

# White Paper Report

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## WHITE PAPER

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### ***Manos Teatrales: Cyber-Paleography and a Virtual World of Spanish Golden Age Theater***

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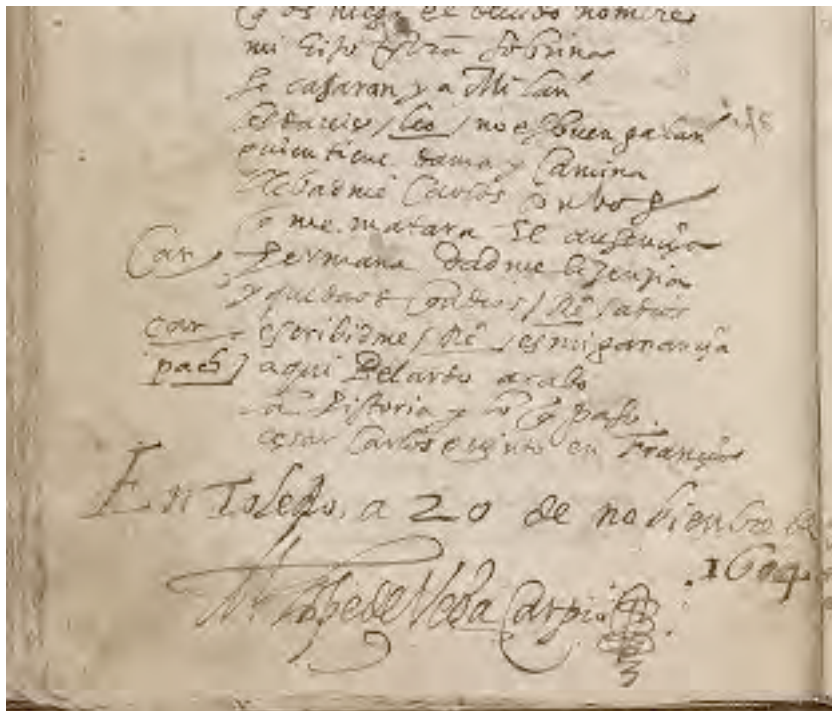


Reconstructed 17th-century *corral* (public theater), Almagro, Spain

### **Brief Introduction**

Literary scholars, historians, archaeologists and others spend large amounts of time analyzing old manuscripts, notary records, account books and letters. Both before and after Gutenberg, the history of artistic, social, or political events is often recorded in handwritten drafts of books, dramas or music scores, and in the correspondence of authors and personalities with the world around them.

In the *Manos Teatrales* (Theatrical Hands) project, literary scholars, historians and computer scientists are developing manual and automatic methods for the analysis of rich manuscript collections, and of the society that surrounds them, using as a case study the surviving treasure-trove of manuscripts of Spanish Golden Age Theater, like this manuscript of Lope de Vega's *Carlos V en Francia*, (U. Penn Ms. Codex 63), along with related archival records. Lope signed the last page seen here in Toledo, on November 20, 1604, linking with his name the initial "M" for Micaela de Luján, an actress whom he loved.



Our cyber-paleography effort aims at building a live, layered virtual world on the web to connect librarians, scholars, students, and interested people anywhere with those theaters. A first layer now connects digitally restored images of manuscript pages to descriptions of the pen strokes on paper. Manual analysis of these descriptions are yielding profiles of

