



Evolution of scientific collaboration within Spanish Psychology between 1970 and 1989

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Título: Evolución de la colaboración científica en la Psicología española entre 1970 y 1989.

Resumen: El objetivo de la presente investigación es analizar la evolución de la colaboración científica en la psicología española a través de trabajos firmados por un autor o autora perteneciente a una institución española de psicología entre 1970 y 1989. Se analizaron un total de 2891 trabajos publicados en 29 revistas de psicología entre los años 1970 y 1989, analizando la colaboración científica a través del estudio de redes mediante el programa UCINET y el software Netdraw. Los resultados indican que a lo largo de los años se produce un aumento del número de trabajos, autores y firmas, así como de la colaboración científica, siendo en el periodo entre 1985 y 1989 cuando los trabajos en coautoría superan al número de trabajos firmados por un solo autor. Se muestra que el número de autores, así como de los grupos de colaboración aumentan a lo largo de los años estudiados. Se puede concluir que es en la segunda mitad de la década de los años 80 cuando se produce un aumento considerable de la colaboración científica en la psicología española.

Palabras clave: Psicología. Historia de la ciencia. Colaboración científica. Producción científica; España.

Abstract: The objective of this research is to analyse the evolution of scientific collaboration within Spanish psychology through papers signed by an author who belonged to a Spanish institution of psychology between 1970 and 1989. We analysed a total of 2891 papers published in 29 journals of psychology between 1970 and 1989, examining the scientific collaboration through network analysis, using the UCINET program and Netdraw software. The results indicated that there has been an increased number of papers, authors and signatures over the years, as well as an increased scientific collaboration. Between 1985 and 1989, co-authored papers overcame single-author papers. It is shown that the number of authors, as well as of collaboration groups, increased over the years under study. It can be concluded that it was in the second half of the 1980s when scientific collaboration within Spanish psychology increased considerably.

Keywords: Psychology. History of Science. Scientific collaboration. Scientific production. Spain.

Introduction

In order to understand current Psychology, and from a socio-historical perspective, it is necessary to delve into the development of different variables which have somehow contributed to the development of this discipline. Since 1968, when the bachelor's degree in Psychology started to be taught in the Faculty of Philosophy and Literature from the Universidad de Madrid (Tortosa-Pérez et al., 2021), different events have marked the evolution of Spanish psychology: the 1973 study program differentiated between the degree in Philosophy, Learning Science and Psychology and the degree in Geography and History and in Philology; the Royal Decree 1652/1979, of 25 May (BOE of 5 July), which authorized the creation of the faculties of Psychology; or the establishment of Professional Associations of Psychology and Faculties of Psychology (31-12-1979), among others.

The 1970s are marked by the increase, dissemination, diversity, plurality, professionalization and institutionalization of Spanish Psychology (García, 2005). There is a change within psychologists' interests and the work methodology aimed at providing Psychology with an own scientific status (Carpintero & Tortosa, 1996). According to Vera (2005), the year 1979 is crucial in the development of Psychology due to its social and institutional positioning in our country.

As stated by Carpintero (1980), Carpintero and Peiró (1981a), Tortosa and Civera (2001) and Tortosa et al. (2019), the history of Psychology can be studied from the history of journals of psychology. On this basis, it is seen as appropriate to turn to this document type as a source of information which displays indicators, traits and aspects of scientific development. In the case of Spanish Psychology, its development is linked to the increase of scientific journals, among other factors. In this sense, Alcáin and Ruíz-Gálvez (1998) point out the increase of Psychology-related publications edited in Spain, which went from 18 journals between 1946 and 1978 to 48 journals between 1979 and 1988.

Numerous papers have tackled the study of the development of Psychology from the perspective of historiography. For example, papers by Blanco (1997), Carpintero et al. 2010, Civera et al. (2006), Fierro (2015), Germain (1954, 1980), Yela (1954, 1982) or Travieso et al. (2001) concerning the institutionalization process of Psychology. Other authors have focused on highlighting the contributions which have played a part in the development of Psychology (Carpintero, 2006; Herrero & Lafuente, 2004; Sáiz & Sáiz, 1996). Others have discussed about the leading figures (Alcover & Curras, 2013) or focused on studying scientific collaboration (López Ferrer & Osca, 2009; López Ferrer, 2008).

