Emotion and the Seduction of the Senses, Baroque to Neo-Baroque

Edited by
Lisa Beaven and Angela Ndalianis

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Chapter 5

The Role of Emotions in the Characters of Pedro Calderón de la Barca's *Autos Sacramentales*

Javier de la Rosa, Adriana Soto-Corominas, and Juan Luis Suárez

Introduction

More than sixty years passed between Lope de Vega's hegemony as the most successful playwright and the rise in popularity of Pedro Calderón de la Barca (1600–1681) as the most celebrated and popular author of the second half of the 1630s in Spain.[1] During these years, emotions were the only constant element in the poetry and literary production of all authors that attained success. For the long time during which theater was mainly considered a spectacle, and only later established as a publishable product,[2] theatrical practice made increasingly more use of dramatic artifacts in order to build a sort of stack of dramatic techniques in which more recent methods did not cancel out the previous ones.[3]

Although in its first phase theater was especially dependent upon poetic text—keep in mind that this theater is always written in verse—the construction of the Coliseo del Palacio del Buen Retiro (1634) as part of the cultural propaganda and support of the arts by the Conde-Duque de Olivares,[4] meant the beginning of a new cycle of performance that would be transferred to all theater stages.[5] For the inauguration of the Coliseo del Retiro, Calderón composed the comedy *El nuevo Palacio del Retiro* (*The New Palace of El Retiro*) and began to work with Italian scenographers Cosme Lotty and Baccio del Bianco in a collaborative process that would produce even more sophisticated works in terms of special effects, use of technology, and elaborated scenography.[6] Lotti and del Bianco were, in fact, engineers who had previously arrived in Madrid to take charge of different tasks related to the ponds, gardens, and theaters of the royal palaces.

The use of varied spaces in theater constituted a second line of development in Calderón's theater of imagination.[7] Calderón exploits a concept of theatrical space, and ultimately of the theater itself as a total show that stems from the notion of imaginary space. This conception has its source in the theaters of memory from Renaissance humanism, and in the Jesuitical conception of imagination as the place of negotiation for affection.[8] Calderón had studied at the Colegio Imperial in Madrid, a school run by Jesuits, and was therefore well acquainted with both sources. Proof of this comes from the most theoretical reflections about art that Calderón puts in his characters' mouths, in which theater is conceived as a stage of imagination.[9] In this sense, imagination is the conduct

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that triggers the affection of a character's senses by means of the actor's body and his voice; horror, admiration, news, marvels, and the linguistic play are the effects of the conceptual rhetoric of baroque poetry.[10]

While this meta-theatrical conception manifests itself in all of the texts by Calderón, its practical implementation changes depending on the dramatic spaces. Spanish baroque authors initially worked in public theaters, which were known as *corrales* ("farmyards"). The most famous *corrales* are in Madrid: el Corral del Príncipe ("The Prince's Farmyard") and el Corral de la Cruz ("The Farmyard of the Cross"). These *corrales* had a relatively small stage that had, at its sides, stands where the public could sit, and, at the back, a wall that was known as the "dressing building." It was precisely this wall that would open up in several ways to uncover different spaces that would oftentimes represent balconies, and which would accommodate the representation of remote places, magical effects, or extraordinary events that extended the boundaries of reality.[11] In contrast, the Coliseo of Buen Retiro was already a theater of the Italian type, based on the Teatro Farnese in Parma (1618) with a larger stage, a proscenium arch, a curtain, space at the back to create the illusion of perspective, and machines to re-create special effects.

Apart from these indoor theaters, which were mainly dedicated to the public from the city and from the court, Calderón used to work in open spaces such as palace gardens. For example, *Amor, honor y poder* ("*Love, Honor, and Power*"), performed in 1623, was represented on three different stages: the ponds in Parque del Retiro, and the squares and streets of Madrid. This diversity of theatrical spaces correlates well with the diversity of genres that were popular at the time, stretching from traditional comedies (or the "standard plays") and *autos sacramentales* (religious plays of allegorical nature), to the so-called "brief" genres (such as *entremeses*, *jácaras*, and *mojigangas*), to *zarzuela* and opera. Although *zarzuelas* and operas were typically created with a royal theater in mind, they were often represented in commercial theaters with less technology. This variety, in which Lope de Vega's poetry was key to satisfying the taste of the demanding audience, manifests itself in the diversity of topics with which these works deal, ranging from honor plays to *comedias de capa y espada* ("cloak-and-dagger comedies"), to *enredo* (situational comedies), and to the progressively more frequent presence of mythological topics in Calderón's most spectacular plays.[12]

Aside from spaces and themes, it may be claimed that Spanish baroque theater was a theater of emotions that constantly evolved, thanks to the public's unquenchable thirst for plays that were full of novelty and excitement. It is clear that as theater plays gained spectacularity, more technological and musical resources were used by the playwright to surprise the audience. However, it is important to bear in mind that literary and theater devices were always present in these works, and were never smothered by technology and special effects. Spanish baroque theater had the intention to affect its audience's imagination and senses, which, after all, shape the emotions.

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In the aforementioned division of Calderón's works into comedies and *autos sacramentales*, it is commonplace to attribute a greater emotional content to the former since their rhetorical structure and the possible range of topics and characters allowed for greater creative freedom. The manner in which comedies were composed in Calderón's time generally followed the rules and formalities postulated by Lope de Vega in his *Arte nuevo de hacer comedias en este tiempo* (*New Art of Writing Plays in this Time*, 1609). However, authors were subject to an ever-changing market due to the great number of plays being presented at the same time. Additionally, the market was influenced by the varying sociological characteristics of the audience that attended the plays.

The thematic scope of the *autos sacramentales*, always played in public venues during the feast of Corpus Christi and written to exalt the mystery of the Eucharist, is relatively more limited compared with other genres. To start with, the plays that were to be presented were selected by the city hall.[13] Consequently, only the most popular authors of the time were likely to be chosen to write the plays. In addition, the topic of the play was restricted to just the mystery of the Eucharist, which, at least, could be approached from a variety of perspectives, such as biblically or historically.[14] It was certainly the allegorical nature of the majority of the characters, such as *el Autor* ("the author"), *el Mundo* ("the world"), *el Pastor* ("the priest"), or *la Belleza* ("the beauty"), which restricted the rhetorical possibilities of authors such as Calderón.[15] In many passages, the *autos* devote many verses to gloss over abstract theological issues—such as guilt, freedom, grace, or creation—or use the characters as bearers of virtues and vices. Due to this, the *autos* have been frequently studied as "intellectual" plays with an important theological and philosophical component that communicated a specific anti-Protestant message to a homogeneous audience.[16] Thus, the *autos* are an essential part of baroque counter-Reformist Catholicism.[17]

However, the reality of the *autos* is rather different, as these are complex works that appeal to the religious inclinations of spectators by also targeting their emotions.[18] If the social setting of the *autos* is marked by the Corpus Christi festivities, the celebration of the Eucharist, and the strong theological messages that conform to the Catholic dogma, then the dramatic nature of the *autos* still represents the artist's freedom and the open nature of the baroque work that are typical of seventeenth-century Spanish dramas.[19] Regardless of the social and religious role of the *autos*, or, more precisely, in order to be effective in fulfilling that social role, the main goal of the playwright was to move his audience by playing with the emotions by means of language, staging, and the evolution of the characters.[20]

In this study, we have researched the extent of the presence of emotions in the text of Calderón's *autos* with the help of a massive yet detailed study of the sentiments expressed by the characters that Calderón created. We have also delved into the distribution of these emotions by studying the occurrence of positive and negative sentiments among different typologies of characters, in order to offer a more nuanced view of the psychology of these characters, even those that are of an allegorical nature.

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It may be claimed that the *autos* fulfilled the four characteristics that José Antonio Maravall used to describe the culture of the baroque; these characteristics being that the baroque was direct, massive, urban, and conservative.[21] The *autos* were organized and funded by city hall as part of a specific type of religious festivity, and were directed to the masses of Madrid, who would attend the public representations staged in Madrid's public squares. The *autos* were, above all, dramatic spectacles that played an important role in spreading an ideological agenda more related to the Catholic church and religion than to the apparatus of the state. As spectacles infused with the poetics of the baroque, the *autos* were complex pieces of theater, structured in such a manner that they could appeal in different ways to the various social and economic groups that were the audience of early modern cities. That is, neither the homogeneity of the theological message that the *autos* conveyed, nor the allegorical nature of the characters, precluded the authors from composing multi-layered plays that aimed at both the emotions and the intellect of the spectator.

