

Received: 10-02-2011
Revised: 08-03-2011
Accepted: 31-03-2011
DOI: 10.3916/C37-2011-03-07

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Bibliometric and Social Network Analysis Applied to Television Dissertations Presented in Spain (1976-2007)

Análisis bibliométrico y de redes sociales en tesis doctorales españolas sobre televisión (1976-2007)

This paper analyses the structure of Spanish research on television based on data found in doctoral theses on this subject defended in Spain between 1976 and 2007. Two methodologies were used in the analysis: bibliometric analysis and social network analysis. The Teseo database was used to locate doctoral theses on television. Results describe the theses produced for every five-year period, university, thesis advisor and members of examining committees. Social networks are created to identify research groups for the time period of study, as well as trends in the composition of committees according to university affiliation and thesis advisor. Altogether, 404 theses on television were produced during this time period (1976-2007). Overall, the results show a constant increase in the number of theses, which is especially noticeable over the last 15 years. Regarding research, the universities with the longest tradition in Communication Studies stand out; in particular the Complutense University of Madrid for being the most productive. The structural analysis shows that only the Complutense University of Madrid, the Autonomous University of Barcelona, the University of Navarra and the University of La Laguna are capable of producing their own research groups. Professors shaping television research in Spain are identified thanks to social network analysis. Leading positions within the network structure are mostly held by professors of Communication from the Complutense University of Madrid and the Autonomous University of Barcelona.

El presente trabajo es un análisis de la estructura productiva de la investigación española sobre televisión a través de los datos extraídos de las tesis doctorales sobre televisión en España en el período 1976-2007. Para ello se utilizan dos metodologías diferentes: el análisis bibliométrico y el análisis de redes sociales. Para localizar las tesis doctorales se ha utilizado la base de datos bibliográfica Teseo. Los resultados describen la producción según quinquenios, universidades, directores y evaluadores. Se generan redes sociales para identificar grupos académicos que caracterizaron el período estudiado y tendencias de selección en tribunales según director y universidad. El número total de tesis producidas en el período estudiado es de 404 títulos. La tendencia general indica un incremento constante en todos los períodos con un crecimiento exponencial en los últimos 15 años. Son las universidades históricas de Comunicación las que destacan en la producción, siendo la Universidad Complutense la que capitaliza el mayor número de tesis leídas. El análisis estructural demuestra que solamente la Universidad Complutense, la Universidad Autónoma de Barcelona, la Universidad de Navarra y la Universidad de la Laguna generan grupos propios. A través del análisis de redes sociales se localiza a los profesores que estructuran el sistema de investigación español en televisión. Las posiciones predominantes dentro de la estructura de la red son ocupadas principalmente por catedráticos de Comunicación de la Universidad Complutense y Autonomous University of Barcelona.

*Social networks, bibliometrics, doctoral theses, audiovisual communication, television, university.
Redes sociales, bibliometría, tesis doctorales, comunicación audiovisual, televisión, universidad.*

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1. Introduction

The study of doctoral theses is extremely valuable, since they are one of the best reflections of research areas, trends and capabilities in university settings. Furthermore, it is an ideal way to understand the social structure of research, which allows us not only to analyse the evolution of research for a given area of study, but also to identify the main stakeholders and the existing relationships between them. Various factors influence and enable the processes of creation and subsequent evaluation of a successful doctoral thesis. In other words, the research topic, related discipline, department, thesis advisor and current university regulations may determine the final characteristics of a thesis. For a PhD candidate, choosing a thesis advisor may be one of the most important decisions, as students consider their advisor as someone who has the right research background to advise them throughout a long process, during which both theoretical and methodological doubts normally arise. University and research policies also play a crucial role. They are stimuli for boosting research production in most academic areas, resulting in an increasing number of theses. Finally, research tradition in university departments plays a decisive role in the quality and quantity of doctoral theses. Tradition articulates the ways of high education in the different universities, and therefore the postgraduate and PhD studies offered by each school. This factor becomes the motor that drives thesis production.