The study of scientific collaboration can be carried out from a sociobibliometric perspective, developed by Carpintero (1980, 1983a and b) and Carpintero and Peiró (1983) to study the development of Psychology, which uses bibliometric methods and techniques (Carpintero & Peiró (1981b). In this sense, López Ferrer and Osca (2009) point out the relevance of bibliometric techniques and network

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analysis when studying scientific collaboration, becoming a useful tool in order to study the historic evolution of several scientific disciplines, or to analyse the social structure of the research groups. To this effect, different works have used this type of analysis when it comes to know the scientific collaboration among authors, institutions or countries, mainly within social sciences (López Ferrer et al., 2009; Molina, 2001; Osca et al., 2009).

Regarding Carpintero's hypothesis (1980), which considers science as an organization, we can understand the importance of scientific collaboration within this organization, considering this collaboration from the perspective of horizontality in opposition to verticality.

In the case of Psychology, scientific collaboration has increased over the years. López Ferrer and Osca (2009) indicate that between 1992 and 2001, 72.79 % of papers published by Spanish authors in journals of psychology included in the JCR databases had been carried out in collaboration, which increased by 35.49 % over these years.

This paper is aimed at analysing the evolution of scientific collaboration within Spanish psychology through papers signed by an author who belonged to a Spanish institution of psychology between 1970 and 1989. On this basis, we expect to find an increase of scientific collaboration over the years, with the possibility of establishing a year from which the tendency of signing papers collaboratively is greater than individually signed papers; and conclude that the analysis of

social networks is a useful tool when identifying collaborative groups, the researchers within these groups and their evolution over time.

Method

Materials and Procedure

In order to carry out the research, we analysed 2891 papers published in a total of 29 journals of psychology. Table 1 shows the title of the journal and the number of papers included contemplating the analysed temporary period. The years, from 1970 to 1989, were selected considering the year when Professional Associations of Psychology and Faculties of Psychology were created, selecting a period of 10 years before and after this date.

Regarding the selection of papers, the inclusion criteria determined that it had to be a scientific article, either a review or discussion article, and it had to be signed at least by an author who belonged to a Spanish institution of psychology or who had studied psychology courses. As for the exclusion criteria, we did not include interviews, experiences, reports, conference communications, lectures, book reviews, nor papers in which it was not possible for us to identify whether at least one of the signatories belonged to a Spanish institution of psychology or had a bachelor's degree or a PhD in Psychology.

Table 1.
Distribution of papers according to the journal and the years (1970-1989).

Journals	Number articles per year			
	1970/1974	1975/1979	1980/1984	1985/1989
Actas Luso-Españolas de Neurología, Psiquiatría y Ciencias Afines	2	8	7	2
Análisis y Modificación de Conducta		60	72	133
Anales de Psicología			12	30
Anuario de Psicología	38	44	44	68
Apuntes de Psicología			22	47
Boletín de Psicología			13	81
Clínica y Análisis Grupal		26	30	38
Cuadernos de Psicología		37	51	18
Estudios de Psicología			83	107
Evaluación Psicológica/Assessment Psychology				45
Infancia y Aprendizaje		18	86	93
Informació Psicològica			5	126
Informes de Psicología			66	44
Papeles del Psicólogo			25	89
Psicológica			78	84
Psicologemas				34
Psicothema				7
Revista Española de Psicoterapia Analítica	2	1		
Revista Española de Terapia del Comportamiento			37	43
Revista de Investigación Psicológica			13	15
Revista de Psicología de la Educación				12
Revista de Historia de la Psicología			56	114
Revista de Psicología General y Aplicada	50	129	211	131
Revista de Psicología del Trabajo y de las Organizaciones				42
Revista de Psicología Universitas Tarraconensis			27	76
Revista de Psicoterapia y Psicología Social Aplicada				5
Revista de Psicoterapia y Psicología Médica			6	6

Journals	Number articles per year			
	1970/1974	1975/1979	1980/1984	1985/1989
Revista de Psicología de la Salud				12
Revista de Psicología Social				35
Total articles	92	323	939	1537

The identification of the journals included in this paper was carried out considering other works published previously on the evolution of Spanish Psychology, like the one by Tortosa and Civera (2001). Furthermore, we decided to include the Spanish journals of psychology which can now be found in JCR and which were already published in the analysed years, along with other journals which could be accessed through the library stock of the Universidad de Valencia. Following this, the selection of the authors' names and surnames and institutions was carried out, including these variables in an Excel spreadsheet. Subsequently, we standardized the data and searched the institutions in the cases in which this information did not appear in the paper.