Thus, it is also true that the range of emotions and the intensity in the *autos* by Calderón also lent his craft to the principles of extremism and suspension that Maravall uses to define baroque techniques. That is, even if we accept that Calderón's *autos*—and especially *El gran teatro del Mundo* ("*The Great Theater of the World*")—are the best example of Maravall's vision of the Spanish baroque, these same *autos* are built through a toolbox of rhetorical resources that rely on the senses, the imagination, and the emotions of the spectator. The rhetorical and spectacular resources that play with the audience's emotional states fit in well with what Angela Ndalianis calls the "assault on the sensorium."[22] The assault on the sensorium that Calderón exploits is achieved through the classical theory of imagination.[23]

This theory of imagination, based on Aristotelian psychology and brought into modernity via multiple transformations, claims that imagination—one of the human body's inner senses—is actually part of the human being, and is used to filter what is perceived by external senses in its way to the most noble parts of the soul.[24] In the Neoplatonic branch of this tradition that highlights metaphorical knowledge, imagination was also part of human existence, and it had been formed with materials of a superior world, which was useful in explaining why humans had access to phenomena that belong to the afterlife, to magic, and to astrology.[25] Calderón would later exploit all these elements as part of his theatrical practice in an attempt to amaze, affect, and suspend his audience's emotions. The transition from psychology to dramatic poetry, as well as the poetry of baroque sermons, took place thanks to plays like *Examen de ingenios para las ciencias* (*The Examination of Men's Wits*), performed in 1575 and written by Huarte de San Juan, and *Philosophía Antigua Poética*, penned by Alonso López Pinciano in 1596.[26] In this way, when Lope de Vega composed his *Arte nuevo* in 1609, and claimed that satisfying the spectator's thirst was the only criterion that an author should follow in order to be successful in the Spanish theater industry, he was basically adapting the theory of imagination to baroque and contemporary aesthetics. In order to develop his theater of imagination and emotions,

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Calderón was inspired by this aesthetic position and by diverse established practices in different decades of commercial theater and public performances.

In this way, a comprehensive study of the role of sentiments in the creation of the characters of the *autos* will help us understand how baroque theater created massively successful performances for many decades precisely by appealing to emotions and opinions that the audience may have shared. It seems likely that the sensorium apparatus of baroque theater was much more complex and more dependent on the creation of emotions and sentiments than has been previously believed by mainstream critics of Calderón's work.

In recent years, with the emergence of the Internet and the so-called Web 2.0, sentiment analysis has become an essential technique in decision-making processes.[27] Most companies and brands desire consumers' perceptions and opinions of their latest products so that their marketing strategies can be modified accordingly. The basic computational treatment of opinions consists in determining the semantic orientation of a text, that is, whether the text is expressing a positive or negative message. In order to establish this polarity, previously evaluated texts need to be provided and used as a baseline upon which new and unseen texts are assessed. Sentiment analysis is typically conducted using massive amounts of online comments and reviews already evaluated in popular sites, forums, or social networks. With a set of texts assessed by humans, techniques from natural language-processing and machine-learning allow us to build software programs able to predict the polarity of an arbitrary text. This software, usually referred to as classifier, allows companies to gain insight into what consumers loved most about their new car, or what people disliked in regard to their new gadget, insights that are always based on past opinions.

In this process, the flow always goes from people to products, since it is people who influence how the product will be modified in the future. The question we ought to ask, then, is whether we could use the inverse approach in order to influence how people feel by purposely altering a product feature. Taking this one step further, we could also ask whether people's reactions could be altered by creating a specific discourse. Looking at the field of psychology, there seems to be evidence that one may do so. The anchoring effect, by which individuals, when given a hint or an "anchor" in a question, tend to choose a response that bears a relation to the initial anchor, is an example of how people's reactions can be modified by the presence of a specific previous discourse.[28] Whereas previous studies have examined the extent of this effect mainly through the interaction of a question and a subsequent response, we speculate that adding anchors in a more subtle way—namely, by using the power of the theatrical metaphor, rhetorical tools, and interpretation—will yield similar results. In fact, the importance of language in the creation of emotional experiences and perceptions has been recently brought to light in developmental and cognitive science: "Language plays a role in emotion because language supports the conceptual knowledge used to make meaning of sensations from

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the body and world in a given context."[29] This notion of language as the "glue" that binds concepts to embodied experiences allowed Calderón to shape the processing of sensory information to create emotional experiences and perceptions.

If this is so, we would be able to understand why Maravall oscillates in his theory between two sets of ideas that are apparently contradictory. On the one hand, he defines baroque culture as a culture that is focused on the control of the masses. On the other hand, he refers to certain mechanisms of play and baroque work creation that appeal fundamentally to the *individual* emotions of spectators. But if we accept that the mass nature of baroque theater makes the dispersion of ideological and religious information more efficient, and that this dispersion makes use of mechanisms such as the provocation of emotional responses by means of the careful construction of the dramatic discourse, both parts of the Maravallian theory could be harmonized. In addition, we would have a more nuanced explanation of the affects that target the masses, and those affects that target the emotional individuality of the urban spectators from different social classes. Thus, we hypothesize that this tension has been extensively used by authors of plays of all times. Specifically, we believe that Calderón de la Barca voluntarily used illusion as a sophistry to spread subliminal messages to his audience as a way of having them empathize with characters in his plays.

Additionally, the introduction of the printing press in Spain, which brought with it the first mass media methods of the dissemination of information in the seventeenth century, also played an important role in the space occupied by Calderón in the machinery of sentiment-creation in baroque Spain. There is evidence to suggest that as the coverage of an issue in the media increases, the more accessible it will remain in the audience's memories.[30] Despite the increased influence of the printing press in baroque Spain, it is unlikely that gazette editors at the time knew about the effect known as the accessibility bias, yet personalities including Juan de Austria—King Charles II of Spain's favorite—commanded the creation of a gazette to promote his popularity. It would take at least another hundred years for the newspaper to become popular among the lower class, with the appearance of almanacs and signs. During this time the *corrales* filled the absence of an affordable medium ready to be consumed by a mostly illiterate population. Therefore, we propose that Calderón was one of the several successful subtle and elegant mass influencers of his time. We hypothesize that, through his works and their representations, Calderón had an influential effect on his audience similar to that of mass media today.[31]

In order to demonstrate how Calderón tried to influence his audience's reactions through his discourse, we based our study on the characters created by him in his *autos* as characterized by the *Diccionario de los autos sacramentales de Calderón* (*Dictionary of the Autos Sacramentales by Calderón*), first published in 2000 by Ignacio Arellano, which is, to this day, the most exhaustive and extensive account of the *autos*. We used the speeches of the characters as inputs for an automatic classifier previously built upon averaged real evaluations of all the sentences in ten of the *autos*.[32]

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Methodology

Our dataset is composed of seventy-three of Calderón's plays included in the collection of *autos* edited by GRISO at the Universidad de Navarra and Edition Reichenberger.[33] This collection, which started in 1992 and is close to being completed, has achieved a major undertaking by collating a set of volumes with critical editions of all the *autos* ever written by Calderón de la Barca, including those of dubious attribution.[34] As of now, seventy-six of the *autos* have been edited, of which only three were not included in this study since this project demanded that the *autos* had the date of composition or the date of first publication.[35]

In the critical editions of the *autos*, some criteria were taken into account by editors that we disregarded for the purpose of our analysis. The first measure we took was to accept all the added omissions as part of the original text. For example, take the phrase [*Nembrot y Salvajes*]. The use of square brackets means that the text was originally missing and was later added by the editor. For our study, the phrase simply becomes *Nembrot y Salvajes*, as if it were part of the original text. We also decided to ignore all text that is not part of the speech of a character. This includes the omnipresent introduction of *chirimías* ("shawms") and all the stage directions given by Calderón, such as where the character must go or to whom they must talk.[36] Normalization of the names of characters was another necessary step, so that, for example, the three variations of Melchizedek—written in the plays as *Melquisedec*, *Melquisedech*, and *Melchisedec*—could be treated as just one in our analysis. Unfortunately, this process was less straightforward in other cases, as in the case of *Primer Adán* ("first Adam") and *Segundo Adán* ("second Adam"). As the purpose of our study was to identify how various characters' speeches are perceived, we merged both Adams together despite their obvious different conceptions, thus creating a unique *Adán* that would subsequently be included in a bigger category of characters.[37] Furthermore, speeches made by more than one character at the same time were unified under the term *Varios* ("several"), which is a grouping of characters that does not appear *per se* in the *autos*. It is important to note that *Varios* should not be confused with *Todos* ("everyone"), *Toda la Música* ("all the music"), or any other variant, as these groupings of characters keep their original name in Calderón's text and in our analysis. Finally, the verses that make up the speech of each character were put together and then split into sentences and words using Punkt tokenizer for Spanish, a tool that is included in the software for natural language-processing toolkit (known as NLTK).[38] Let us provide an example of the conversion of Calderón's texts into tables. We start with a speech given by Noah in the play *La torre de Bablionia* (*The Tower of Babylon*), 1675:

NOAH: Sovereign paranymph,
faithful entrusted to your
word, I depart where
with constant faith

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I will always be waiting for the day
when I return to see again
the innumerable family
of the sons of Noah.
Because you command I leave,
if your feet I don't kiss it's
because I do not deserve to touch
the sandals of your feet.
He leaves. (ll. 579–90).[39]

This excerpt is then split into sentences and converted into tabular data (see table 5.1).