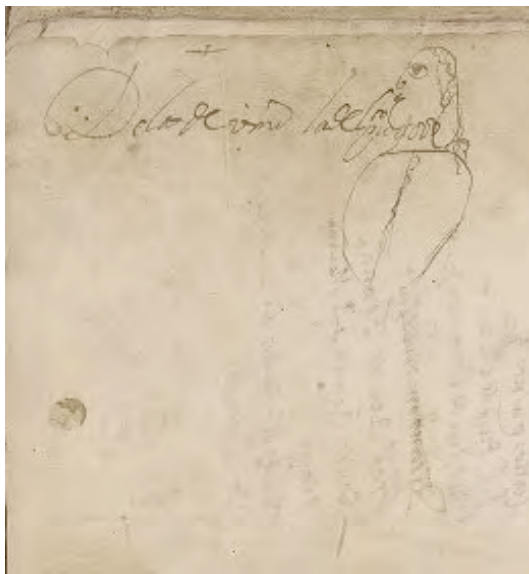
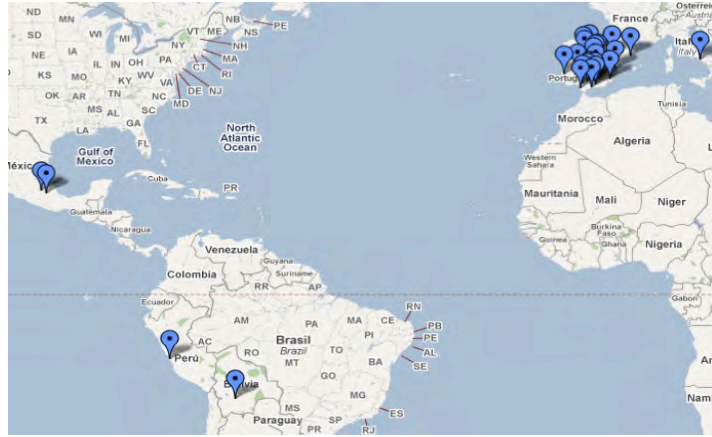
the writers' handwriting styles, and enabling semi-automatic inferences about who wrote what and when. We are concurrently developing semi-automatic processes based on machine learning methods to accomplish this analysis more efficiently. A second layer is connecting sources to individual and collective histories of the theater community and to the larger society, assisting scholars in understanding it, and inviting students to explore a fascinating historical world. A third layer describes to both humanists and scientists the techniques and continuing challenges of cyber-paleography.

### Project History

In the *Manos Teatrales* (Theatrical Hands) project, literary scholars and computer scientists are developing manual and automatic methods for the analysis of a major manuscript collection and of the society that surrounded it. Theater in "Golden Age" Spain, as in Elizabethan England and Classical Greece, flourished as a central cultural institution. This map shows locations of 17th-century *corrales* (public theaters). From the late sixteenth through early eighteenth centuries, drama was the most popular form of

entertainment throughout the Spanish empire, performed in public theaters, on palace stages, on carts in city streets, and aboard ships to America.

Great playwrights—Lope de Vega, Tirso de Molina, Calderón de la Barca, Ana Caro, and Sor Juana Inés de la Cruz—and dozens of other writers penned thousands of dramas to meet the insatiable demand. (Below, a drawing on the *Carlos V* manuscript)

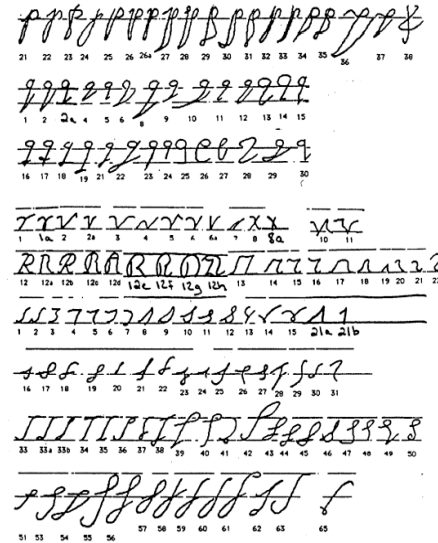


Thanks to Spain’s dry climate and precocious bureaucracy, hundreds of autograph, partially-autograph and unsigned manuscripts of the plays survive. Although there are good moderns editions based on great dramatists' autograph manuscripts, little had been done with the hundreds of unsigned manuscripts that survived in the libraries and archives of Madrid, Barcelona, Toledo, and other cities of Spain, Italy, France, England, the U.S., Mexico and Peru. In the Biblioteca Nacional Española (Spanish National Library or BNE) and the Theater Institute of Barcelona alone, they number well over

1,500. In a few cases, scholars have succeeded in identifying the copyists of such manuscripts, yielding information valuable for evaluating those manuscripts and for understanding the organization and operation of the theatrical working community. They show that some copyists worked closely with dramatists, making clean copies of their drafts, while other manuscripts reflect the work of a theater company owner who cut or expanded the text to suit his company’s capabilities and his sense of audience preferences. Others made copies for specific actors, or for sale, and a few, anticipating hand-held camera movie pirates, made their copies from memory after seeing a performance.