The fact that doctoral theses themselves are a research topic proves their relevance. Numerous studies on doctoral theses have been conducted in Spain. Fuentes and Arguimbau (2010) presented a classification of studies on theses based on the methodology used (either general or field-specific); up to 18 different topics were identified as research areas. Due to their similarities in terms of method and topic, it is worth mentioning studies in doctoral theses in the field of Bibliometrics (Delgado, Torres, Jimenez & Ruiz-Pérez, 2006), Public Relations (Castillo & Xifra, 2006: 141-161) (Xifra & Castillo, 2006: 302-308), and Radio (Repiso, Torres & Delgado, 2011). Nevertheless, similar studies have not been conducted in every field. No studies have addressed television research in Spain. Similarly, no specific descriptive studies have focused on television research in Spain apart from those carried out in the framework of broader studies on Communication. In this regard, the research carried out by Daniel Jones (1994, 1997, 1998, 2000) stands out, since it has triggered a massive interest in measuring and understanding research in the field of Communication, leading to a vast compendium of papers and books on this matter.

The aim of this study is to characterize the production of doctoral theses on television in Spain between 1976 and 2007, through two complementary methods: bibliometric analysis and social network analysis (SNA). Therefore, this paper has a two-fold aim: to quantify and track the production of doctoral theses per university, thesis advisor and participation in committees, and to identify the main stakeholders in television research in Spain and how they related to each other. The latter objective requires the use of two methods: bibliometrics and SNA. Existing relationships between the different stakeholders in the process of creating and evaluating a doctoral thesis are identified thanks to SNA. In particular, the advisors and members of committees are identified, thus making it possible to identify schools and faculties conducting research on television that were invisible at the moment. The social network relations can be extracted from the composition of the examining committees because as the committee composition is suggested by the PhD student and their advisor. The university will then endorse their suggestion. SNA has been used in this study to visualize the invisible structures underlying television research in Spain, as has been the case in previous group studies (Cross, Borgatti & Parker, 2002).

2. Material and methods

A descriptive longitudinal and retrospective study of doctoral theses on television that were defended in Spain between 1976 and 2007 was conducted. The Teseo database, kept by the Spanish Ministry for Education, was the main data source. This database consists of a compilation of information on doctoral theses presented in Spanish universities. One of the most important features of Teseo is that it comprises records of the theses produced over a long period of time (since 1976), together with exhaustive descriptions of bibliographical records, which include highly interesting data like the names of the members of committees. Nevertheless, there are some problems related to record standardization with Teseo, as has been mentioned in previous studies (Delgado, Torres, Jiménez & Ruiz-Pérez, 2006; Delgado, Fernández & Torres, 2011). In terms of inclusiveness, it is worth mentioning that not every doctoral thesis in existence can be found in the database: only those that have been submitted by the PhD candidate or university are included in the catalogue. However, the most problematic aspect regarding coverage, affects recent theses, since not enough time has

elapsed from the submission/entry of every file. According to Fuentes and Arguimbau (2010: 76), it is estimated that Teseo contains 74.9% of the total number of theses produced in the academic year 2006-07 and 66.7% of those produced in 2007-08. These percentages were calculated in 2010, the year when the data for this study were collected. Despite such limitations, Teseo is the only tool compiling the theses presented in Spanish universities and virtually the only one used in quantitative studies.

The time period analysed covers three decades, starting in 1976, when the first records were entered in the database, and ending in 2007. Over the first two years only one thesis was recorded, the one written by Mariano Cebrian. Therefore, the first «five-year» period in this study actually includes seven years (1976-82). This enables a better time distribution. As shown in previous studies (Jones & al., 2000), only one thesis on television was written before 1976 (Moragas, 1974). This work can be considered the start of television research in Spain. This study covers the first thirty years of dissertation studies about television in Spain. Exhaustiveness in data retrieval was paramount in designing a strategy to search for relevant theses. For this reason, we opted to retrieve the data and create a targeted database of theses written on the field of Communication and to then narrow these down to those theses specific to television. To this end, all the theses written in departments of universities offering Communication studies were collected in the first «round». Next, analysis of the terms used in the theses titles was conducted by using the keywords «Televis*», «audiencias» [audiences], «series» [series] and «canal» [channel] in the fields «Title» and «Abstract» of the Teseo search engine. The number of resulting theses totalled 387. Inserting data manually solved the problem of absence of data in some fields, such as the advisor or the members of the committee. Results were contrasted with those obtained in Jones et al. (2000). As a result, 19 more theses absent in Teseo were included in the compilation, totalling 404 theses. Finally, all the records were exported to an ad hoc Microsoft® Access 2007 database.