Table 5.1. "Noah" excerpt now split into sentences and converted into tabular data.

Code	Title	Year	Character	Start	End	Speech	Words
TB	La torre de Babilonia	1673	Noah	579	586	Auditorium sovereign, faithful entrusted to your word, I depart where with constant faith I will always be waiting for the day when I return to see again the innumerable families of the sons of Noah.	35
TB	La torre de Babilonia	1673	Noah	587	590	Because you command I leave, if your feet I don't kiss it's because I do not deserve to touch the sandals of your feet.	20

Once the texts had been converted into tabular data, we started the creation of a sentiment-classifier in order to apply sentiment analysis to the texts. Sentiment analysis can be defined as the task of classifying the sentiment expressed in, or perceived from, a medium. The types of materials that undergo sentiment analysis are typically user-generated content, such as texts extracted from social networks or review sites. For these cases, which present a lot of texts to be handled at the same time, an automated approach to classifying is much more desirable. Binary classification of texts has existed in machine learning for a long time, and current implementations of automatic classifiers are based on early work by Peter Turney and Bo Pang, whose main goal was to identify the polarity, whether positive or negative, of product or movie reviews found on various consumer-oriented websites.[40] Although their methodology was applicable to our project, for two main reasons we were forced to build our own annotated corpus that would let us create a domain-specific classifier. First, there is a clear difference in complexity between product reviews and seventeenth-century Spanish Golden Age theater. Second, there is a lack of annotated corpora available for sentiment analysis of theater from this period. Creating our own annotated corpus allowed us then to apply Turney and Pang's methodology effectively.

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From the aforementioned set of *autos*, we randomly selected ten to be used as a "training set" for the rest of the *autos*. These *autos* are as follows: *El cubo de la Almudena* (*Almudena's pail*); *La humildad coronada de las plantas* (*The Crowned Humility of Plants*); *La hidalga del valle* (*The Noblewoman of the Valley*); *El lirio y la azucena* (*The Iris and the Lily*); *Llamados y escogidos* (*Called Ones and Chosen Ones*); *El árbol del mejor fruto* (*The Tree of the Best Fruit*); *No hay más fortuna que Dios* (*No More Fortune Than God*); *El orden de Melchisedech* (*Melchizedek's Order*); *Quién hallará mujer fuerte* (*Who Will Find Strong Women*); and *El socorro general* (*The General Relief*).[41] We then extracted the different sentences—more than 5000—and fed two different crowd-sourcing systems with them. The first system was our own deployment of the open-source Python-based PyBossa, which asked seven subject participants to read and assess the sentiment associated with the given sentences by using a discrete scale ranging from −2 to 2, until a redundancy of 3 evaluations per sentence was achieved.[42] These participants were educated adults, between the ages of eighteen and thirty, who completed the task for economic compensation.[43] The second system was the Amazon Mechanical Turk, where three different subjects, who also shared the profile of our PyBossa participants, assessed all the sentences.[44] In this case, however, we were not able to define the scale and finished with a gradation from −1 to 1 and also a redundancy of 3.[45] In other words, we gauged positive and negative responses, including scales of intensity in each, which relate to emotional responses and that can serve as proxies of the emotional responses of Calderón's audiences to the characters represented in the *autos*. The results derived from this study were used to build the database from which the classifier was later on developed.

After normalizing the different scales and averaging per sentence evaluation, we assigned the tag "pos" for values greater than 0; "neg" for less than 0; and then rejected the rest since we are not interested in neutral evaluations. In order to create a binary classifier, which would be able to predict, given a sentence, to which class a sentence belonged—"pos" or "neg" —we used the scikit-learn library,[46] along with Pandas and the IPython Notebook.[47] We randomly split the annotated corpus into two sets: a training set with 80 percent of the sentences, and a testing set with the remaining 20 percent. The slicing of the original corpus was later cross-validated. After trying several models, a Stochastic Gradient Descent Estimator (SDGC) with tf–idf weighting outperformed any other combination with an accuracy of 73.71 percent, precision of 75.26 percent, recall of 92.80 percent, and an unweighted F-score of 83.11 percent.[48] While 73.781 percent might be seen as not accurate enough, Amazon Mechanical Turk reported that humans only agree 79 percent of the time, which makes the performance of our classifier almost as accurate as that of humans.[49]

We ran the classifier against the rest of the sentences—more than 30,000—and calculated the probability of a sentence being classified as either "pos" or "neg." We also calculated the lexical diversity, which is defined as the number of distinct words divided by the total number of words, as well as the ratios of words per sentence and per verse, as

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the complexity of a text measured in terms of its lexicon is usually used for the assessment of the sentiment expressed. This gives us the material to assess the emotional response to Calderón's texts and, therefore, to better understand the psychological evolution of these complex—albeit allegorical—figures that make up the *autos sacramentales*.

Typology of Characters

In baroque Spanish comedies there are several typical characters: the villain, the young lady, the gallant, the king, the joker, and all, in some occasions, are used in the *autos*. When they are present in the *autos*, the allegorical side of the characters is wrapped up around these archetypes. For example, the young lady can also represent Beauty or the vice of Luxury, depending on the work, whereas the old man could also be playing the figure of the Author. Given the hundreds of plays composed for the stage during the Spanish Golden Age—critics estimate that Lope alone wrote around 500 plays—and the development of an appreciation of this theater by the public, it is reasonable to assume that the public had certain expectations regarding the range of behaviors and emotions embodied by specific types of characters. At the same time, there is a level of ambiguity built into the poetics of Spanish baroque theater, as the model popularized by Lope in his *Arte nuevo* proclaimed the need to mix the comic and the tragic, and to make hybrids a resource to surprise and impact the public.

Some characters in the *autos* may seem to fall into recognizable types that could engage with specific emotional responses, as in the case of villains or heroes. Since there is no complete dictionary of the characters in the *autos*, an important part of our approach was to classify characters into different groups to locate the defining features of each. There has been previous research on some of Calderón's characters—either regarding specific plays or in a more general sense—but none that we are aware of has tried to classify all the characters into categories and analyze the positiveness of each group.[50] In this context, "positive" means that the sentences of the characters of a category have been classified as positive by our classifier, and therefore a human reader would likely assess those sentences as expressing a positive sentiment. This classification operates the same in regard to "negativeness." We propose the following, and not mutually exclusive, types of characters, and let the analysis of the text decide how the characters can be classified. With this classification, we attempted to dispose of as much subjectivity as possible in order to avoid entering into the hermeneutics of Calderón's creations.

1. *Gender*. Guessing the sex of a character was evident sometimes, but at other times the sex could be deceptive. Characters such as *Aarón*, *Adán*, *el Rey* ("the King"), or *Isaías* are undoubtedly male. Incidentally, allseven deadly sins, usually perceived as negative, are feminine characters. As suggested by James Maraniss, this could have more to do with the Spanish language itself or even a Christian tradition than a

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deliberate action on the part of Calderón, although this pairing of the feminine with sin still "suits Calderón's thought well enough."[51] Therefore, when the sex of the character was not disclosed in the text, we proceeded in two different steps. To start with, if the character's name coincided with a common noun of Spanish, such as *voz* ("voice"), which is a feminine noun, we used the gender of the noun to tag the character as either male or female.If, on the other hand, the gender of the character could not be deduced from other accounts, such as historical or biblical, and the name was not an existing noun in Spanish, we used the gender of modifying articles and adjectives to assign a masculine or feminine gender to the character. This was the case of *Amalec*, who could be a biblical figure, or the representation of a tribe, or signify a place. In this case, we classified this character as masculine because of the expression *Amalec valeroso* ("brave Amalec"), where the adjective is overtly masculine.

2. *(Existential) Plane*. This category covers the following cases in order of precedence: biblical characters such as *Saulo* ("Saint Paul"); theological abstractions like *Penitencia* ("penance"); allegorical incarnations, as in *los Cinco Sentidos* ("the Five Senses"); mythological beings such as *Andrómeda* ("Andromeda"); historical figures such as *Almanzor* (the *de facto* ruler of al-Andalus in the late tenth to early eleventh centuries); or just people, real or fictional, in supporting roles, like *Soldado* ("soldier") or *Criado* ("servant"). *Gedeón*, an actual historical warrior and biblical judge, is annotated only as a biblical character because his biblical role has precedence over his historical one.