Once the standardization process was completed, we carried out the analysis of social networks (ARS) through the program UCINET and through making graphics with Netdraw software (Borgatti, 2002; Borgatti et al., 2013) and counting frequencies. The size of the nodes indicates the total number of papers by an author. The nodes are greater when the production is greater, too. The links indicate what authors have signed a paper collaboratively and the thickness of the lines highlight the number of signatures which two au-

thors share. Although for the network analysis we selected authors with three or more papers in the first three analysed periods, in the period between 1985 and 1989 we selected those authors with four or more papers, since the increase in the number of groups and authors made it impossible to appreciate the data represented in the figure.

Results

Number of collaborative and single-author papers between 1970 and 1989

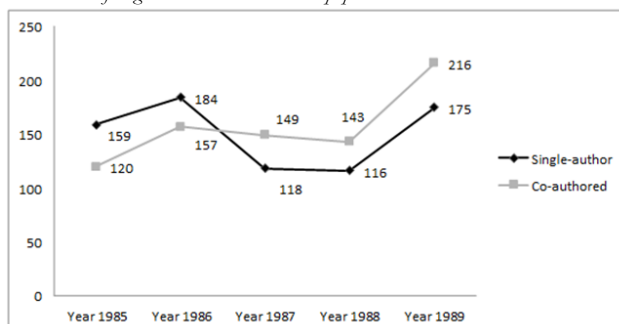
Considering the analysed papers from the 29 journals which were subject of study, we retrieved a total of 4.865 author signings which correspond to 2.534 authors. During the analysed period, as reflected in Table 2, there is an increase in the number of collaboratively signed papers over the years. In the period between 1985 and 1989, there is a greater number of co-authored papers compared to single-author papers, as well as a greater average of signatures per paper, going from 2.35 signatures in the period between 1970 and 1974 to 2.72 signatures in the last period analysed.

Table 2.
Number of collaborative papers and average of signatures per paper.

Years	Nº (%) Single-author papers	Nº (%) Collaborative papers	Nº signatures collaborative papers	Average signatures collaborative papers
1970-1974	72 (78.26%)	20 (21.74%)	47	2.35
1975-1979	225 (69.65%)	98 (30.35%)	235	2.5
1980-1984	618 (65.81%)	321 (34.19%)	790	2.46
1985-1989	752 (48.92%)	785 (51.08%)	2023	2.72
Total	1667 (57.66%)	1224 (42.34%)	3095	2.52

When analysing the distribution of single-author and co-authored papers between 1985 and 1989, it is noted (see figure 1) how co-authored works predominate from 1987 on, a trend which will continue in subsequent years.

Figure 1.
Distribution of single-author and co-authored papers between 1985 and 1989.



Analysis of collaboration networks in the period 1970 – 1974

During the five-year period 1970 – 1974, the number of signatures retrieved from papers published in the analysed journals was 120, which belonged to total of 92 authors. During this period, the greatest producers according to the number of signatures are the following: Ramón Bayés Sopena, from the Universidad Autónoma de Barcelona and the Galton Centre of Psychological Research (5 papers), Miguel Sigúan Soler, from the Universidad de Barcelona (4 papers) and Jesús Amón Hortelano, from the Universidad Autónoma de Madrid; Jaume Arnau Gras, from the Universidad de Barcelona; Pilar García Villegas, from the Instituto Nacional de Psicología Aplicada in Madrid; and Vicente Pelchano Barberá (from the Patronato de Asistencia Psiquiátrica in Madrid, the Universidad Complutense de Ma-

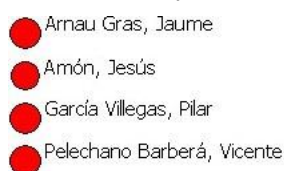
drid and the Universidad Autónoma de Madrid), all of them with three papers.

Figure 2 represents the collaboration networks of authors who have signed three or more papers, along with all their collaborators. Out of the 6 authors who present a greater production during this period, 4 authors have carried out their works individually, without any collaboration. In

this case, the nodes are isolated and appear on the left side of the figure. It can also be seen that there are 2 authors who have carried out a paper collaboratively, with the possibility of identifying two groups of authors. The first group is formed by Miguel Siguán Soler and Montserrat Freixa de Sastre, whereas the second one is composed by Ramón Bayés Sopena and Enriqueta Garriga Ferriol.

