from which "fans" and "bridges" emerge.
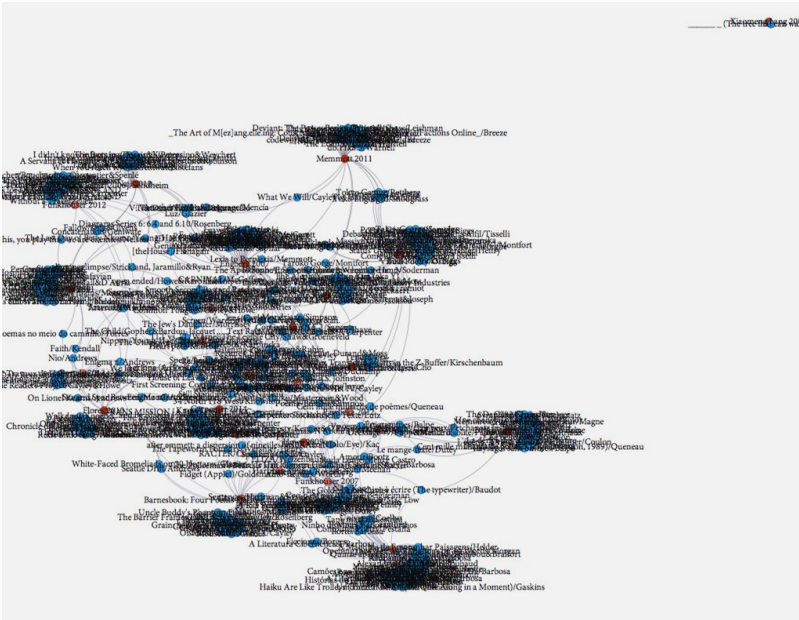
Figure 7. Image exported from Gephi. As the ForceAtlas2 layout gravity algorithm starts to run, Xiaomeng Lang's (2008) Ph.D. dissertation node (upper right) is gradually pushed out of the network, as it does not reference any creative work in common with all the other books.

Gephi incorporates features and algorithms developed by mathematicians and computer scientists. Therefore, the graph can be customized and manipulated in different ways, e.g. node size, in-degree of connections, and layout. The primary context shows 427 nodes and 571 single directed edges, after running a ForceAtlas2 layout gravity algorithm that moved Xiaomeng Lang's Ph.D. dissertation (2008) node out of the network, as it does not—according to the data entered into the ELMCIP Knowledge Base—reference any creative work in common with all of the other critical writing nodes. The first exported image (figure 7) is fuzzy, but clearly displays the red node's trajectory towards the top right corner of the graph. The ForceAtlas2 layout algorithm can prevent overlap of the nodes; it scales the graph and produces stronger gravity between nodes, consequently pulling nodes with higher in-degree closer. It forces attraction between critical writing nodes that reference shared creative works nodes, from which edges are drawn and create "bridges" or "brokers" (Walker Rettberg 2014). After ranking nodes by size, those having more edges become bigger, meaning that creative works that are more referenced populate a larger part of the graph. This process created a full picture of the most referenced creative works, as shown in figure 8 (Seiça 2015c). Here, the fans around orange and red nodes represent creative works that are only referenced by a single monograph or Ph.D. dissertation. Creative works functioning as bridges—i.e. that are referenced by two or more

critical works—attract critical writing nodes to smaller clusters appearing either in the center of the graph or in the top left and bottom left areas, while creative works commonly referenced by several orange and red nodes start to form a visible network of bigger nodes in the middle.

Figure 8. Image exported from Gephi displaying the network filtered by node and label size with a topology created by the ForceAtlas2 gravity algorithm. The creative works are ranked by size according to a scale from 1-7, where a blue node referenced only once by a book is smaller and one referenced by 7 books is bigger. A high resolution PDF is available for download in open access, under a CC-BY license, at http://figshare.com/articles/Digital_Poetry_1995_2015_Network_Visualization/1428662

Visualizations can be used for confirming or discarding hypotheses, and they can also induce recognition of patterns that can be macroanalytically investigated and read from a distance. These patterns, as Franco Moretti (2003: 74) observes, might emerge as "temporary structures," elements that relate to each other by interconnections within abstract models of knowledge representation. However, as Moretti (72) points out, "graphs are not *models*; they are not simplified versions of a theoretical structure in the way maps and (especially) evolutionary trees [are]." We can indeed count discrete units, but the fundamental approach lies on how to be critical towards a representation of a relational set of units, and so, to understand how and what questions to pose, and what answers are worth exploring—combining quantitative and qualitative analysis. "Quantitative research," Moretti continues, "provides a

type of data which is ideally independent of interpretations (…) and that is of course also its limit: it provides *data*, not interpretation." (72)