The software program Pajek 2.0 was used to analyse social networks. The resulting social networks were mainly related by co-participation of the different stakeholders in committees of theses on television, namely the candidate, advisor and members of the examination committee. The analysis of social networks generated by exam committees required designing different symmetrical matrixes for type-1 networks. Members of the committee are represented by means of a node and co-participation or coincidence in the same committee is represented by means of a non-directed edge. In order to increase network visibility, edges with values exceeding two relationships² were used in medium networks (of up to one thousand nodes) and those exceeding three relationships in large networks (with over one thousand nodes).

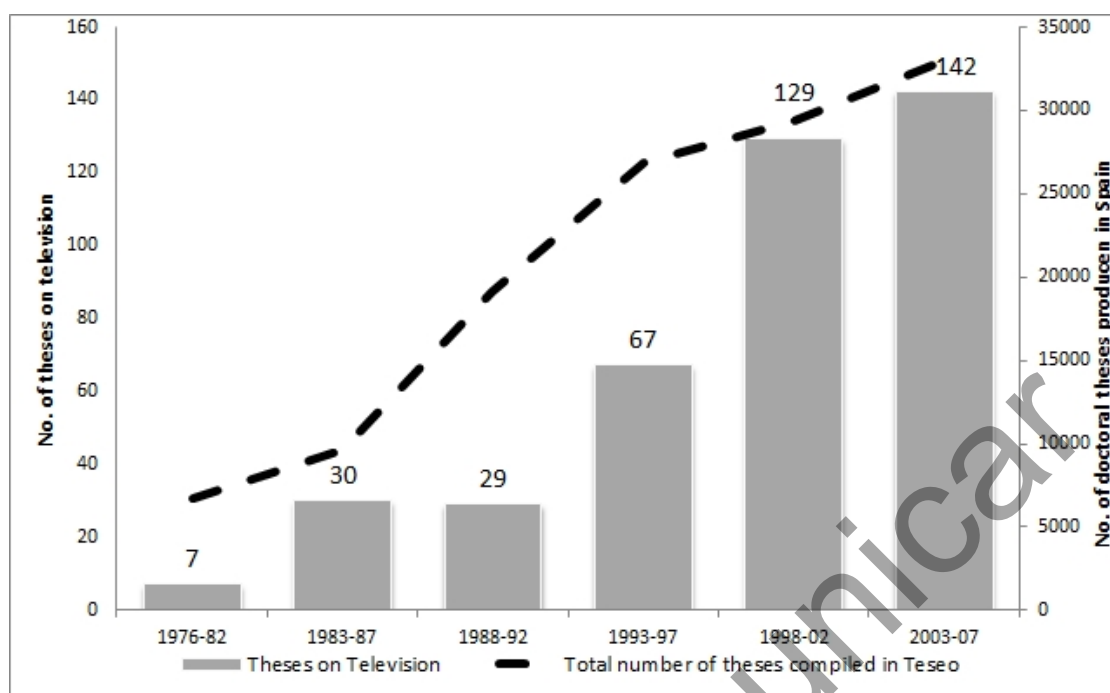
It is relevant to identify existing relationships showing communication between nodes during the structural analysis. Research breakthroughs in this and other fields are highly dependent on communication between researchers (Cole & Cole, 1973).

3. Results

3.1. Production of theses on television: evolution and universities

The total number of doctoral theses on television defended in Spain between 1976 and 2007 amounts to 404. Figure 1 shows the evolution of production in five-year periods since 1976. There has been an ongoing increase in the number of theses written on this topic, which coincides with the increasing number of theses produced in the rest of academic fields. The first theses on television in Spain were written in the late seventies and the numbers increased in the eighties. However, a significant breakthrough was not registered until the late nineties, with 129 theses produced between 1998 and 2002. The highest production turnover was registered in the last period (2003-07) with 142 theses, although production increased less rapidly and seemed to stabilise around similar figures.

Figure 1. Evolution of theses on television written in Spain between 1976 and 2007 per five-year period.



Regarding the schools where theses were presented, 41 different universities were identified in the analysis. The ten most productive ones generated 70% of the theses (table 1). The Complutense University in Madrid ranks first with 128 (32%) theses, followed by the Autonomous University of Barcelona with 56 (14%) and the University of Navarra with 27 (7%). Given their short tradition in Communication studies, the presence of the Universities of Seville, Malaga and Valencia in the ranking is worth mentioning. Regarding the evolution of the five most productive universities per five-year period, the Complutense University in Madrid stands out. It registers a constant increase in the number of theses and is systematically the leading university in every period.