Figure 2.

Collaboration network of authors with three or more papers between 1970 and 1974.



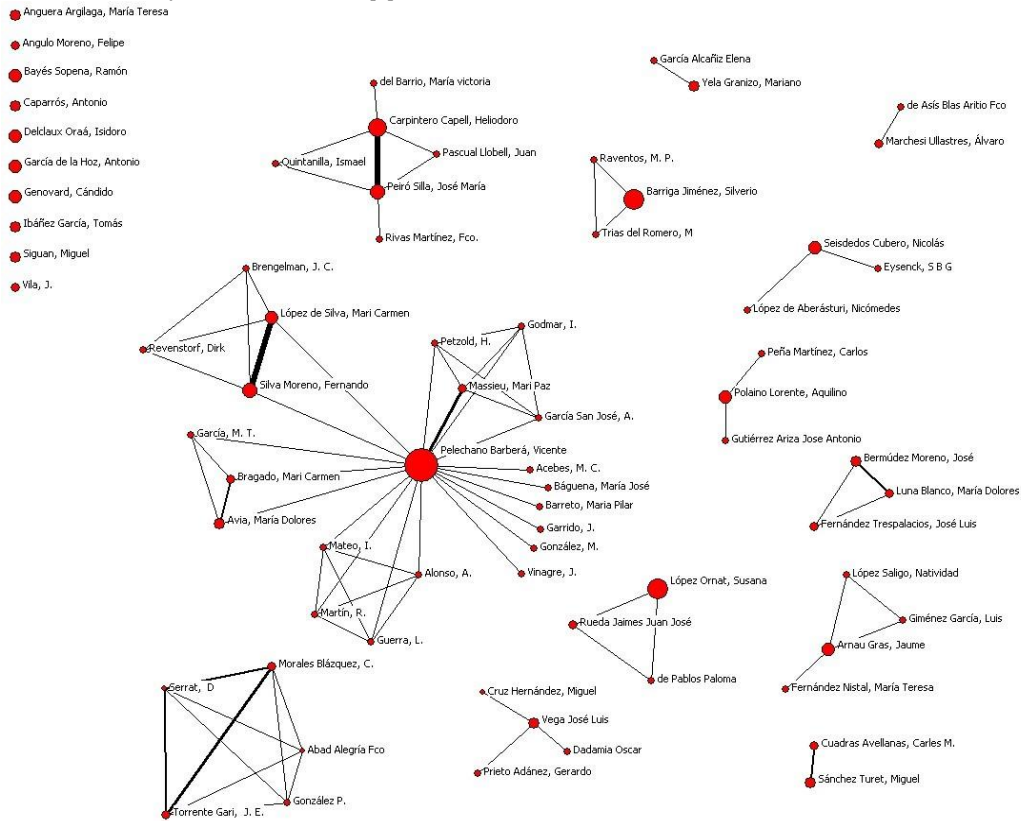
Analysis of collaboration networks in the period 1975 – 1979

The number of authors who have signed any paper in this period was 287, being responsible for a total of 470 signatures. Among the greatest producers, some prominent figures are Vicente Pelechano Barberá (Universidad de La Laguna), with 20 papers; Silverio Barriga Jiménez (Universidad Autónoma de Barcelona), with 11 papers; Susana López Ornat (Universidad Complutense de Madrid), with 10 papers; and Heliodoro Carpintero Capell (Universidad de Valencia), with 9 papers. With 7 papers, we can find José María Peiró Silla (Universidad de Valencia) and Fernando Silva Moreno (Universidad Complutense de Madrid). And with 6 papers:

Jaume Arnau Gras, Cándido Genovard Roselló (Universidad Autónoma de Barcelona), Mari Carmen López de Silva (Medicine) and Aquilino Polaino Lorente (Universidad Complutense de Madrid).

Figure 3 shows the collaboration networks among authors who have signed three or more papers collaboratively, along with all their collaborations. Within the 13 groups which can be identified, the largest group is the one led by Vicente Pelechano and formed by a total of 22 authors. The second most important group, considering the number of authors, is the one led by Heliodoro Carpintero, which is formed by a total of 6 authors. They all belong to the Universidad de Valencia.

Figure 3.
Collaboration network of authors with three or more papers between 1975 and 1979.