3. *Sphere*. This category encapsulates the social sphere with which the character is normally associated. As an example, *el Rey* is almost always linked to nobility, unlike the *Segador* ("reaper"), who is usually related to laymen, or *el Sacerdote* ("priest"), who is bound to clergy. With this classification we avoid the questionable class distinctions between "high" and "low" characters and, at the same time, we come closer to a more sociological approach that goes beyond the traditional types normally described in the manuals of literary history. As proposed by Maravall, a realistic social distribution adds an "objective" sociological dimension based on the principles of identity, totality, and opposition which are expressed not in individual opinions, but in the collective action of the members of a specific sphere.[52] Although this seems to fit well with some of the characters in the *autos*, others would not play a role in society as we usually understand it nowadays, despite the fact that the role may be of vital importance in the allegorical world of Calderón. Examples of these characters are saints or allusions to Jesus Christ (classified as supernatural), and concepts of moral or psychological dimensions, such as *Entendimiento* ("understanding"), *Justicia* ("justice"), or *Razón* ("reasoning").

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4. *Role*. Occasionally, Calderón gave additional information about the characters, either in the text or at the beginning of the play in the *Personas* ("characters") section. Different values such as villain, gallant, shepherd, wise man, gypsy, or priest are included in this category. It was also very common that some characters, biblical or historical, were intended to be played as themselves.

We could have created a typology as exhaustive as we would have wanted by, for example, splitting the social sphere to also cover the supposed addressee in the real world of each character's speeches, or by differentiating their existential planes to include virtual artifacts, as in *Labranza* ("farming"), or physical ones, as in *Esqueleto* ("skull").[53] However, such is the complexity of Calderón's creations that such fine-grained categorizations would end up having almost as many sections as there are characters, thus becoming a pointless classification. In addition, it would rely too much on the interpretation of the texts, losing all traces of our first-intended objectivity. The categories we proposed are nuanced enough to differentiate almost each one of the characters: for example, *Levita* is classified as a feminine character, in an allegorical plane of existence, member of the clergy, and playing the role of a priest in the *auto*. No other character in the *autos* shares the same classification.

Quantitative Analysis of *Autos*

We analyzed more than 430 characters, whose combined discourses produced around 613,000 words distributed across 140,000 verses and 37,000 sentences.[54] The longest *auto* is *El convite general* (*The General Reception*), with 3249 verses, followed by *La nave del mercader* (*The Merchant's Ship*); *La viña del Señor* (*The Lord's Vineyard*); *El cordero de Isaías* (*The Lamb of Isaiah*); and *El día mayor de los días* (*The Greatest Day of the Days*). At the bottomof the list we find *El primer blasón del Austria* (*The First Blazon of the Austria*)

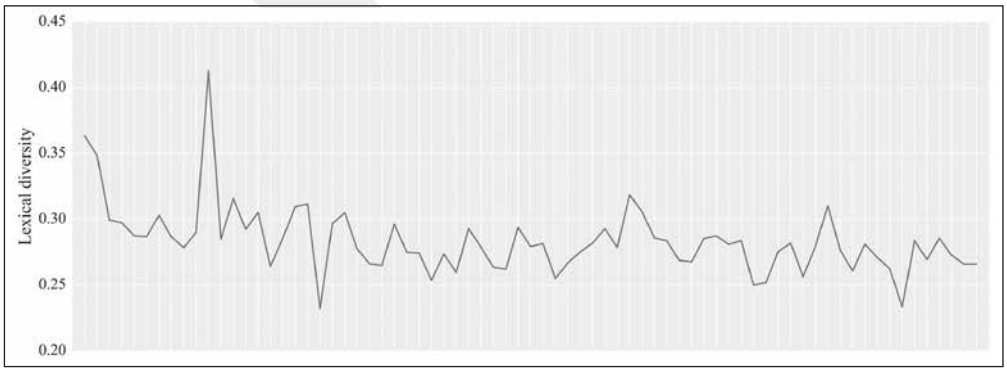

Figure 5.1. Lexical diversity of *autos* over time.
This graph illustrates the lexical diversity of the *autos* sorted by year.

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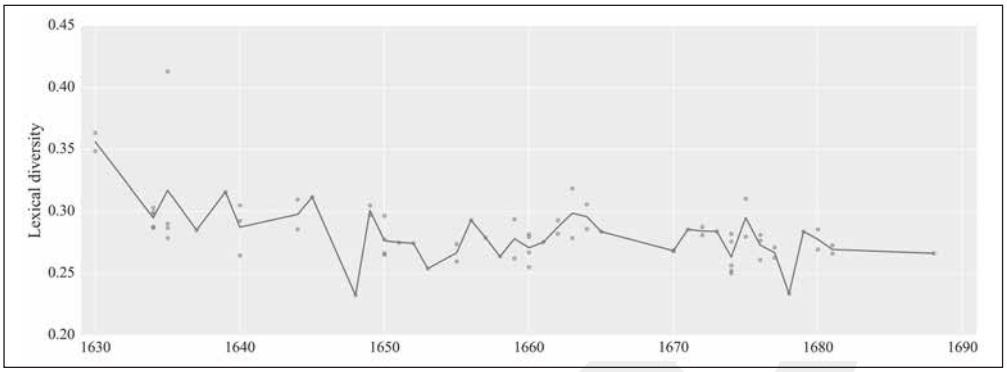

Figure 5.2. Lexical diversity over time. Lexical diversity of *autos* averaged by year.

as the shortest, and above it *El divino Jasón* (*The Divine Jason*); *El gran duque de Gandía* (*The Grand Duke of Gandía*); *La iglesia sitiada* (*The Besieged Church*); and *Los encantos de la culpa* (*The Charms of Guilt*). Regarding the complexity of the plays, figure 5.1 shows their lexical diversity, sorted by year and ranging from 0 for texts with no unique words, to 1 for texts that never repeat a single word. The *autos La vide es sueño* (*Life is a Dream*) and *El divino Jasón* are ranked as the most lexically diverse, whereas *El convite general* and *El día mayor de los días* are ranked as the least.

However, what is particularly important to notice is the fluctuation of lexical diversity as time progresses. This tendency still holds when grouping the *autos* by year, as shown in figure 5.2. There seems to be no historical reasons for this and we cannot help but wonder whether this is a deliberate ploy by Calderón, or just mere coincidence.

Given the fact that almost nothing is accidental in his work, and that the diversity of a play is a measure of its richness, we hypothesize that Calderón was adjusting the

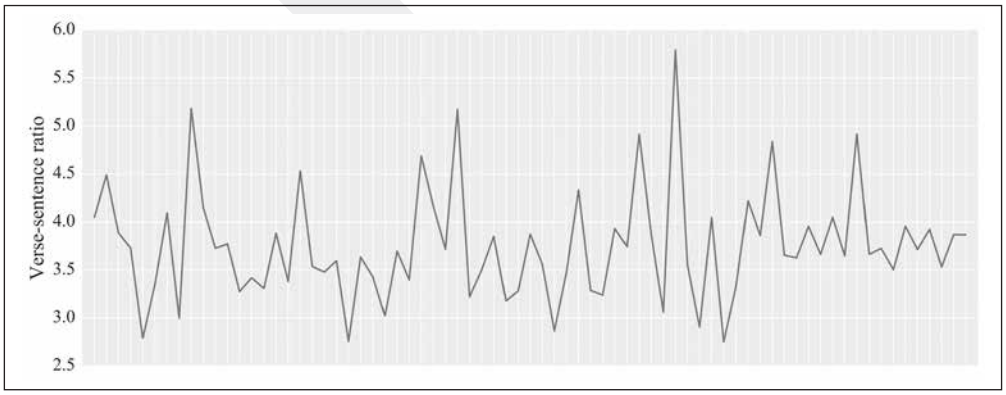

Figure 5.3. Verse–sentence ratio of *autos* over time.
Number of verses per sentence in *autos* sorted by year.