The reliability of the dataset is another, if not the foremost, arguable issue at stake here. The gathered dataset is biased—the cross-referenced records documented in ELMCIP are human-typed and not script harvested, a point already noted by Jill Walker Rettberg (2013) and Scott Rettberg (2014). This fact has positive and negative outcomes. On the one hand, code can be written in order to harvest all the bibliography from critical works and to allow for a faster and full as possible automatic documentation. On the other hand, since many authors do not reference creative works in their bibliographies, human documentation is needed and so script harvest would still be an incomplete method of pre-parameterized data-minable information.

Some of the records are incomplete, either due to their "stub" state—e.g. Chris Funkhouser's Ph.D. dissertation (1997) was not included in my data sample as none of its references were documented—or due to reasons as trivial as language access, as Walker Rettberg (2014) refers, in the case of Xiaomeng Lang's Ph.D. dissertation (2008). As table 1 (below) indicates, from the 26 records of critical writing here analyzed, 7 records are approved, which means that in principle all creative works should have been documented. In addition, as the ELMCIP KB editor notes reveal, 13 "stubs" and records in need of revision have all or almost all creative works ("cw") inserted, even if some of their critical writing references are missing. Therefore, the incomplete status of some records might compromise my findings, which should be understood as reflecting an overall pilot analysis. It is important to state, though, that the ELMCIP KB is the most complete database documenting cross-references of any of these records.

Author	Publication Type	Year	Record Status	KB editor notes
Barbosa	Book (monograph)	1996	Incomplete record (stub)	Almost all creative works harvested
Hartman	Book (monograph)	1996	Incomplete record (stub)	Harvest all refs.
Glazier	Book (monograph)	2001	Incomplete record (stub)	Almost all creative works harvested
Reither	Book (monograph)	2003	Revisions required	Check and complete refs.
Stefans	Book (monograph)	2003	Revisions required	Refs. missing
Funkhouser	Book (monograph)	2007	Revisions required	Insert full list of refs.
Hayles	Book (monograph)	2008	Revisions required	Are references complete?
Simanowski	Book (monograph)	2011	Revisions required	Refs. should be more complete

Pawlicka	Book (monograph)	2012	Incomplete record (stub)	Harvest all refs.
Eskelinen	Book (monograph)	2012	Revisions required	Add cover and WorldCat info
Funkhouser	Book (monograph)	2012	Approved record	
Portela	Book (monograph)	2013	Not yet reviewed	Added some refs. to cw but not all
Emerson	Book (monograph)	2014	Revisions required	Are references complete?
Bootz	Book (Ph.D. diss.)	2001	Revisions required	Have added refs. to cw up to p. 105
Engberg	Book (Ph.D. diss.)	2007	Incomplete record (stub)	All cw inserted. Harvest critical
Lang	Book (Ph.D. diss.)	2008	Incomplete record (stub)	Harvest all refs.
Howe	Book (Ph.D. diss.)	2009	Approved record	
Flores	Book (Ph.D. diss.)	2010	Incomplete record (stub)	Critical writing refs. missing
Gattass	Book (Ph.D. diss.)	2011	Approved record	
Jhave	Book (Ph.D. diss.)	2011	Approved record	All key critical and cw refs. entered
Memmott	Book (Ph.D. diss.)	2011	Revisions required	Pull info from Web Supplement
Rosario	Book (Ph.D. diss.)	2011	Incomplete record (stub)	Critical writing refs. missing
Dupej	Book (Ph.D. diss.)	2012	Approved record	All cw ref. and most critical writing
Naji	Book (Ph.D. diss.)	2012	Approved record	
Sørensen	Book (Ph.D. diss.)	2013	Incomplete record (stub)	
Carpenter	Book (Ph.D. diss.)	2014	Approved record	

Table 1. Critical Writing.