Analysis of collaboration networks in the period 1980 – 1984

The number of authors who have signed any paper in the period between 1980 and 1984 was 704, with a total of 1382 signatures. Some of the greatest producers are Heliodoro Carpintero Capell, with 28 papers, and José María Peiró Silla, with 15 papers, both from the Universidad de Valencia. Al-

so, Ramón Bayés Sopena (Universidad de Granada), with 13 papers and Gonzalo Musitu Ochoa and José Bernia Pardo (Universidad de Valencia), with 12 and 11 papers, respectively. Table 3 reflects the authors who have published six or more papers during this five-year period, along with the institution they work in and the number of papers published in this period.

Table 3.
Most productive authors in Spanish Psychology (1980-1984).

Author	Institution	Nº articles
Carpintero Capell, Heliodoro	Universidad de Valencia	28
Peiró Silla, José María	Universidad de Valencia	15
Bayés Sopena, Ramón	Universidad Autónoma de Barcelona	14
Vila Castellar, Jaime	Universidad de Granada	13
Musitu Ochoa, Gonzalo	Universidad de Valencia	12
Bernia Pardo, José	Universidad de Valencia	11
Pelechano Barberá, Vicente	Universidad de La Laguna	10
Carretero Rodríguez, Mario	Universidad Autónoma de Madrid	9
Fernández Ballesteros, Rocío	Universidad Autónoma de Madrid	9
Algarabel González, Salvador	Universidad de Valencia	8
Coll Salvador, César	Universidad de Barcelona	8
Fierro Bardají, Alfredo	Universidad de Salamanca	8
Genovard Roselló, Cándido	Universidad Autónoma de Barcelona	8
Labrador Encinas, Fco Javier	Universidad Complutense de Madrid	8
Maldonado López, J. Antonio	Universidad de Granada	8
Pastor Mallol, Estanislao	Facultad de Tarragona	8

Author	Institution	Nº articles
Tortosa Gil, Fco	Universidad de Valencia	8
Yela Granizo, Mariano	Universidad Complutense de Madrid	8
Ferrándiz López, Pilar	Universidad Complutense de Madrid	7
Pinillos, José Luis	Universidad Complutense de Madrid	7
Polaino Lorente, Aquilino	Universidad Complutense de Madrid	7
Ponsoda Gil, Vicente	Universidad Complutense de Madrid	7
Secadas Marcos, Francisco	Universidad Autónoma de Madrid	7
Siguán Soler, Miguel	Universidad de Barcelona / Universidad Central de Barcelona	7
Campos Bueno, José Javier	Universidad Complutense de Madrid	6
Caparrós Benedicto, Antonio	Universidad de Barcelona / Universidad Central de Barcelona	6
Costa Cabanillas, Miguel	Universidad Complutense de Madrid	6
Delval Merino, Juan Antonio	Universidad Autónoma de Madrid	6
González Almendros, José L.	Universidad Complutense de Madrid	6
Marchesi Ullastre, Álvaro	Universidad Complutense de Madrid	6
Miralles Adell, José Luis	Universidad de Valencia	6
Pascual Llobell, Juan	Universidad de Valencia	6
Román Sánchez, José María	Facultad de Tarragona	6
Ruíz Vargas, José María	Universidad Autónoma de Madrid	6

When depicting the collaboration network among authors who have signed three or more papers collaboratively, along with the authors who have collaborated with them during the conduct of 2 papers (see figure 4), it is possible to identify a total of 23 groups. The largest group is the one led by Heliodoro Carpintero Capell and formed by a total of 22

authors. The second most important group, considering the number of authors, is the one led by Rocío Fernández Ballesteros and formed by 11 authors. The third group in terms of authors is the one led by Aquilino Polaino Lorente and Mariano Yela, with a total of 9 authors.

Figure 4. Collaboration network of authors with three or more papers between 1980 and 1984.



Analysis of collaboration networks in the period 1985 – 1989

The number of authors who have signed any paper in the period between 1985 and 1989 was 1451, with a total of 2893 signatures. Some of the greatest producers are Heliodoro Carpintero Capell, with 35 papers; Fco. Tortosa Gil, with 30 papers; and José María Peiró Silla, with 25 papers. They all belong to the Universidad de Valencia. Also, Vicente Pelechano Barberá (16 papers), from the Universidad de La

Laguna; Fernando Silva Moreno (15 papers), from the Universidad Complutense de Madrid; Abilio Reig Ferrer (14 papers) and Salvador Algarabel González (Universidad de Valencia), María José Báguena Puigcerver (Universidad de Valencia) and Alfredo Fierro Bardají (Universidad de Málaga), all of them with 11 papers. Table 4 shows the authors with six or more papers during this period, along with the institution they work for and the number of papers published in this five-year period.