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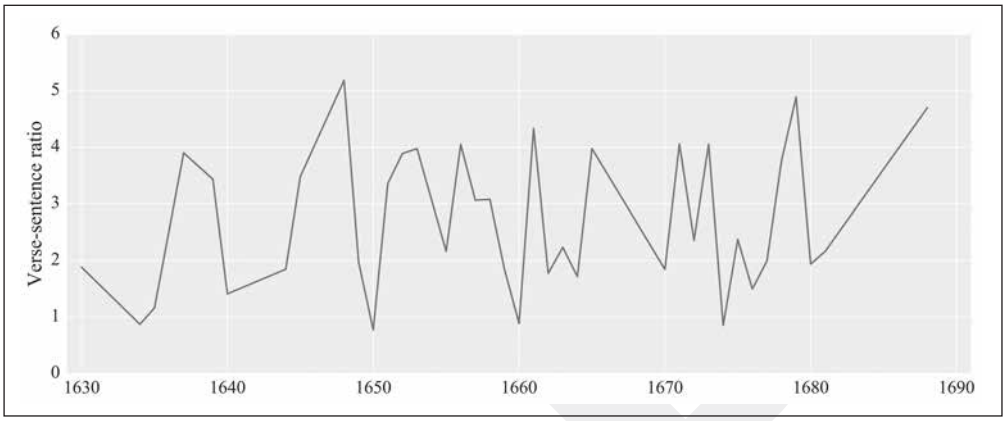

Figure 5.4. Verse–sentence ratio over time.
Average number of verses per sentence grouped by year.

complexity of his texts according to their audience. To further demonstrate this, we use a rough approximation of complexity: the ratio between the number of verses divided by the number of sentences. Longer sentences are split among many verses, thus making their meaning more difficult for the audience to grasp. Figures 5.3 and 5.4 show consistency with this result, although correlation is only significant between averaged values of lexical diversity and verse–sentence ratio, both grouped by year (Pearson coefficient of 0.73, p-value < 0.01). Results are very similar for word–sentence ratio, and distributions are practically the same in both ratios (Pearson 0.97, p-value < 0.01).

Furthermore, the length of the *autos* grouped by year is also inversely correlated with both verse–sentence ratio (Pearson −0.80, p-value < 0.01) and diversity (Pearson −0.90, p-value < 0.01). In line with our intuitions, the longer the play, the less diverse and lower the number of verses per sentence. This could be a generalizable result or a clue about who was the intended audience of each play. However, the only relation between sentiments and the length of a play is a weak correlation with respect to the probability of a sentence being positive—the probability of a sentence being negative is just the opposite case—and averaged by *auto* (Pearson 0.46, p-value < 0.01) (see figure 5.5).

This fact adds to our previous result about the length of *autos*: the longer the *auto*, the more positive the overall sentiment classification of the play by our algorithm, which suggests that different *autos* were conceived with different emphasis for different audiences. Long, rich, and positive plays, possibly with more complex subtexts and deeper meanings, could have been primarily intended for nobles and well-educated people. Short, plain, and negative *autos* were presumably addressed to the less-educated sector of the population. Examples of the former include *El convite general*, or *Lo que va del hombre a Dios* (*So Far this Man to God*). Examples of the latter include *Los encantos de la culpa and Los misterios de la misa* (*The Mysteries of the Mass*). To further support this

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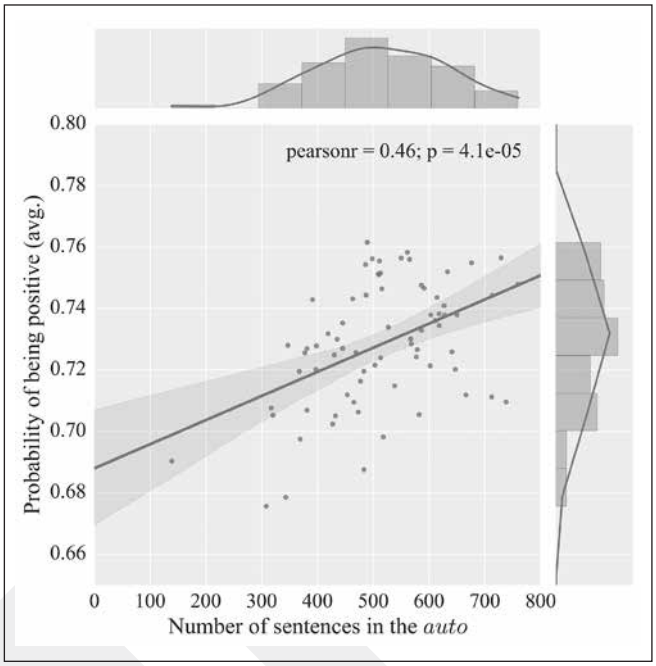

Figure 5.5.
Correlation between sentiment and length of *autos*. Distribution of the number of sentences in an *auto* and the probability of the *auto* being positive, calculated as the average of the probabilities of its sentences.

idea, we resorted to our typology of characters, and discovered that shorter plays usually have more representation of characters in the social sphere of the laymen. In particular, we found that in the ten shortest *autos*, the number of verses of characters in the laymen category outnumbered those in clergy by an average factor of twelve, those in nobility by seven, and those in supernatural by four.

These are the first pieces of evidence of Calderón's attempts to empathize with his audience. Not only that, but these results also show a conscious effort from Calderón to engage in emotionally different ways with diverse audiences. This is to say, if the shorter *autos* show a tendency towards low-social class characters and, in addition, these plays often communicate a negative message, we could hypothesize that such negativity outlines a feeling of fear that would drive these social classes to assent to their socio-political condition without questioning the social and economic *status quo*. This conservative version of the baroque has been traditionally defended by many critics, who have typically centered their arguments on the *auto El gran teatro del Mundo*. This *auto* certainly seems to support this political vision from a religious interpretation of the world: each of us has to accept the role we have been assigned in the play of life.

It should be taken into account that the vast majority of the *autos* ended up being represented in front of a diverse audience since they were meant to be shown in public celebrations on the streets of Madrid, among other cities. The fact that all sorts of audiences had access to these plays would question our hypothesis unless it were the case

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that the identification of the different types of public with their social equivalents was so strong, and their sympathy for these characters so profound, that this psychological mechanism constituted a tool for Calderón to address his audiences in different ways.

Another important aspect that should be explored more carefully is the relation between longer plays and the festive nature that is typically associated with later plays, which featured more musical and mythological content. This comparison is complicated, as we do not always have specific information regarding the representations of the places and, in many cases, all we have is the dramatic text and some scattered information. We have proven that generally, the later the *autos* are composed, the longer they will be. Additionally, they will become more positive in terms of the emotions they convey. This is a direct result of the fact that later in his career, Calderón devotes more and more effort to develop works of a mythological theme that make part of the baroque total artwork that becomes the backbone of festive spectacles full of technology, special effects, and music. These are the very first works of entertainment of the early modern era. These pieces of entertainment water down the negative load of sentiments associated with earlier and more conservative plays.

In any case, these results clearly show the intention and command of Calderón over the emotional effect that his play would have on his public; his capability to regulate positiveness and negativeness of emotional messages; his choice of different social groups as the main object of his poetry; and his capability to alleviate emotionally the messages when plays become more spectacular and technologically advanced. Calderón would, therefore, be following what one of his characters says in the auto *Los encantos de la culpa*:

> Don't you see
> that they are Human senses
> and that in the end it is needed
> reliefs that divert them
> from the fatigues they were born![55]

Character Sentiments

Unfortunately, total numbers and more generalized statistics do not contribute much to the understanding of the characters or the audience's perception of them. To investigate if Calderón was actually trying to promulgate empathy for specific characters, we need to look at the prevailing sentiment of their specific interventions. Using the results provided by our classifier and the different categories with which we annotated the characters, we know that characters such as *Nacor* or *Criado* ("servant") or *Leproso* ("leper") are among those with the most positive discourse as classified by our algorithm. In contrast, the interventions by *Bernardo*, *Leví*, or *Teutónico* receive the most negative perception. Even with an impressive average probability of 98 percent of being positive, *Nacor* is not

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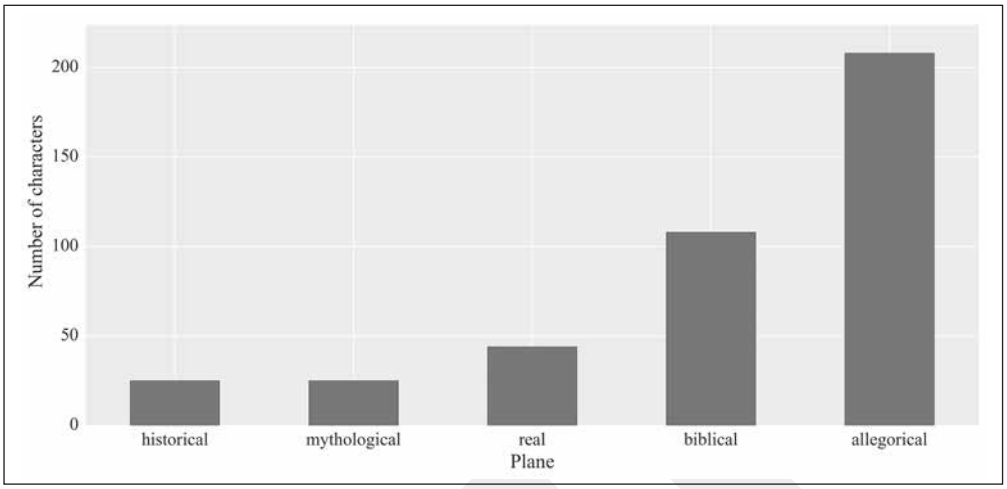

Figure 5.6. Number of characters by plane.
Total number of characters of each type in the category of existential plane.

representative, as his participation, which only takes place in the *auto El viático cordero* (*The Viatical Lamb*)barely adds up to 0.19 percent. For this reason, we ignore characters whose participation ratio is lower than 1 percent, measured as the result of dividing the number of verses of a character's interventions by the total number of verses of the play. If the character appeared in more than one play, then the ratio of participation is averaged. After excluding these, the characters with the most positive message are *Dentro* (the undetermined character used in the plays to designate that someone or some people are speaking outside the stage); *Centro* ("centre"); *Aqueronte*; *Aminta*; *Panadero* ("baker"); *Levita* ("levite"); *Labranza*; *Sísara*; and *Saúl*. On the other side, those with a more negative sentiment are *Ley* ("law"); *Melchisedech*; *Tiburtina*; *Pérsica*; *Orden Sacerdotal* ("priestly order"); *Felipe*; *Baptista*; *Templanza* ("temperance"); *Isaías*; and *Fortaleza* ("strength"). Although this seems to be a hodgepodge of characters—both males and females, in different existential planes, and playing a variety of roles—some patterns start to emerge.