Zooming in several of the fans, our first question can be explored—Is there a prevalence of self-referenced creative works in critical writing? To be sure, critical discourse affects the selection of digital poems. Yet, is there a difference between practice-based critical writing and critical writing developed by scholars who are not practitioners? In this case, zooming in into each of the 26 nodes of critical writing and trying to understand what creative works they are linked to, and how they relate to each other, reveals thought-provoking findings. First, from the list of authors who are simultaneously poets and theorists, Pedro Barbosa (1996), Charles O. Hartman (1996),

Philippe Bootz (2001), Loss Glazier (2001), Brian Kim Stefans (2003), Daniel
C. Howe (2009), Talan Memmott (2011), Jhave (2011) and J.R. Carpenter
(2014) do reference their own creative works. This list is composed of 4
monographs and 5 dissertations.

Figure 9. Detail of the network shown in figure 8 (top right). Loss Pequeño Glazier's
2001 monograph (orange) fan illustrates how several of his own creative works are
only referenced by him. In the top left corner of the image, the node *White-Faced
Bromeliads on 20 Hectares* (1999) acts as a bridge between the nodes Glazier (2001) and
Flores (2010).

This can be explained by the fact that the figure of the poet and critic,
especially in many of the Ph.D. dissertations, tends to deploy a model of
criticism which is practice-based, that is, authors reflect on their own creative
process, but they also present it along with other poets' works; or authors
reflect about other poets' works and also exemplify certain critical points of
view with their own creative works. This aspect is less frequent in mono-
graphs. Notwithstanding, when zooming in the fan (figure 9) of Loss
Pequeño Glazier's monograph *Digital Poetics: The Making of E-Poetries* (2001),
the node proves to be surrounded by multiple creative works by Glazier
himself. The only poem by Glazier that is also referenced by another book is
White-Faced Bromeliads on 20 Hectares (1999)—the bridge shows how the poem
is referenced both by Glazier (2001) and Leonardo Flores (2010). It may well
be that this finding elucidates my initial argument of an apologia of one's
own standards.

Now, if from the list of 12 critical works (7 monographs and 5 disserta-
tions) and 11 authors who represent the group of poets and theorists we
subtract those who did not self-reference creative work, we are left with 2.
All authors, then, who perform both in the creative and critical stage of the
field, except for Chris Funkhouser (2007, 2012) and Manuel Portela (2013),

have in their studies self-referenced creative works. As figure 10 exemplifies, Funkhouser's fan (2012) does not show any linked poem by Funkhouser himself.

Figure 10. Detail of the network shown in figure 8 (top). Chris Funkhouser's 2012 monograph (orange) fan illustrates how none of his own creative works is referenced by himself.

Nevertheless, both Funkhouser and Portela are poets and, as such, this finding might indicate that the nature of criticism they are engaging with is exogenous and not following the endogenous majority. I would argue that there is no chief point in contending for one type of criticism over the other, since they represent different approaches to essay-based writing. I should mention, though, that the model of serious, historically rooted criticism which Funkhouser and Portela pursue—different in style, but no less serious than that of Hayles, Simanowski, Markku Eskelinen or Lori Emerson— avoids falling into a category of writing in which the author's poems are only being judged by the author herself. This model also suggests an effort to be more objective. However, a closer inspection into Funkhouser's (2007, 2012) and Portela's (2013) monographs reveals that, in fact, Portela does not refer- ence any of his creative works, whilst Funkhouser, contrary to what we can deduct from the graph, does—*MOO poems* (2007: xxiv, 204), *The Idea of Swit- zerland* (2007: 204), *Selections 2.0* (2007: 317, Note 27) and *13 States of Malaysia* (2012: 182-183). My reasoning behind this circumstance is to recognize the incomplete documentation of cross-references in Funkhouser's records, but also to situate his theoretical practice in a "grey zone," when compared to the previous authors. While all the authors reference their creative works either as a substantial bulk of their theory or as a practice-based endeavor,

Funkhouser positions them far from the central narrative of his critical discourse and does not analyze them in a self-legitimizing way.

In order to address the second question—Is there a set of digital poems which is more referenced than others?—we need to filter out works that are only referenced once. If the network visualization set displays only creative works referenced in two or more critical works, the image of the graph changes. By changing the in-degree level—that is, the number of edges between differently referenced creative works—a filtered visualization of works with specific referenced occurrences is obtained.