Table 1. Number, percentage and evolution of the number of theses on television written in Spanish universities between 1976 and 2007 per five-year period.

University	No. of Theses* *	Theses %	No. of theses presented per five-year period						
			1976-1975	1983-1982	1988-1987	1993-1992	1998-1997	2003-2002	2007
Complutense University of Madrid (UCM)	128	31.7 %	1	2	12	9	28	35	41
Autonomous University of Barcelona (UAB)	56	13.7 %	1	0	6	7	9	23	11
University of Navarra (UNAV)	27	6.65 %	0	1	0	2	5	9	10
University of Seville (US)	15	3.69 %	0	0	1	1	2	7	4
University of Malaga (UMA)	14	3.45 %	0	0	0	2	2	4	6
University of Valencia (General Studies) (UV)	13	3.20 %	0	0	2	1	0	4	6
University of the Basque Country (UPV/EHU)	12	2.96 %	0	0	1	1	3	5	2
University of La Laguna (ULL)	11	2.71 %	0	0	0	0	2	6	3
Spanish Distance University (UNED)	10	2.46 %	0	0	0	1	4	1	5
Polytechnic University of Valencia (UPV)	9	2.22 %	0	0	4	2	1	1	1
University of Salamanca (USAL)	9	2.22 %	0	0	0	0	1	3	5
Pontifical University of Salamanca (UPSA)	8	1.97 %	0	0	0	0	0	0	8
University of Santiago de Compostela (USC)	8	1.97 %	0	0	0	1	1	6	0
Pompeu Fabra University (UPB)	7	1.72 %	0	0	0	0	1	3	3
University of Alcala (UAH)	6	1.48 %	0	0	1	0	1	1	3
Barcelona University (UB)	6	1.48 %	0	1	1	2	0	0	2
Jaume I de Castellon University (UJI)	6	1.48 %	0	0	0	0	0	0	6
University of Granada (UGR)	4	0.99 %	0	1	1	0	0	0	2

University of Murcia (UM)	4	0.99 %	0	0	1	1	0	0	2
Polytechnic University of Madrid (UPM)	4	0.99 %	0	1	0	0	2	0	0

Only those universities with at least four doctoral theses are included.

3.2. Doctoral thesis advisors and participation in examination committees

Table 2 shows the names of professors who have been the advisors of at least three doctoral theses³. The Complutense University of Madrid is the leading school, with 14 different advisors. Two notable advisors at this University are Mariano Cebrian Herreros, the advisor with the highest number of theses (10), and Jose Ramón Pérez Ornía, who has advised on five theses. The Autonomous University of Barcelona is the second school with the highest number of advisors, in particular six professors. Two of them, Emilio Prado Pico and Miguel de Moragas Spa, rank second and third, with eight and six theses, respectively. The Complutense University and the Autonomous University of Barcelona are the schools with the most productive advisors. The ten professors with at least five theses are from one of those two universities. Other universities have an important presence in the list, such as the University of Navarra with four advisors with at least three theses and the salient Juan José García Noblejas, as well as the universities of Malaga and La Laguna. The absence of advisors from the University of Seville is striking, since it ranks as the fourth most productive university in the period analysed. This gap is due to the fact that research production generated in this University is distributed among a large number of professors instead of being linked to one specific advisor.

Table 2. Professors who have advised more than two theses written on television theses 1976 and 2007.

Advisor	No. of theses	School	Advisor	No. of theses	School
Cebrián Herreros, Mariano	10	UCM	García Noblejas Liniers, Juan José	4	UNAV
Prado Pico Emilio	8	UAB	Franquet Calvet, Rosa	3	UAB
Moragas Spa, Miquel De	6	UAB	Rodríguez Bravo, Ángel	3	UAB
Pérez Ornía, Jose Ramon	6	UCM	Vilches Manterola, Lorenzo	3	UAB
Bustamante Ramírez, Enrique	5	UCM	Benito Jaén, Ángel	3	UCM
Esteve Ramírez, Francisco	5	UCM	García Fernández, Emilio Carlos	3	UCM
Fernández Del Moral, Alfonso J.	5	UCM	Piñuel Raigada, José Luis	3	UCM
García Matilla, Agustín	5	UCM	Torán Peláez, Luis Enrique	3	UCM
Orive Riva, Pedro	5	UCM	Aciron Royo, Ricardo	3	ULL
Palacio Arranz, José Manuel	5	UCM	Álvarez De Armas, Olga Margarita	3	ULL
Balsebre Torroja, Armand	4	UAB	Pablos Coello, Jose Manuel De	3	ULL
García García, Francisco	4	UCM	Aguilera Moyano, Miguel De	3	UMA
Lara García, Antonio	4	UCM	Díaz Nosty, Bernardo	3	UMA
Mendiz Noguero, Alfonso	4	UMA	Nieto Tamargo, Alfonso	3	UNAV
Sevillano García, Maria Luisa	4	UNED	Sánchez Aranda, José Javier	3	UNAV