As shown in figure 5.6, allegorical characters represent the majority of cases in Calderón's *autos*, followed by biblical characters, and then by the rest after a big gap. This result is in line with the notion of the *autos* serving as part of the machinery of the Catholic church that sought to spread its values by means of allegories.[56] Regarding our extended version of the social sphere, laymen have the highest number of characters, followed closely by nobility, theological, and moral, which supports our previous claims and the importance given to spiritual affairs (see figure 5.7). Supernatural, natural, and clerical characters then form the next step, as they seem to be less represented in the plays. Bureaucrats, places, and psychological concepts are in the lowest section the fewest number of characters.

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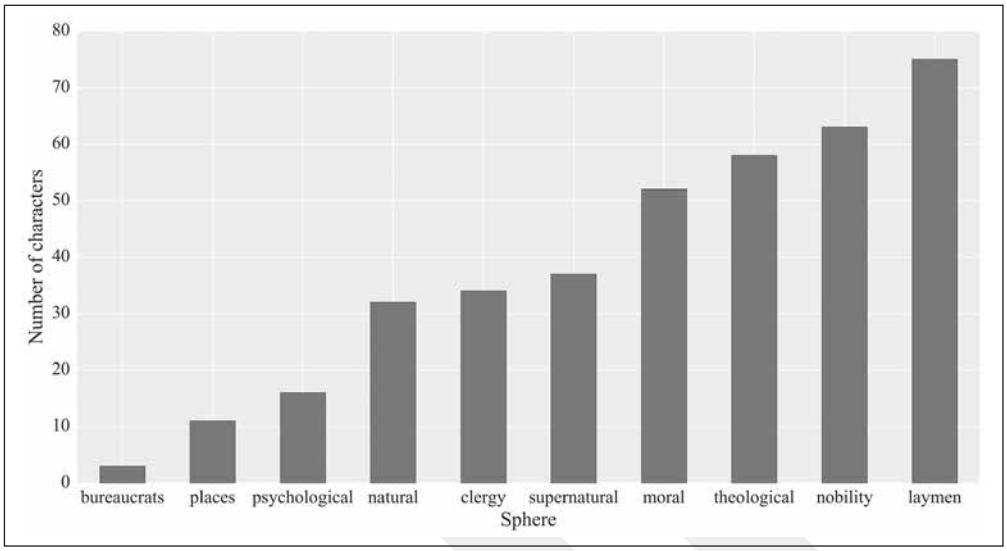

Figure 5.7. Number of characters by sphere.
Total number of characters of each type in the category of the social sphere.

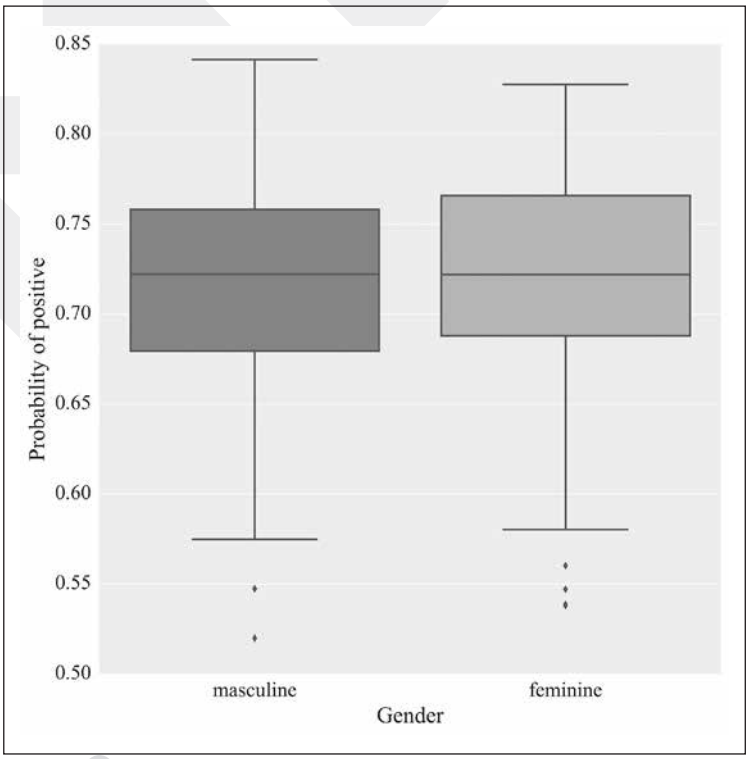

Figure 5.8. Probability of positive sentence by gender. Probability of a sentence being classified as positive grouped by the gender of the character.

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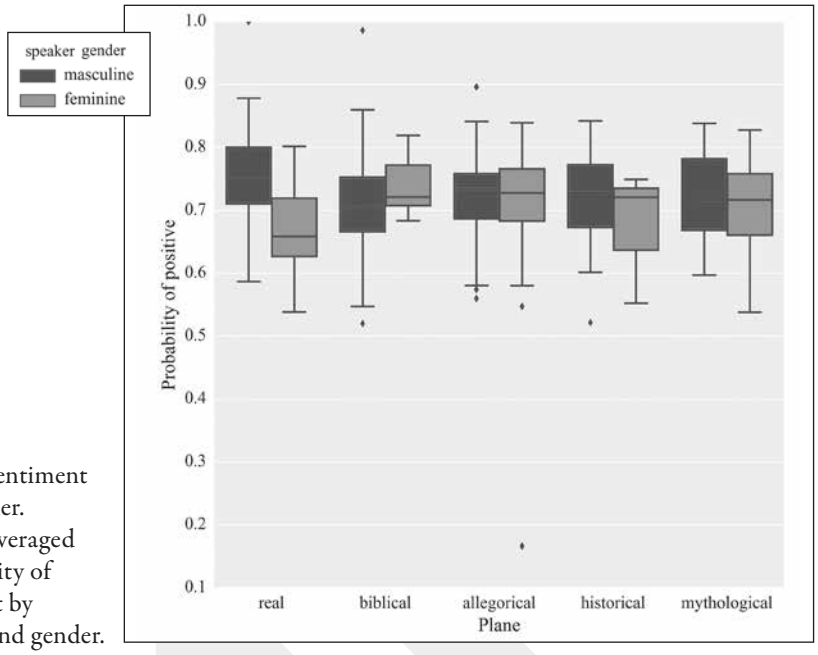

Figure 5.9.
Distributions of sentiment by plane and gender. Distributions of averaged values of probability of positive sentiment by existential plane and gender.

In terms of positiveness of message, historical and allegorical characters have the highest values, and biblical and mythological the lowest. With respect to the social sphere, laymen, moral, and theological characters have the highest number of sentences classified as positive, while supernatural and members of the clergy have the lowest (see median values in figure 5.7). Saints and other characters of the biblical dimension have the most negative use of sentiments as derived from the artificially intelligent analysis of their interventions, sending a message that could be understood as them being depicted as non-merciful. Allegorical allusions to laymen and abstract artifacts related to the moral and theological characters send positive messages to the audience. We hypothesize that Calderón had a twofold purpose in doing this. First, he intended to make his audience identify with certain types of characters in the play. Second, he also attempted to show his audience that the morality of the Catholic doctrine was positive for them. This would be in line with ideological interpretations of baroque theater as an instrument to maintain social order and confirm the worldview sustained by the Catholic faith.

With regard to gender, both masculine and feminine characters follow similar distributions, with female characters' interventions having a slightly more positive perception (see figure 5.8). However, it should be noted that the number of female characters is half that of male characters. Therefore, women are under-represented in Calderón's *autos*. When considering the total number of sentences and verses, the difference narrows down; and female characters produce "only" 22 percent fewer sentences than men.