Setting the in-degree level to 4 drastically changes the image (figure 11). Therefore, unique works with four, or more than four references, are:

Title	Author	Year
Stochastische Texte	Theo Lutz	1959
Cent Mille Milliards de Poèmes	Raymond Queneau	1961
ELIZA	Joseph Weizenbaum	1966
Holo/Olho	Eduardo Kac	1983
Travesty	Hugh Kenner and Joseph O'Rourke	1984
First Screening	bpNichol	1984
The Legible City	Jeffrey Shaw and Dirk Groeneveld	1989
afternoon, a story	Michael Joyce	1990
Enigma n	Jim Andrews	1998
Stir Fry	Jim Andrews	1999
Text Rain	Romy Achituv and Camille Utterback	1999
the dreamlife of letters	Brian Kim Stefans	2000
Lexia to Perplexia	Talan Memmott	2000
Arteroids	Jim Andrews	2003

Now, setting the in-degree level to 7 decreases even more the number of works (figure 12). Then, creative works with seven, or more than seven references are reduced to:

Title	Author	Year
Stochastische Texte	Theo Lutz	1959
Cent Mille Milliards de Poèmes	Raymond Queneau	1961
afternoon, a story	Michael Joyce	1990
the dreamlife of letters	Brian Kim Stefans	2000

Figure 11. Image exported from Gephi displaying the network filtered by in-degree 4, meaning that only creative works referenced by four or more monographs or dissertations are included in the graph.

Figure 12. Image exported from Gephi displaying the network filtered by in-degree 7.

From all the creative works referenced by the 26 critical writing nodes, the oldest is Quirinus Kuhlmann's "Der XLI. Libes-Kuß" (1671) and the most recent are J.R. Carpenter's *TRANS.MISSION [UN.DIALOGUE]* (2013) and *...and by islands I mean paragraphs* (2013). Thus, if in the list corresponding to figure 11 we find not only poems, but also two computer programs and one hypertext fiction, in figure 12, out of the four more referenced works, one, *afternoon*, is not poetry. It is surely the case that these non-poetry works are referenced in critical writing whose scope is not restricted to digital poetry, and it is also the case that certain works, such as *ELIZA* and *afternoon* are widely discussed in connection with the critical debate within the field of electronic literature. There is then a set of three poetry works—by Lutz, Queneau and Stefans—which is referenced the most. Again, Queneau's *Cent Mille Milliards de Poèmes* (1961) and the OuLiPo's contribution to constrained writing practices are widely acknowledged in critical discourse. In fact, there are only two digital poetry works that are cited the most: Theo Lutz's *Stochastische Texte* (1959) and Brian Kim Stefans's *the dreamlife of letters* (2000).
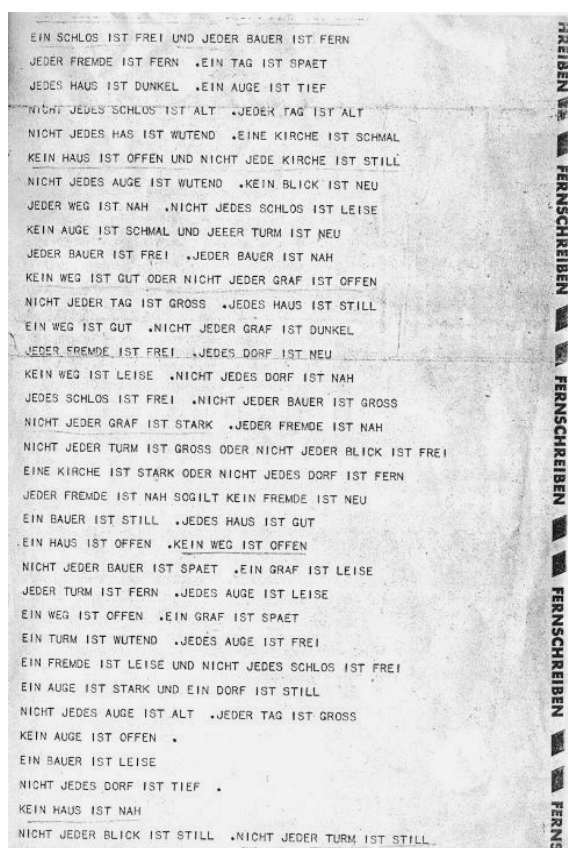

Figure 13. Printout of Theo Lutz's *Stochastische Texte* (1959), a poetry slot generator programmed by the author on a mainframe Zuze Z22, using words from Franz Kafka's *Das Schloß* (1926).