Table 3 contains the names of scholars with the highest participation rate in exam committees. Prado Pico, Fernández del Moral and Bustamante Ramírez have been appointed examiners on over 20 occasions. In this regard, the Complutense University and the Autonomous University of Barcelona are the leading universities. Apart from their participation in examining committees, we were interested in analyzing where this examining committees took place. This provides valuable information about the influence of the professor based on the number of theses that were discussed at the professor's own university, the number argued at other universities, and how many different universities the theses were argued at. García García presents an interesting case, since he has participated in 17 exam committees, six of them at the Complutense University in Madrid, where he teaches, and 11 committees held in seven different Spanish universities. This fact indicates that he is a figure of national renown. On the contrary, some researchers with a high participation rate like Palacio Arranz (Complutense University of Madrid), Moragas Spa (Autonomous University of Barcelona), or García Fernández (Complutense University of Madrid) have mainly participated in committees held at their universities.

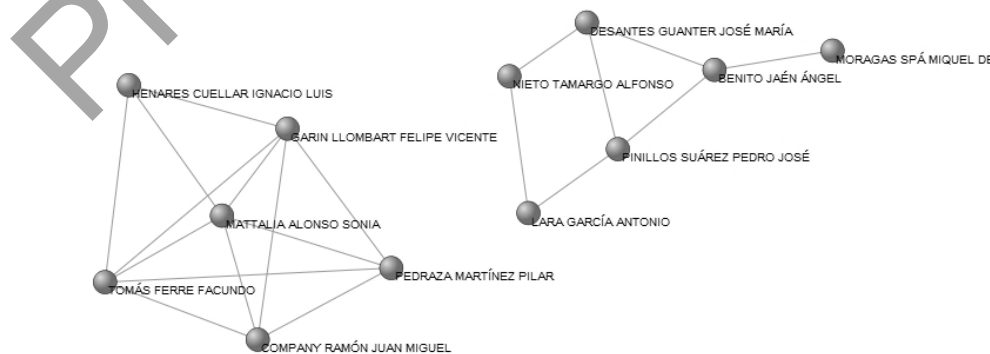
Table 3. Number and type of participation in committees of theses on television in the period 1997-2007.

COMMITTEE	University of origin	No. of committees	Number of participations in committees per University of presentation ⁴		
			Own university	Other universities	Different universities
Prado Pico, Emilio	UAB	24	9	16	7
Fernández del Moral, Alfonso J.	UCM	23	18	5	4
Bustamante Ramírez, Enrique	UCM	22	13	9	7
García García, Francisco	UCM	17	6	11	7
Palacio Arranz, José Manuel	UCM	16	12	4	4
Cebrián Herreros, Mariano	UCM	15	10	5	5
Franquet Calvet, Rosa	UAB	13	6	7	3
Benavides Delgado, Juan	UCM	12	7	5	5
Moragas Spa, Miquel de	UAB	12	10	2	3
García Fernández, Emilio Carlos	UCM	11	10	1	2
Huertas Bailén, Amparo	UAB	11	5	6	4
Lara García, Antonio	UCM	10	7	3	4
Sánchez Tabernero, Alfonso	UNAV	10	8	2	2
Tresserras Gaju, Juan M.	UAB	9	7	2	2
Gómez y Méndez, José Manuel	US	8	1	7	2
Gubern Garriga Nogues, Roman	UAB	8	3	5	5
Ledó Andion, Margarita	USC	8	1	7	3
Pablos Coello, José Manuel De	ULL	8	4	4	3
Ricarte Bescos, José María	UAB	8	8	3	4