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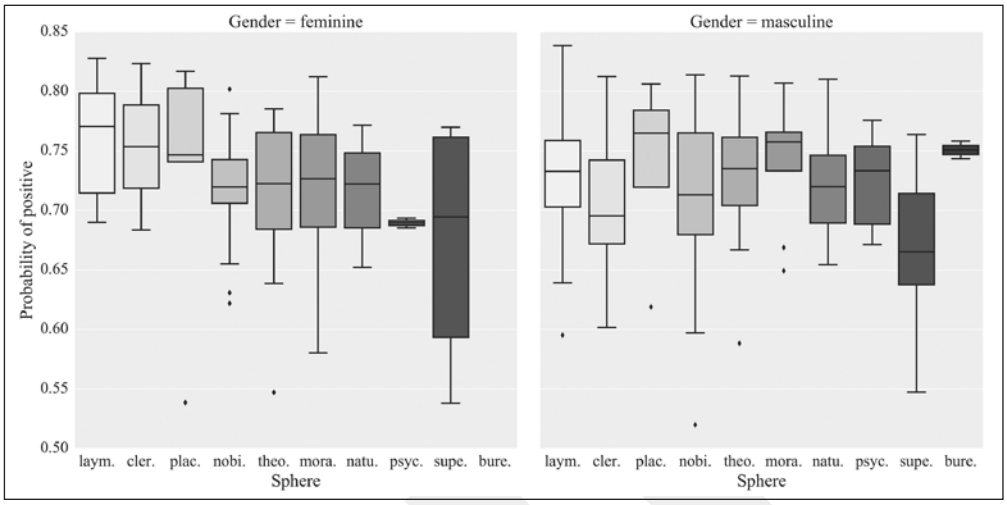

Figure 5.10. Distributions of sentiment by sphere and gender. Distributions of averaged values of probability of positive sentiment by social sphere and gender.

However, the distinction between genders is accentuated when the existential planes and social spheres of the characters are analyzed. Figures 5.9 and 5.10 show distributions of probability of positive sentiment for the categories of plane and sphere. In the existential plane, female characters of an allegorical, biblical, or mythological nature have more sentences classified as positive than male characters, although historical figures seem to be more positive when incarnated as male. The case of "real" people—characters who do not represent historical or biblical figures—shows the biggest difference, as female characters are depicted with a more negative sentiment than males. Regarding the social sphere, and excluding the case of bureaucrats, for which only a couple of masculine characters are found, median values of positive sentiment are higher for female characters when they represent characters in the laymen, clergy, nobility, nature, and supernatural spheres.

Antonio Regalado, whose monograph on Calderón spans two volumes and is over 1800 pages, discusses a "feminism" in Calderón's comedies, which would consist of representing the archetypical and mythical dimensions of the feminine figure in a context in which the vision of the feminine characters refutes stereotypes and vulgarities about women.[57] The feminine figure shows the sensuality associated with the feminine body and the complex intelligence of characters such as *Semíramis* in *La hija del aire* (*The Daughter of the Wind*) or the sorceress *Circe* in *El mayor encanto amor* (*The Greatest Charm of Love*). These are characters that clearly differ from their masculine counterparts. They are, in many cases, women that need to navigate the social difficulties of their time, but they would have found an audience of their own in the women that attended the theaters and hada section for themselves to avoid contact with men and musketeers.

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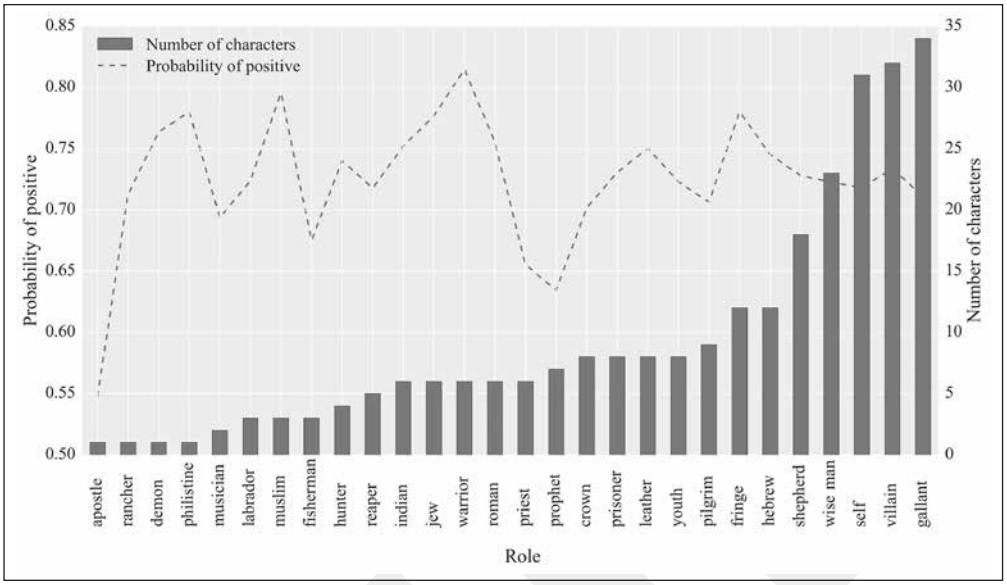

Figure 5.11. Number of characters and probability of positive sentiment by role. Total number of characters of each type in the category of the role given explicitly by Calderón in the *auto*, as well as the probability (from 0 to 1) of their sentences being classified as positive.

Regarding the *autos sacramentales*, the topic of feminine eroticism stems from the adaptation of the comedy *El mayor encanto amor* as the *auto Los encantos de la culpa*, in which the lecherous *Circe* represents, in a nuanced manner, the pleasures that surround sin. On the one hand, the religious and sinful dimension of pleasure has a presence. On the other hand, spectators witnessed the pleasures that derive from sexual intercourse and erotic games. *Circe*/Sin embodies a subjectivation of the world rooted in myth and tries to compensate for the excesses of rationality and contempt with the world that the very *auto* imposes in its dimension of theological discourse. This emotional dimension, an identity that is typically assigned to feminine characters, becomes apparent in the computational analysis of the *autos* and supports the coexistence of different ideological and emotional levels in the complex plays of baroque theater.

Finally, we examine the case of the explicit role assigned by Calderón himself in the *autos*. This case is especially intricate, as sometimes, although not very often, some characters start playing a role and during the play they change to a different one. For instance, in *Las espigas de Ruth* (*The [*wheat*] Ears of Ruth*), *Ruth* starts as a reaper and ends playing the role of villain in the same play. In those cases we kept the first identifiable role. As figure 5.11 illustrates, there is no correlation between the number of characters playing a specific role and the probability of their sentences being positive. However, some interesting results can still be extracted when analyzing the data. The set of the

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three more numerous roles—gallants (with twenty-two women and eleven men); villains (twelve women and seventeen men); and characters played as themselves (eight women and twenty-three men)—accounts for almost 25 percent of all the characters, with values of probability of positive sentiment around the average of 70 percent, although villains have a slightly higher value. This suggests that Calderón was trying to polarize the main discourse of the *autos* by having onstage characters that were easily identifiable, while he added all the necessary complexity to make the plays interesting and surprising by making the discourse of other types of characters more positive.

Moreover, and counter-intuitively, the characters with the highest values of probability of positive sentiment are those of the non-Christian tradition, such as Muslims, Philistines, and Jews. Again, this was an exercise of Calderón to mislead the audience with arguments that did not always fit the expected character prototype. Sentences from apostles, priests, and prophets, although not very numerous, have the highest probability of being classified as negative, which apparently contradicts the idea of baroque plays, and *autos* especially, as being homogeneous representations of a given ideology and religious worldview.

Conclusions

Our results show agreement with the proposed thesis of this study. Analyzing characters and their speeches in Spanish Golden Age theater in an objective manner is not an easy task, and some of the assumptions and decisions we made could be argued against. Machine-learning techniques and natural language processing are obviously worthwhile when applied to vast amounts of texts, but this study does not try to substitute the thorough job of the traditional philological analysis of the experts in the field. On the contrary, it tries to complement and give them support by providing them with a valuable source of information and data. Even the most accurate of the classifiers face trouble when facing rhetorical figures. This is why we tried to take into account as much data as possible so that we minimize the effect of outliers.

Alongside this study, we have analyzed almost 37,000 sentences constructed from verses in dramatic and allegorical plays. Since our main objective was to demonstrate whether Calderón could be considered a mass influencer or not, and, if so, what artifacts he used to do so, we built an automated classifier to annotate all the sentences in his works. Afterwards, we tagged all the sentences and characters of the plays, and discovered the predominance of characters of allegorical and biblical dimensions in the social spheres of nobility, laymen, and theological abstractions. These clearly compose the intended audience of the *autos,* as these were staged in public spaces and free of charge for the entire population of Madrid.