In 1985-6 Greer developed a system for describing individual handwriting in a numerical form that could be stored and searched in a database, using a numbered letter form sheet (sample here; full sheet in Appendix). Storing that description

along with other relevant information from the manuscript and archival sources, she began populating the database with assistance from US and Spanish graduate students, aiming at print publication. Rising salaries in Spain then made that plan impractical and work on Manos stopped for a decade. In 2000, with digital advances and web publication making even a partially-completed Manos database feasible and useful, Greer revived and updated the project, now available at <http://www.manosteatrales.org>. In 2008, the directors of the Biblioteca Digital Hispánica and of Technical Services at the BNE agreed to an official collaboration with the Manos project and to supplying digital images free of cost.



Carlo Tomasi, Professor of Computer Science at Duke, joined the Manos project in the fall of 2007. Tomasi and Greer developed the “cyber-paleography” techniques during the 2008-09 academic year with the help of a grant from the Provost’s Common Fund at Duke and with digitized images in various resolutions supplied by the BNE and other collections and digital photos made by Tomasi at the Biblioteca Palatina in Parma, Italy.

As well as the NEH Start-Up Grant Level II award for the period September 2009-August, 2010 (extended to December, 2010), the Manos Project was awarded an American Council of Learned Societies Digital Innovation Fellowship for January 1 to December 20, 2010.

### Project Activities

With the combined NEH and ACLS funding, Greer, post-doctoral research associate Alejandro García-Reidy and several part-time graduate student research assistants analyzed manually and / or verified the analysis of 140 additional manuscripts during the grant period, bringing the total number of manuscripts thus analyzed to more than 400. At present, 629 records contain writer profiles of 408 different copyists, a statistical account of the shape properties of letters, orthographic practices, lines spacing, and other characteristics of that writer. (Some copyists appear in multiple manuscripts, while other manuscripts include portions by multiple copyists.) The database currently includes 2,934 manuscripts. We secured digital images of relevant pages or whole manuscripts and worked with Hannah Arps, Director of Humanities IT support at Duke, to link them to the analysis of each manuscript. This proved a time-consuming process for manuscripts containing multiple hands. We incorporated in the database a field that includes a live link to the 149 digitized manuscripts thus far published with stable web addresses by several libraries (the University of Pennsylvania Library, the Boston Public Library, and the BNE, or those of the Institut del Teatre of Barcelona, available through the Biblioteca Virtual Miguel de Cervantes. Other improvements in the database included adding the

capacity to search globally for dramatists by name, whether they appear as first, second, or third author of jointly-written manuscripts, adding biographical information on dramatists, and creating a field in which to record licenses for performance when they appear on manuscripts.

Having upgraded to the latest version of FileMaker on the Duke server, we prepared new illustrated manuals both for users of the database and for analysts (sample below).

#### b) MANOS TEATRALES: ESTRUCTURA Y USO

1. En el menú principal observará la existencia de diez campos a los cuales podrá acceder pulsando encima: manuscrito, documento, analista <sup>1</sup>, copista, dramaturgo, lista de compañía, tres campos referidos a la mano copista (el primero: mano; el segundo: mano asociada a manuscrito, y el último: mano asociada a documento); representaciones, bibliografía e imágenes.