3.3. Networks of co-participation in examining committees

Once the main stakeholders are identified, graphs enable us to observe the social structure of co-participation in examining committees. They may represent invisible schools. As a general rule, the total network for 1976-2007 comprises 1,593 participants interrelated by means of 7,505 links. Among them, 7,021 (93.5%) are attached to value 1, which may mean a single coincidence in a committee. The network increasingly incorporates a higher number of nodes, increases in cohesion and density, thus requiring superior measurement units for representation. Figure 2 shows the reduced co-participation network for the period 1978-87 (no data on the members of the committee is available for theses written before 1978) featuring two highly differentiated components. The first component is found on the left-hand side and comprises a united group of researchers who have participated in examining committees of theses advised by Tomas Ferré (Polytechnic University of Valencia). Mattalia Alonso is one of the main committee members included in this group. The second component is of a more heterogeneous nature. Even though most of the researchers included come from the Complutense University of Madrid (Antonio Lara García, J. María Desantes and Pedro J. Pinillos), members from other universities, such as the Autonomous University of Barcelona (Miquel de Moragas) and the University of Navarra (Alfonso Nieto Tamargo and Angel Benito), are also present.

Figure 2. Network of scholars with at least two co-participations in examining committees of theses presented between 1978 and 1987.



An evolution of the co-participation network is identified in the second period (1988-97). Firstly, a higher number of professors with at least two co-participations is registered. Secondly, sub-groups are more interrelated even though there are still two main components. The mediating task of scholars like Fernández del Moral is clearly visible in the network (figure 3), showing the strong connection between the Complutense University of Madrid and the University of Navarra. Similarly, Bustamante Ramírez has strong links connecting

the Complutense University of Madrid, the University of Barcelona and the University of the Basque Country. Exchanges of members of examining committees affect the same teachers. Universities tend to appoint certain members systematically. A striking fact is the isolated nature of the node led by Ventín Pereira of the Complutense University of Madrid, who participates in committees that are not connected to the rest of the network. The cohesion of the network for this period suggests that the studies on television are more mature and consolidated. A shift is registered, with nodes that changed from representing slightly interconnected groups attached to specific universities in the first study period to a network with a higher frequency of exchanges.

Figure 3. Network of scholars with at least two co-participations in examining committees for theses written between 1988-1997.

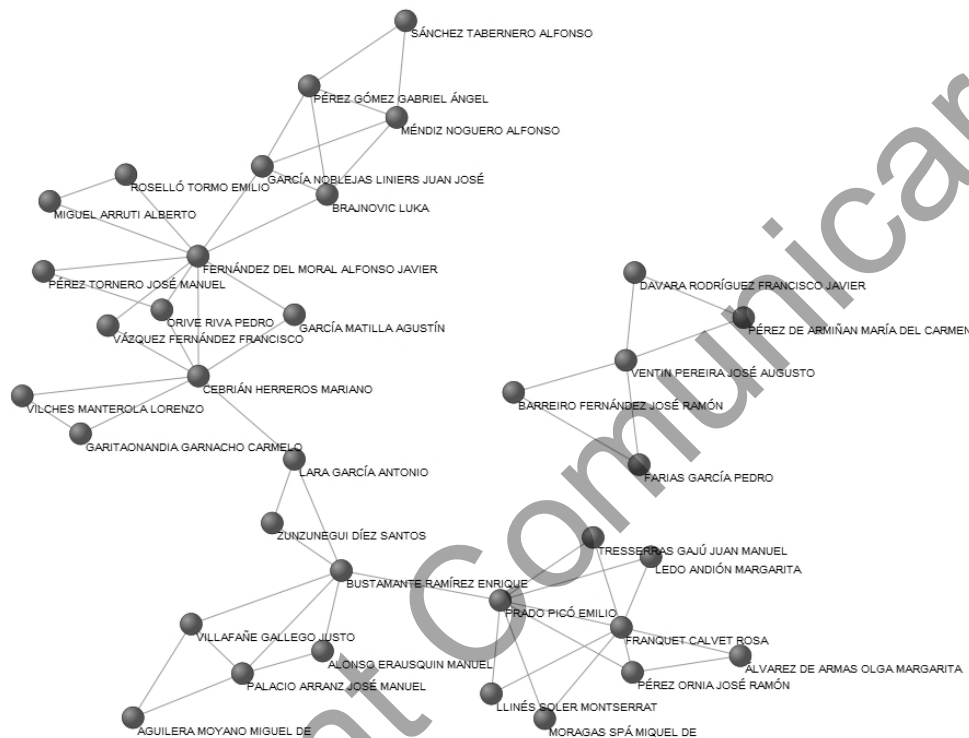
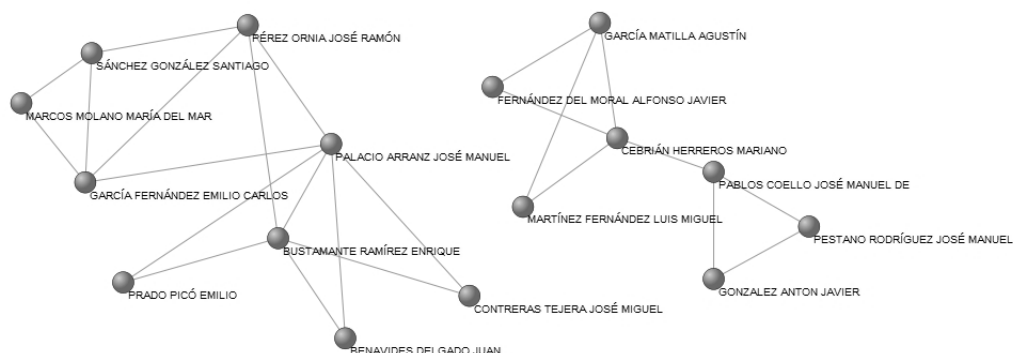