Women seem to be slightly under-represented when compared with men, which could be considered standard when taking into account the contexts of society during

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the era in which the plays were written. However, female members of the laymen, clergy, nobility, and supernatural spheres have more sentences classified as positive, which leaves men as the authority of moral and soul-related affairs, as far as our typology of characters is concerned.

We can conclude by saying that the architecture of sentiments in Calderón's *autos* is as complex as the dramatic structure of baroque plays, and that the various metaphysical and rhetorical interconnected levels of baroque technologies of speech make it difficult to draw firm conclusions about the empathy of the characters and the machination of the messages by baroque authors. Data can be contradictory at times. For example, according to our methodology, speeches by villains are classified as positive, which is in line with the notion of the *engaño* ("deceit") practiced in the baroque, but villains do not have the highest values of positive messages: Muslims, Philistines, and Jews can claim even higher values. In other cases, it is hard to decide whether Calderón was using a character's speech to send clear religious messages or just as a device to fool the audience and play with public assumptions. Be that as it may, the twisted nature of the baroque is once again brought to light.

NOTES

* This study has been possible thanks to the collaboration of the *Grupo de Investigación Siglo de Oro* (GRISO) Group at Universidad de Navarra, which kindly provided us with electronic text versions of all the plays, and the Social Sciences and Humanities Research Council of Canada, which kindly provided funding.

[1] Ignacio Arellano follows the classification of this theater in two main cycles: that of Lope and that of Calderón. For a complete list of the codes, titles, and dates of the *autos* referred to in this essay, see Ignacio Arellano, *Historia del teatro español del siglo XVII*, pp. 139–40.

[2] Arellano, p. 61.

[3] Arellano, p. 84.

[4] See Federico Sánchez Escribano and Alberto Porqueras Mayo, *Preceptiva dramática española del Renacimiento y el Barroco*. The Parque del Retiro is currently a park in the center of Madrid, but in the 1630s it was one of the palaces on the outskirts of town where the king would spend most of his leisure time surrounded by cultivated gardens. The king's habitual residence was located in the Palacio de Alcázar, currently known as Palacio Real, which had originally been a Muslim fortress that burnt down in 1734.

[5] Jonathan Brown and J. H. Elliott, *Un palacio para el rey*.

[6] For various dates of each play, see Ignacio Arellano, *Autos sacramentales completos de Calderón*.

[7] Juan Luis Suárez, *El escenario de la imaginación*.

[8] It is important to bear in mind that in some versions of psychological theory of senses, imagination and memory overlap.

[9] Suárez, *El escenario de la imaginación*.

[10] Evangelina Rodríguez Cuadros, *La técnica del actor español en el Barroco*.

[11] J. M. Ruano de la Haza and John J. Allen, *Los teatros comerciales del siglo XVII*.

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[12] Sebastian Neumeister, *Mito clásico y ostentación*.

[13] Frank P. Casa, Luciano García Lorenzo, and Germán Vega García-Luengos, *Diccionario de la comedia del Siglo de Oro*, p. 19.

[14] J. E. Varey, *Cosmovisión y escenografía*.

[15] Arellano, *Historia del teatro español del siglo XVI*, pp. 691–97.

[16] Arellano, *Historia del teatro español del siglo XVI*, pp. 690–91.

[17] Emilio Orozco, *Manierismo y barroco*.

[18] Juan Luis Suárez, "Complejidad y barroco."

[19] Juan Luis Suárez, "El paisaje del tiempo y la estética de la comedia nueva."

[20] Hilaire Kallendorf has argued in her *Conscience on Stage* that baroque plays are built in part as complex and detailed arguments of casuistry, and that in many cases these plays put on stage "troubled consciences." Kallendorf, *Conscience on Stage*, pp. 159–62.

[21] José Antonio Maravall, *La cultura del Barroco*.

[22] Angela Ndalianis, *Neo-baroque Aesthetics and Contemporary Entertainment*.

[23] Suárez, *El escenario de la imaginación*.

[24] For the development of this theory of imagination, see, for example, Avicena's *The Canon of Medicine*, completed in 1025, or Pico della Mirandola in *On the Imagination*, published in 1536.

[25] Vincent Martin, *El concepto de "representación,"* p. 46.

[26] Suárez, *El escenario de la imaginación*.

[27] Tim O'Reilly, *What is Web 2.0.* Sentiment analysis is also known as "opinion mining."

[28] Fritz Strack and Thomas Mussweiler, "Explaining the Enigmatic Anchoring Effect," p. 437.

[29] See Kristen A. Lindquist, Jennifer K. MacCormack, and Holly Shablack. "The Role of Language in Emotion."

[30] Shanto Iyengar, "The Accessibility Bias in Politics," pp. 1–15.

[31] Ndalianis, p. *96.*

[32] Ignacio Arellano, *Diccionario de los autos sacramentales de Calderón*, vol. 28.

[33] For more on this group, see http://www.unav.edu/centro/griso/ (accessed November 5, 2017).

[34] For a list of the specific *autos* used in this study, see Javier de la Rosa Pérez "Making Machines Learn," pp. 74–82.

[35] Only plays with a date were considered as ultimately we aim to find patterns of emotions over time.

[36] A shawm is a wind instrument used profusely by Calderón in his plays. Every time a shawm was introduced, and delivered its penetrating tone, a change would usually take place in the play, such as characters leaving or entering the scene.

[37] Arellano, *Diccionario*.

[38] See Steven Bird, "NLTK," pp. 485–525.

[39] Original Spanish text reads: Noé: *Paraninfo soberano, / en tu palabra fiel / confiado, parto donde / con siempre constante fe / estaré esperando el día / en que he de volver a ver / la familia innumerable / de los hijos de Noé. / Porque lo mandas me parto, / si el pie no te beso es / porque tocar no merezco / las sandalias de tus pies.*

[40] For binary classifications of text in machine learning, see Thorsten Joachims, *Text Categorization with Support Vector Machines*. Turney and Pang's early works are described in Peter D. Turney, "Thumbs Up Or Thumbs Down?" and Bo Pang, Lillian Lee, and Shivakumar Vaithyanathan, "Thumbs Up?"

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[41] There are currently no translations in English of the given titles; some titles are culture-dependent and may make little sense in English. Articles and research that focus on the *autos* generally use the Spanish titles.

[42] This scale would be classified as follows: "Very Negative"; "Negative"; "Neutral"; "Positive"; "Very Positive."

[43] See http://bossa.cultureplex.ca/ (accessed November 5, 2017).

[44] Gabriele Paolacci, Jesse Chandler, and Panagiotis G. Ipeirotis. "Running Experiments on Amazon Mechanical Turk," pp. 411–19.

[45] This scale would be classified as follows: "Negative"; "Neutral"; and "Positive."

[46] Fabian Pedregosa et al., "Scikit-Learn," pp. 2825–30.

[47] Wes McKinney, *Python for Data Analysis*.

[48] See David M. Blei, Andrew Y. Ng, and Michael I. Jordan. "Latent Dirichlet Allocation," pp. 993–1022; and Albert Bifet and Eibe Frank, "Sentiment Knowledge Discovery in Twitter Streaming Data," pp. 1–15. Precision is a measure of hits versus errors, while recall is a measure of hits versus misses. High precision means that positive sentences do not end up being classified as negative; high recall means that no negative sentences end up being classified as positive. For a further explanation of the measures, see David D. Lewis and Marc Ringuette, "A Comparison of Two Learning Algorithms for Text Categorization." Accuracy is a measure of the number of hits vs total number of instances.

[49] See http://aws.amazon.com/mturk/ (accessed November 5, 2017).

[50] For example, see Arellano, *Autos sacramentales completos de Calderón*, vol. 31; William J. Entwistle, "La controversia en los autos de Calderón," p. 223; and Dominique Reyre, *Lo hebreo en los autos sacramentales de Calderón*.

[51] James E. Maraniss, *On Calderón*, pp. 18–28.

[52] See Luciano García Lorenzo, *Calderón*; and José María Maravall and Ubaldo Martínez-Lázaro, "Estratificación social y operacionalismo," p. 48.

[53] Juan Luis Suárez, "Para una teoría de la realidad virtual en Calderón."

[54] More than 4500 stage directions were used to annotate characters' categories but these directions were not analyzed.

[55] EC, 1645. The original Spanish text reads: *No ves / que son sentidos Humanos / y que al fin es menester / alivios que los diviertan / de las fatigas en que han nacido!*

[56] Viviana Díaz Balsera, *Calderón y las quimeras de la culpa*, pp. 87–88.

[57] Antonio Regalado, *Calderón*, p. 981.

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