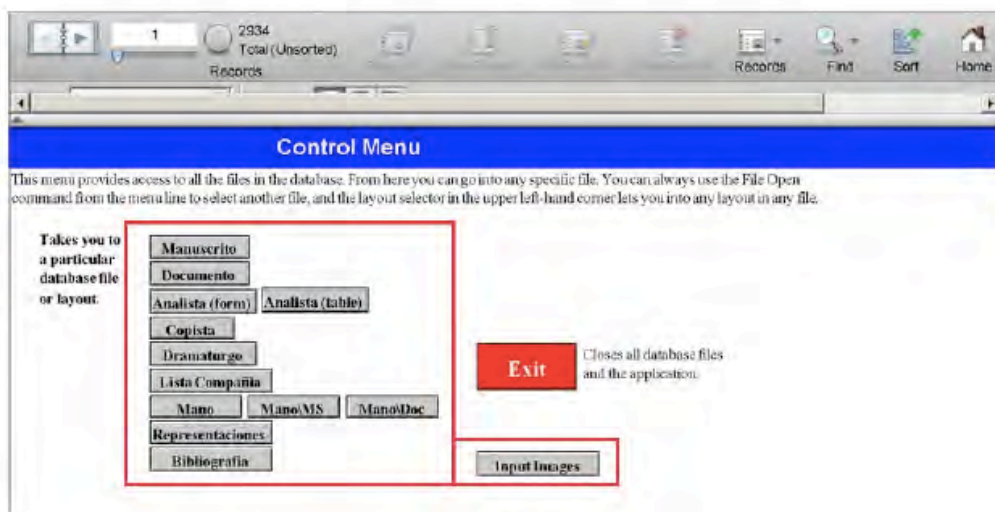


Ilustración 4

2. Siempre que acceda a uno de estos campos podrá volver al “Menú principal” pulsando “Control”.

The user's manual can be downloaded from the Manos Teatrales login-page, (<<http://www.manosteatrales.org/Welcome.html>>).

Alejandro García-Reidy, who played a key role in preparing the *Diccionario biográfico de actores del teatro clásico español* (DICAT), published by T. Ferrer Valls in 2008, used his experience with that resource to identify the actors and actresses in cast lists that appear on over 100 of the manuscripts analyzed. This information, combined with that of licenses, enabled us to date the manuscript and performances

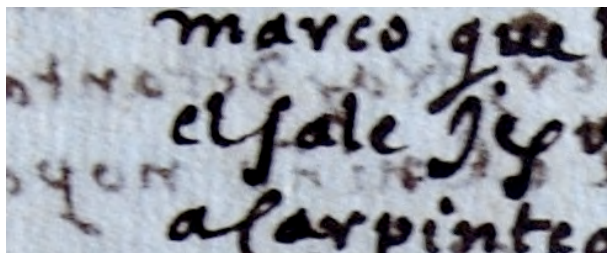
of the play and follow the life of the manuscript as it travelled to cities around the peninsula and in some cases, from one theater company to another. Much of this information is supplemental to *DICAT*, which drew primarily on published works.

Other accomplishments of the project to date have included: 1) identifying, by combining analysis of the copyist and archival data, a Lope de Vega play presumed lost; 2) correcting incorrect bibliographic and cataloging information of manuscripts in various libraries; 3) identifying and explaining the nature of manuscripts that were made as actors' copies rather than for or by company owners or prompters; 4) identifying the writers of several manuscripts made by "memoriones," the early modern equivalent of video pirates; and 5) identifying a substantial group of professional copyists who appear to have made manuscripts for sale either to theater companies or readers.

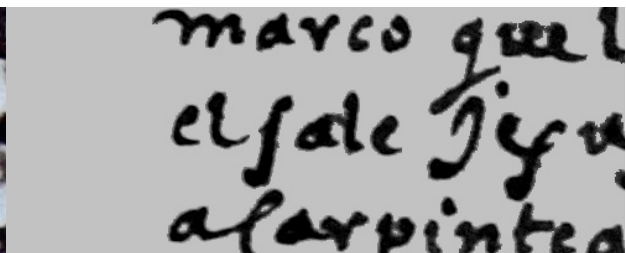
Greer secured agreements of cooperation from the directors of three other libraries besides the BNE, all of which greeted the project with great enthusiasm: the Institut del Teatre in Barcelona, the Biblioteca del Real Palacio (Madrid), and the Biblioteca Histórica Municipal (Madrid). We have particularly appreciated cooperating with another NEH Digital Humanities grantee, the University of Pennsylvania project directed by Nancy Shawcross that digitized the rich UPenn Medieval and Renaissance holding. Their two beautifully digitized and catalogued Lope de Vega manuscripts, one of which illustrates this report, were the first to which we made live links in our project.

### **Computer-assisted manuscript processing and hand-identification**

Tomasi and Duke CS graduate student Rolando Estrada developed an improved method for removing the ink bleed-through that makes reading old manuscripts difficult. The method, described in the article included in our appendix, uses hysteresis thresholding on blind- or single-sided digital images of manuscript pages. This cleaning of bleed-through will be essential for the most automated transcription and hand identification. Tomasi and Estrada also began experimenting with methods for differentiating manuscript hands, but then Estrada was switched to a project with full industry funding and Tomasi became Chair of the Computer Science Department and could not continue work on our project.