It is reasonable that Lutz's piece (figure 13), considered as the first example of digital poetry, figures among the most cited works. However, Stefans's work needs to be understood under a different light. *the dreamlife of letters* (figure 14) might have been the *right* work for the *right* platform at the *right* time. By this I mean a poem that takes advantage of the animation capabilities of Flash, and adds striking visual and new kinetic features. On the other hand, its formal approach re-instantiates many old strategies that were implemented in concrete poetry without developing an innovative and complex elaboration of temporality, as in Stephanie Strickland's or John Cayley's work, even if these authors have lesser citations of single works. It also lacks denser exploratory aspects such as multimodality, interactivity and performativity, in which code, network and real-time play a significant role, by enabling new fertile arenas for rethinking modes of writing.
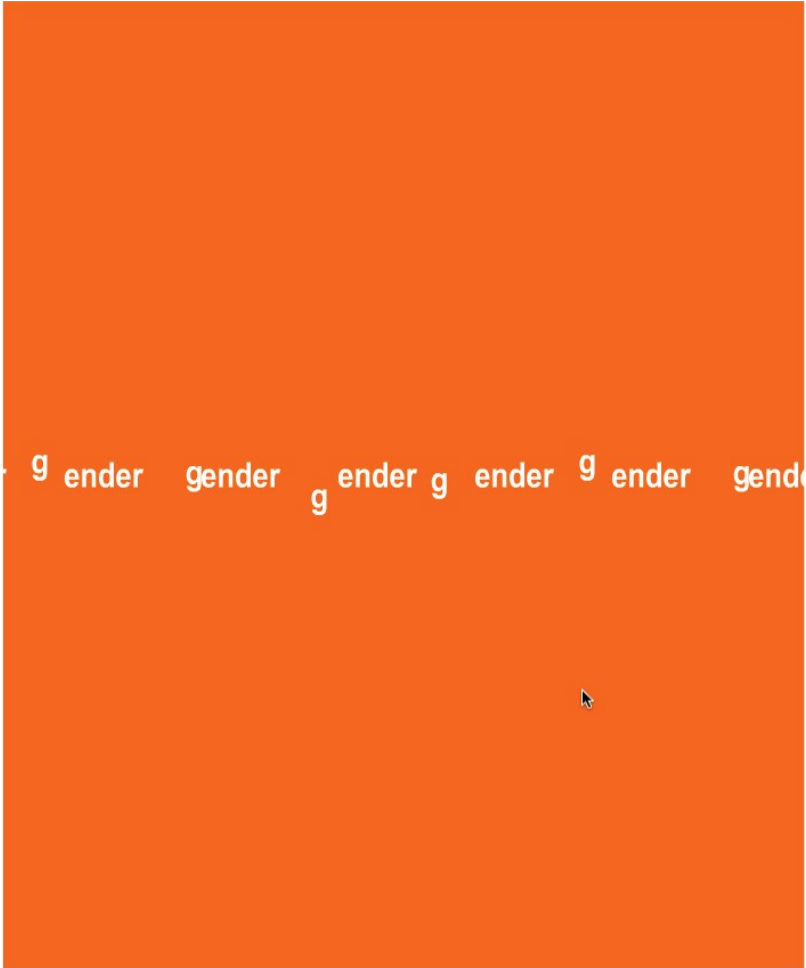

Figure 14. Screen shot of Brian Kim Stefans's *the dreamlife of letters* (2000), a kinetic poem presented in Flash, which is a response to Rachel Blau DuPlessis.

Another interesting finding is that the authors with more varied refer-
enced works are Jim Andrews, John Cayley and Young-Hae Chang Heavy
Industries. One hypothesis for Andrews's and Cayley's poems being recur-
rently cited is their long-standing practice of digital poetry, which is reflected
by temporal frame, number, diversity and quality of works. On the other
hand, Young-Hae Chang Heavy Industries, in a shorter period of roughly
one decade and a half, published a much vaster array of works, even if often
using the same platform and kinetic mechanics.