Table 4.

Most productive authors in Spanish Psychology (1985-1989).

Author	Institution	Nº. articles
Carpintero Capell, Heliodoro	Universidad de Valencia	35
Tortosa Gil, Fco	Universidad de Valencia	30
Peiro Silla, Jose María	Universidad de Valencia	25
Pelechano Barberá, Vicente	Universidad de La Laguna	16
Silva Moreno, Fernando	Universidad Complutense de Madrid	15
Reig Ferrer, Abilio	Universidad de Alicante	14
Algarabel González, Salvador	Universidad de Valencia	11
Báguena Puigcerver, María José	Universidad de Valencia	11
Fierro Bardají, Alfredo	Universidad de Málaga	11
Fernández Ballesteros, Rocío	Universidad Autónoma de Madrid	10
León García, Orfelio G	Universidad Autónoma de Madrid	10
Mestre, María Vicenta	Universidad de Valencia	10
Arnau Gras, Jaume	Universidad de Barcelona	9
Carbonell Vaya, Enrique	Universidad de Valencia	9
del Barrio, María Victoria	Universidad de Valencia	9
del Valle Inclán, Fernando	Universidad de Santiago	9
Garzón Pérez, Adela	Universidad de Valencia	9
Ibáñez Guerra, Elena	Universidad de Valencia	9
Labrador Encinas, Fco Javier	Universidad Complutense de Madrid	9
Mayor Martínez, Luis	Universidad de Valencia	9
Mira Solves, José Joaquín	Ctro. Orientación Familiar; Servicio Valenciano Salud; Universidad de Alicante	9
Moreno Jiménez, Bernardo	Universidad Autónoma de Madrid	9
Quiñones Vidal, Elena	Universidad de Murcia	9
Roldan Badía, María Consuelo	Universidad de Valencia	9
Vizcarro Guarch, Carmen	Universidad Autónoma de Madrid	9
Arce Fernández, Constantino	Universidad de Santiago	8
Ávila Espada, Alejandro	Universidad Complutense de Madrid	8
Clemente Carrión, Antonio	Universidad de Valencia	8
Fernández Abascal, Enrique G.	Universidad Complutense de Madrid	8
Hierro Bustos, María Dolores	Facultad de Tarragona	8
Meliá Navarro, José Luis	Universidad de Valencia	8
Pérez Delgado, Esteban	Universidad de Valencia	8
Romero Medina, Agustín	Universidad de Murcia	8
Sanmartín Arce, Jaime	Universidad de Valencia	8
Santolaya Ochando, Fco J.	Universidad de Valencia	8

Figure 5 represents the collaboration network using a threshold or intensity of collaboration of 4 or more papers signed in co-authorship. The most significant producers are Heliodoro Carpintero, Francisco Tortosa and José María Peiró. Apart from signing papers collaboratively, they begin signing with different authors. Even if most of the co-authorships involve authors within the same institution, there are examples of signing papers collaboratively with authors from different institutions, such as the Universidad

Complutense de Madrid, through the figure of Fernando Silva, or the Universidad de Alicante, with Abilio Reig. Other significant groups are the ones of Salvador Algarabel, with 7 authors, and of María José Báguena, with 6 authors, both from the Universidad de Valencia. Relevant groups from the Universidad de Santiago are the ones formed by José Manuel Sabucedo, Jorge Sobral and Constantino Arce, along with 6 more authors. Also, the group of Elena Quiñones, from the Universidad de Murcia, formed by a total of 7 authors. Oth-

should abandon the approach on arts to adopt a scientific and experimental methodology (Carpintero, 1980).

All of this has an impact on the way production and scientific collaboration of Spanish psychology is going to evolve, with a greater production in view of the number of authors and signatures, which went from 92 authors and 120 signatures in the period 1970-1974 to 1451 authors and 2893 signatures. There is also an increase in the number of research groups and the authors who constitute these groups, and a change from a single-author production to a greater co-authorship production. This change took place in the period between 1985 and 1989, specifically in the year 1987, when the trend which existed at that moment reversed. The same trend continued in the next two years included in this studio, a trend towards co-authorship which stabilised between 1992 and 2001 (López Ferrer & Osca, 2009).

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