*Original manuscript with bleed-through*



*Manuscript after cleaning*

Greer is now working with Antonio Quiroga, a physics professor specialized in vision at the Universidad Complutense of Madrid, who is developing a three-stage process for computer-assisted hand identification. The first stage will involve developing a computer program that will classify the letter forms isolated by an analyst in a digital manuscript image according to the categories in the Manos letter sheet, using mathematical probability to evaluate the match. This will not only speed up the process of analysis but also improve consistency, eliminating the necessity of having a second analysis verify that of the first. The second stage will involve programming to identify all occurrences of a given letter form in a selected sample. In a third stage which, having observed the work of Tomasi and Estrada, we still consider hypothetical, machine-learning algorithms could be trained on sample pages by a given writer, and could subsequently transcribe text on their own. When in doubt, the algorithm could present an analyst familiar with the particular discourse a small menu of alternative transcriptions for a highlighted word, and learn from the resulting feedback to improve its own performance.

## **Audiences**

To expand the audience for the project, Greer continued her earlier presentations for various scholarly groups. During the grant period these included a seminar presentation for the University of Pennsylvania History of Material Texts Seminar, as well as a workshop presentation for Penn graduate students, a lecture at Boston College, and a keynote address at the major Spanish theater conference in Almagro, Spain. The last of these was published in the conference *Actas*. García-Reidy also gave presentations of work relying significantly on Manos in several venues: the 2009 AITENSO conference in Olmedo, Spain, the 2010 AHCT Symposium on Golden Age Theater in El Paso, and the 2011 Northeast Modern Language Association meeting in New Brunswick, N.J. He has several articles drawing on Manos in publication (see Appendix bibliography).

Greer was invited to submit an article on the Manos project, "Authority and Theatrical Community: Early Modern Spanish Theater Manuscripts," for publication in the 40th anniversary issue of *Renaissance Drama*. She has also tentatively agreed with a reporter to do a televised interview on the Manos project and the role of the resources of the Institut del Teatre on her next trip to Barcelona.

Carlo Tomasi and Rolando Estrada presented their work, "Manuscript bleed-through via hysteresis thresholding," at the 9th International Conference on Document Analysis and Recognition, Barcelona, 2009.

Finally, the Manos Teatrales project has been included as part of the TC/12 "Patrimonio Teatral Clásica Español" macroproject, the first Humanities project to win such support by the Spanish Ministry of Science and Innovation within the ambitious Consolider-Ingenio 2010 program (<<http://tc12.uv.es/tc12/>>). That team wishes to foreground the Manos project as one of the most technically innovative activities it sponsors and they are assisting us in redesigning our web presentation to highlight and draw increased traffic to it.



## Continuation

The Manos Teatrales project will continue until we succeed in analyzing all relevant manuscripts. A wide range of scholars and students have recognized it as an important resource for scholarship on Spanish classical theater and as a model for work that might be done in other fields that rely on paleographic analysis. Thanks to its online presence, it is being used by individual researchers and other research projects, such as "CATCOM. Las comedias y sus representantes: base de datos de comedias mencionadas en la documentación teatral (1540-1700)" (<<http://www.uv.es/dicat/catcom.html>>). Quiroga's plan for computer-assisted analysis will speed up the process of manuscript analysis, enhance consistency of analysis, eliminate the need to have two analysts examine each text, allow us to broaden our group of analysts and complete processing of the manuscripts more quickly. Once Quiroga's method is operative, Greer will apply for additional grant funding. In the interim, we will continue with our manual method of analysis, financing the work with Greer's Duke research funds. Five Spanish graduate students will be working with Manos this summer, two of them experienced analysts, three new to the project.

To begin the work of the promised construction of a virtual world of Spanish Golden Age theater, in the spring of 2012, Greer plans to teach an advanced undergraduate / graduate course to be cross-listed between Spanish, Theater Studies, and Information Science + Information Studies (ISIS). Thereby, we aim to place both old play manuscripts and modern theater enthusiasts in virtual equivalents of the complex spaces that dramatists, actors, actresses, copyists and spectators inhabited in early modern Spain.