If we compare the previous list with Scott Rettberg's investigation (2013,
2014) about the creative works referenced 8 times or more in all the publica-
tion types of critical writing documented in the ELMCIP KB, we find some
similar findings, but also some differences. From a pool of 21 works—which
was retrieved on July 6, 2013 and would certainly be non-identical nowa-
days—*afternoon* also shows to be the most cited, with 76 references. It is im-
mediately followed by two other hypertext fictions: Shelley Jackson's *Patch-
work Girl* (1995, 57 citations) and Stuart Moulthrop's *Victory Garden* (1991, 37
citations). Regarding digital poetry, it is compelling to verify that *Text Rain*
(16 citations) is the most cited work, followed by *the dreamlife of letters* (14
citations). However, out of that list of 21 items, *Stochastische Texte* does not
show up, though *Cent Mille Milliards de Poèmes* (13 citations) does; and three
other works with 11 citations appear: Jason Nelson's *game, game, game, and
again game* (2007), Rui Torres's *Amor de Clarice* (2005) and Jim Andrews's
Arteroids. This suggests that if we had taken into consideration not only
books, but also all the other types of critical writing, the critical landscape of
digital poetry would be more diverse. Even though Romy Achituv and Ca-
mille Utterback's cross-genre work now dominates it, and Stefans's work still
shows up to be the second most cited, Nelson's and Torres's work punctuate
it for the first time. To be sure, there is an English-based predominance in
the database, which may obfuscate a total picture of the field. At the same
time, this contrasting analysis provides a basis to infer that *Stochastische Texte* is
most likely to be written about when in conjunction with criticism that ad-
dresses digital poetry.

To Conclude Is To Find New Questions

Distant reading methods tend to be consistent in giving account of specific
questions that can be quantified, but they also provoke unexpected out-
comes. Once we start paying closer attention to certain details of the net-
work's structure, new questions arise. For instance, what is Funkhouser's
(2007) fan doing so close to Barbosa's (1996)? And what is that nest around
Nick Montfort's *Taroko Gorge* (2009) node comprised by Memmott's (2011)
and Dupej's (2012) fans?

Figure 15. Detail of the network shown in figure 8 (right). Chris Funkhouser's 2007 monograph (orange) is pulled towards Pedro Barbosa's 1996 monograph (orange) due to common creative works that act as attractors.

Figure 16. Detail of the network shown in figure 8 (bottom left) depicting a cluster of poetry generators. Three monographs that reference Nick Montfort's poetry generator and mods created by several authors gravitate around that node.

Similar creative works referenced by two or more books attract those nodes closer, as figures 15 and 16 show. Even someone who had not read Funkhouser's (2007) and Barbosa's (1996) monographs would note that figure 15 makes clear six poetry works—by Nanni Balestrini, Ángel Carmona, Erthos Albino de Souza, Silvestre Pestana, João Coelho and Barbosa himself—that function as bridges between the two nodes, besides other common cited creative works dispersed around them. Funkhouser's fan attraction towards Barbosa's is then clear for someone who had not read it, but espe-

cially for someone who did. Why? Because both authors take a historiograph-
ical approach in their studies, and therefore cite common examples of digital
poems from the 1950s to the 1990s. Moreover, *Prehistoric Digital Poetry* draws
substantially from examples of poetry generation presented by Barbosa in *A
Ciberliteratura.*

Another not so unexpected surprise is the poetry generator cluster
around Nick Montfort's *Taroko Gorge* node. Not only do we find other nodes
representing modifications of the code, that is, creative works by Scott
Rettberg, J.R. Carpenter, Talan Memmott and Eric Snodgrass, but also these
same nodes act as bridges attracting Memmott's (2011) and Holly Dupej's
(2012) Ph.D. dissertations, the latter dedicated to poetry generators (figure
16).
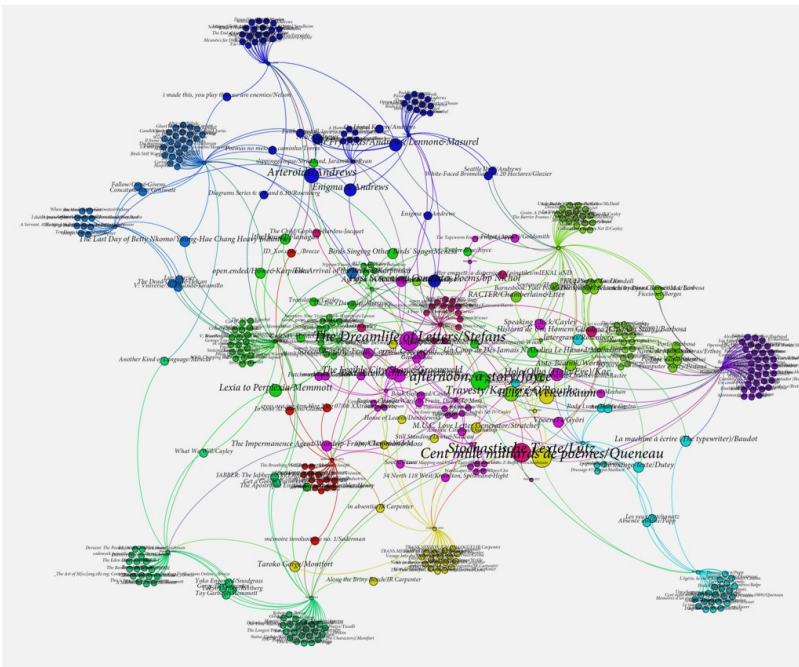
Figure 17. Image exported from Gephi displaying the network after running a modu-
larity algorithm and coloring communities.

