Sketching the first 45 years of the journal *Psychophysiology* (1964–2008): A co-word-based analysis

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Abstract

This article presents a keyword-based bibliometric study of the thematic evolution of the journal *Psychophysiology* since its first publication in 1964 until 2008. Bibliometric maps showing the most relevant associations among the main topics treated by the journal are provided separately for the periods 1964–1978, 1979–1988, 1989–1998, and 1999–2008. These maps offer insight into the conceptual structure of psychophysiology as a research discipline and help to visualize the division of the field into several interconnected subfields. Bibliometric maps created by co-word analysis can be used by both experts and novices to understand the current state of the art of a scientific field and to predict where future research could lead.

Descriptors: Psychophysiology, Bibliometric studies, Co-word analysis, Scientific structure, Conceptual development

Psychophysiology is a scientific discipline that has experienced a high rate of growth compared to other disciplines within psychology. A bibliometric study published in 1996 showed a mean half-life of 6.5 years for articles published in the journal *Psychophysiology* since its first issue in 1964 until 1993 (Sánchez-Hernández, Pedraja, Quiñones-Vidal, & Martínez-Sánchez, 1996). This short half-life index implies a constant evolution of the discipline similar to that observed in the experimental and natural sciences and probably reflects the dependence of psychophysiological research on rapidly evolving scientific fields such as physics, mathematics, and engineering. Innovations in these fields are bound to lead, sooner or later, to significant breakthroughs in psychophysiological research.

In spite of the corroborating evidence demonstrating that psychophysiology is a lively and rapidly evolving scientific discipline, to our knowledge, no other study has provided concrete bibliometric information, based on the journal *Psychophysiology*, after 1993. The aim of the present study is twofold: first, to extend the analysis period to 2008 and, second, to complement the previous bibliometric data with new thematic analyses based on the associations between

key concepts (co-word analysis). Bibliometric maps based on co-word analysis help to visualize the division of one field into several subfields and their relationships, providing interesting insight into the evolution of the main topics being discussed in the field throughout the years (Cho & Khang, 2006).

The journal *Psychophysiology* was chosen as our target because of its acceptance among psychophysiologists as one of the most valuable and influential sources of information in the field. The choice of this journal also facilitates the discussion of our results in relation to those provided by Sánchez-Hernández et al. (1996) and by another bibliometric study published in *Psychophysiology* focused on the early years of the field, from 1930 to 1964 (Holguín & Cadaveira, 2003).

Co-word analysis is a content analysis technique that is effective in mapping the strength of association between information items in textual data (Callon, Courtial, Turner, & Bauin, 1983; Callon, Courtial, & Laville, 1991; Coulter, Monarch, & Konda, 1998; Whittaker, 1989). It is a powerful technique for discovering and describing the interactions between different fields in scientific research (Callon et al., 1991; Cobo, López-Herrera, Herrera-Viedma, & Herrera, 2011; Bailón-Moreno, Jurado-Alameda, & Ruíz-Baños, 2006; Leydesdorff & Zhou, 2008; López-Herrera et al., 2009; López-Herrera, Cobo, Herrera-Viedma, & Herrera, 2010; Zhang, Wolfram, Wang, Hong, & Gillis, 2008). Co-word analysis reduces the distance between descriptors (or keywords) to a set of network graphs that effectively illustrate the strongest associations between the descriptors (Coulter et al., 1998).

processes (*classical-conditioning*, *operant-conditioning*, *habituation*). In Period 2 (1979–1988), the major research themes were motivational in nature (*stress*, *psychological-stress*, *human-sex-differences*). In Period 3 (1989–1998), the primary interest was in cognitive processes (*attention*, *auditory-perception*, *memory*). In Period 4 (1999–2008), the primacy of cognitive processes continued. This thematic evolution parallels changes in psychology—from learning and motivation to cognition—revealing the strong connection between the two disciplines.

Finally, the thematic network of the latest period also allows some speculation on the future evolution of the discipline. Emotional themes, which experienced an increment from Period 3 to Period 4, might consolidate and continue growing. Motor processes, which appeared to be integrated in the emerging theme *REACTION-TIME*, may also experience some future increment and move toward higher density and centrality. Two new keywords, which appeared only in the latest period (*brain* and *frontal-lobe*), may suggest the increasing future relevance of neuroscientific and neuroimaging approaches within psychophysiology.

To our knowledge, this is the first bibliometric study of the journal *Psychophysiology* based on co-word analysis. The bibliometric study by Holguín and Cadaveira (2003) examined the consolidation of the field between 1930 and 1964, prior to the publication of the journal *Psychophysiology*. According to Holguín and Cadaveira, this *consolidation period* was characterized

by a predominance of methodological articles, which advanced the standardization of techniques and procedures necessary to support further empirical research. A second bibliometric study by Sánchez-Hernández et al. (1996) examined the records of the first three decades of the journal *Psychophysiology* (1964–1993). The authors divided the topics of the articles published by the most productive authors in that period into two different categories: (a) *content*, for the articles dealing with some specific psychological topic (e.g., *attention*, *stress*, etc.) and (b) *measures*, for those articles whose main focus was the optimal measure of a given psychophysiological response (Sánchez-Hernández et al., 1996). No data on the evolution of the topics were reported.

The information provided by the bibliometric maps presented in this article complement the previous findings by adding new information and a new perspective. The strategic diagrams and the thematic networks not only identified the major themes of the field, they also provided information about less visible themes and the strength of their interconnections. Moreover, by examining the strategic diagrams across the years, it is possible to recognize specific transient trends that emerged as a result of a technological advancement or theoretical development but later disappeared or merged with a broader experimental or theoretical context. Such analysis aids understanding of the dynamic structure of a discipline and provides an opportunity to anticipate its future developments.

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