Corral de comedias, Almagro, Spain. Photo courtesy of Robert G. Greer



## II. Participating personnel

\* Currently active    + Joining Manos in summer, 2011

- \* Margaret R. Greer, Duke University, Project Director
- \* Alejandro García-Reidy, U. de Valencia PhD, Duke University, Assistant Director
- Carlo Tomasi, Duke University, Professor, Chair, Computer Science
- Rolando Estrada, Duke University PhD student
- \* Hannah Arps, Director of Humanities IT, Duke University
- \* Antonio Quiroga, Universidad Complutense, Madrid
- \* Joanna M. Barros, Duke University PhD, Elon College
- \* Alejandra Ulla Lorenzo, Universidad de Santiago, Spain
- \* Noelia Fernández, Universidad de Santiago
- \* Francisco López-Martín, Duke U. PhD, Denison University
- + Alejandra Juno Rodríguez Villar, Duke University PhD student
- + Leticia Mercado, PhD student, Boston College
- + Esteban Mayorga, PhD student, Boston College
- \* Guillermo Gómez Sánchez-Ferrer, PhD student, Universidad Complutense, Madrid
- Javier Krauel, Duke University PhD, U. of Colorado, Boulder
- Yolanda Fabiola Orquera, Duke University PhD, Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina
- Katie MacLean, Duke University PhD, Kalamazoo College
- Brooke Campbell, Emory University PhD, U. of Georgia
- Heraldo Falconi, Lecturer, Vanderbilt University
- Karen Serwer, Duke University PhD, St. Louis University,
- Talia Weltman, Duke University PhD, Wayne State University
- Mina García Soormally, Duke University PhD, Elon College
- Zachary Erwin, Duke University PhD, Swarthmore University
- Marcos Cantelli, Duke University PhD, Resident Director, Duke in Madrid program
- Rebecca Ingram, Duke University PhD., University of San Diego
- Martin Repinecz, Duke University PhD student
- Fernando Rodríguez-Gallego, U. of Santiago PhD, Postdoctoral Fellow, Duke U.
- \* María Hernández Fernández, U. Autónoma de Madrid PhD, Independent scholar, Barcelona

#### IV. Publications

Rolando Estrada and Carlo Tomasi, "Manuscript bleed-through via hysteresis thresholding," *icdar* 2009, <<http://www.sciweavers.org/publications/manuscript-bleed-through-removal-hysteresis-thresholding>>

Alejandro García-Reidy, "La trayectoria escénica de Bien vengas mal y el manuscrito 15633 de la BNE," in *Anuario Calderoniano*, V, forthcoming.

Alejandro García-Reidy, "«Y puso debajo de su jurisdicción a todos los farsantes»: el primer Lope y las compañías de actores en la génesis de la Comedia Nueva," in *Papeles de Teatro*, I, forthcoming.

Alejandro García-Reidy, "Mujeres y criados, una comedia recuperada de Lope de Vega," in *Revista de Literatura*, forthcoming.

Alejandro García-Reidy, "Spanish comedias as Commodities: Possession, Circulation and Institutional Regulation," in *Hispanic Review*, forthcoming.

Margaret R. Greer, "Authority and Theatrical Community: Early Modern Spanish Theater Manuscripts," Invited article for the *Renaissance Drama*, 40th anniversary issue, 2011.

Margaret R. Greer, "El nuevo arte de leer manuscritos y de visualizar el mundo teatral," *Actas de las XXXII Jornadas de Teatro Clásico, Almagro, 2009*. eds. Felipe Pedraza Jiménez et al, Almagro: Festival Internacional de Teatro Clásico de Almagro, 2010, pp. 99-119.

Margaret R. Greer, "Early Modern Spanish Theatrical Transmission, Memory, and a Claramonte Play." in *Hispanic Studies in Honor of Robert L. Fiore*. eds. Malcolm Compitello, Chad Gasta et al. Newark, Del.: Juan de la Cuesta, 2009. pp. 261-280

Margaret R. Greer, "La mano del copista: Diego Martínez de Mora interpreta a Calderón," *Anuario Calderoniano* I (2008) 201-221.

Margaret R. Greer, "Manos teatrales: Un recurso para la identificación de copistas teatrales iberoamericanos." *La edición y anotación de textos coloniales hispanoamericanos*. Eds. Ignacio Arellano and José Antonio Rodríguez-Garrido, Pamplona: Universidad de Navarra, 1999, 189-211.

Margaret R. Greer, "From Copyist to Computer: Identification of Theatrical Scribes of the Siglo de Oro." *Bulletin of the Comediantes*, 40 (1988) 193-204.

Margaret R. Greer and Alejandra Ulla Lorenzo, "El proyecto 'Manos teatrales'," *Anuario Calderoniano* I (2008) 407-411.