These aspects become even more salient when inspecting the network's
structure in terms of modularity. By applying modularity algorithms, com-
munities or modules with denser connections are colored the same way. As
seen in figure 17, different clusters form inside the network—several clusters
form around references with common antecedents, that is, older creative
works that have influenced works of digital poetry, but more recent ones as
well. The poetry generator cluster emerges in flashy green in the bottom left
corner, although Carpenter (2014) clusters in yellow with Daniel Howe
(2009). Critical writing by Maria Engberg (2007), Emerson (2014) and Hayles

(2008) gets clustered in medium green, and Funkhouser (2007) becomes clustered with Charles Hartman (1996) and Glazier (2001), in lighter green, strangely enough, or not, instead of Barbosa (1996). In fact, Glazier's fan is much less dense than Barbosa's, and having nodes as well in common with Funkhouser's, the algorithm might read that density as more relevant. Eskelinen (2012), Luciana Gattass (2011) and Jhave (2011) set another cluster in purple. Bootz (2001) and Saskia Reither (2003) fulfill another cluster in light blue, while in the top left corner Giovanna di Rosario (2011) and Jeneen Naji (2012) cluster in dark blue.

Therefore, modularity underlines both initially visible and invisible clusters. It produces confirmation but it also provides some new insights—for example, Carpenter's Ph.D. thesis shows more points in common with Howe's than with Memmott's and Dupej's, despite being situated closer to these. However, Simanowski (2011) and Urszula Pawlicka (2012) connect only with one creative work, while Mette Sørensen (2013) becomes isolated. This smaller community and the single node may well prove their lesser contact with other authors, that is, either their focus is falling upon works less cited by other theorists, or their research might be in some sense more unique or independent when it comes to close reading creative works. These clusters then can be useful for identifying particular genres and themes shared by certain books.

To conclude, the process has shown that data analysis and content analysis need to be complementary, meaning that quantitative and qualitative approaches supply different information and critical views. Content analysis was irrefutably required in order to articulate the findings, but it was also necessary so that the harvested dataset could be improved.

From a set of 12 books, only Manuel Portela's *Scripting Reading Motions: The Codex and the Computer as Self-Reflexive Machines* does not reference the author's own creative works. From a set of 26 books, a number of digital poems was seen to be referenced four or more times along with a variety of creative works, attesting the use of multiple platforms, and the diversity of forms and genres of electronic literature: combinatorial poetry, textual installation, holographic poetry, hypertext fiction, chatterbots and computer programs. Theo Lutz's *Stochastische Texte* and Brian Kim Stefans's *the dreamlife of letters* are the most cited poetry works. My findings demonstrate that there are different modes of critical knowledge production, but also a high level of self-referentiality in critical discourse published between 1995 and 2015. The criticism of digital poetry in book form shows a wide range of creative work selection (401 unique works), but evidences a lack of diversity of digital poems frequently referenced.

This investigation can be further expanded, both at the methodological level—by addressing the limitations of data that can be mined from the ELMCIP KB—and at the theoretical level, by reasoning behind the patterns retrieved in network graph visualizations. Being a pilot data analysis, it will be

relevant to compare the current findings with those obtained in the future once these references of creative works in critical writing are fully documented.

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