Figure 4 shows the network for the period 1998-2007. In this case (due to limited space), the graph is based on three instead of two co-participations. A higher number of stakeholders and interactions is registered. Two components are identified; the one for the Complutense University of Madrid and the one related to the Autonomous University of Barcelona. As shown in Table 1, these components represent leading groups in theses production. One of the characteristics of this period is the incorporation of new, properly-defined sub-groups within universities. Two sub-groups linked by Cebrián Herreros and Pablos Coello, respectively, are found in the node on the right-hand side, which is regarding the Complutense University. The one for the Autonomous University of Barcelona on the left-hand side also includes two groups. One of them is strikingly large and related to Bustamante Ramírez. The second group has strong links with the first one through Bustamante and Palacio Arranz. It is worth mentioning that other universities orbit around the Complutense University or the Autonomous University of Barcelona rather than being tightly grouped. A further group could be considered if the graph were based on two rather than three co-participations. It would be grouped around the University of Navarra and led by Sánchez Tabernero.

Figure 4. Network of scholars with at least three co-participations in examining committees presented between 1998-2007.



The same display method was used to create a figure of the «Network of scholars with at least 3 co-participations in committees of theses defended between 1976 and 2007» (<https://sites.google.com/site/torressalinas/archivos1/Red1978-2007.tif>). The total network (1976-2007) comprises 1,593 members of committees related to each other by means of 7,505 links. Once reduced, the network comprises 13 components. Four of them have three nodes each. The main component has 54 scholars, including the main researchers doing television research in Spain collected by means of doctoral theses. The Complutense University of Madrid, the Autonomous University of Barcelona, the University of La Laguna and the University of Navarra are the only ones capable of generating their own research groups in the field of television. Other universities do not have their own groups. Therefore, their scholars depend on the Complutense University of Madrid and to a lesser extent on the Autonomous University of Barcelona to form a group. The thickness of connecting lines represents the level of the relationship between the different stakeholders. As a result, solid connections can be identified, such as the one between Franquet Calvo and Prado Pico or the one between Moragas Spa and Prado Pico.

3.4. Networks of committee selection per advisor and university

The analysis of social networks enables us to identify preferences in member selection. Selection has been analysed at two different levels: first, the professors that are most frequently appointed by a given advisor, resulting in the «Network of preferences in member selection per advisors of theses on television defended in Spain between in 1976-2007» (<https://sites.google.com/site/torressalinas/archivos1/redselecciontribunal.jpg>), and secondly, professors who are most frequently selected by universities, resulting in the «Network of preferences in member selection per university for theses on television defended in Spain in 1976-2007» (<https://sites.google.com/site/torressalinas/archivos1/Redseleccionuniversidades.tif>). In the network of selection preferences per advisor, preference given by Cebrián Herreros to Fernández del Moral is worth mentioning (eight times). Likewise, the tendency of Pérez Ornia to appoint García Fernández is salient. One of the most interesting aspects is the triad made up by Bustamante Ramírez, Lara García and Prado Pico, who are consciously rather than randomly selected, as may be the case in co-participations. The Complutense University of Madrid and the Autonomous University of Barcelona are connected and the leading figures identified. In addition, various general phenomena are identified. First of all, the majority of advisors tend to appoint someone from their own university, which is in agreement with the logics of relevant regulations. Secondly, preferences are not reciprocal except between Orive Riva and Fernández del Moral. Finally, very few members of committees are preferred by two advisors, except Bustamante Ramírez.

An increase in the aggregation level and the preferential appointment of certain examiners by universities is obtained in the «Network of preferences in appointment of examiners for theses on television shown by universities in Spain between 1976 and 2007». The reduced network implies that only those relationships with values over three are included. Co-appointment of certain examiners by specific universities indicates that similarities exist between their preferred research topics and scholar exchanges. In this respect, the Complutense University of Madrid and the Autonomous University of Barcelona are the ones with the highest number of common preferences. Five professors participate in committees held at either school (Franquet Calvet, Prado Pico, García García, Bustamante Ramírez and Ledó Andion). Apart from these professors, the following stand out as scholars who are normally selected by two universities: Pablos Coello (Complutense University of Madrid and University of La Laguna), Méndiz Noguero (from the University of Malaga and is preferably appointed by the University of Madrid and the University of Navarra), and Aguilera Moyano (Complutense University of Madrid and University of Malaga). As a general rule, the rest of the professors are preferably selected by one university. In most cases, those professors who are preferred by several universities are those with a higher national renown.

4. Discussion and conclusions

In this study 404 doctoral theses on television written in Spain between 1976 and 2007 were identified. Most of them (67%) were defended between 1998 and 2007. This is probably due both to the massive increase of the potential of Spanish university for producing research and to the effect of different policies and reforms in the research arena. Likewise, the evolution of the number of theses compared to the total number of theses presented in Spain indicates that research on television has followed the same pattern as in other fields in Spain. With regard to universities, the Complutense University of Madrid leads thesis production (31.7%), followed by the Autonomous University of Barcelona (13.7%) and the University of Navarra (6.65%). This fact is related to the longer tradition of the leading universities in Communication studies: communication studies were first offered in those three universities in the academic year 1971-72. Nevertheless, history is not the only fact determining thesis production. An interesting fact is that some universities with a shorter research tradition in Communication studies came together in different periods (1998-2002; 2003-07), as was the case of the University of Malaga and the University of Seville. This was due thanks to the incorporation of professors who had studied at other universities.

In terms of advising theses on television in Spain, Mariano Cebrian from the Complutense University of Madrid and Emilio Prado Pico from the Autonomous University of Barcelona stand out as the two professors with the highest number of theses advise. Both have taught Audiovisual Communication since the eighties and contributed to the inception and consolidation of research on television. Regarding participation in committees, E. Prado Pico, E. Bustamante and A. J. Fernández del Moral are two notable figures. F. García García and E. Prado are the most renowned in Spanish universities, since they have participated in the highest number of committees in different universities (excluding their university of origin). Period-based SNA shows the way in which the number of scholars in networks increases and becomes more specialized over time. During the first period (1976-87), most professors came from Information Sciences and Arts departments and did not specialise in television, except special cases such as Miquel de Moragas. Over the second period (1987-98), new professors were included in the network. They contributed to the consolidation and quantitative increase of theses written in the departments of Information Sciences to the detriment of other fields. In addition, research groups focusing on television were created. The leading figures in the last period (1998-2007) are highly specialized professionals who conduct research in the areas mentioned above and also in the field of Audiovisual Communication. This fact portrays the extent of consolidation of the research community. Leading positions may result from their gift to set up relationships or, as some studies suggest, from their multidisciplinary nature within their field (Leydersdorf, 2007a; 2007b).

In addition, the chronological evolution shows that the Complutense University of Madrid and the Autonomous University of Barcelona are the universities with the highest number of groups. The Complutense University stands out as the one with the highest number of independent sub-groups (up to four groups have been identified, two in the case of the Autonomous University of Barcelona). Such groups attract professors from different universities without their own groups. Apart from these two universities, the University of Navarra and the University of La Laguna are the only ones capable of generating their own groups. However, the number of members is limited.

Notes

¹ An asterisk is used in search engines for truncation of terms in order to retrieve all those terms with the same root.e.g. *Televis** returns results including *Television* (noun), *Televisivo* (adj.), *Televisiva* (adj.) and other words with the common root «*televis*».

² Professors have coincided in two or more committees.

³ In order to simplify data analysis and representation, only those supervisors who have advised three or more theses are included.

⁴ This table shows the number of committees the professors have been members of at their university of origin, at other universities and the number of different universities they have participated in.

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