Systems thinking epistemological underpinnings of practice among rehabilitation professionals: case study of the major text of a French physiotherapy founder

Example of empirical systems thinking among rehabilitation providers

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Abstract
This paper has three objectives: first, to examine the historical foundations of the social representation of French physiotherapy; second, to explore the holistic dimension of physiotherapy care addressed by physiotherapists in our survey; third, to disseminate the research design in social science. A literary text by a founder of French physiotherapy was transcribed and examined by lexicometry. The analysis revealed the avant-garde philosophy of care developed by Dolto in the seventies: a merged model of care and a unique evidence of systems thinking that distinguishes the empirical practice of professionals working according to a functional rehabilitation logic. We argue that the introduction of systems theory into the initial or continuing education of these practitioners could make its bio-psycho-social application more effective. This calls for further research on rehabilitation practices in other cultural contexts and provides a theoretical basis and argument for the development of lexicometry in the social sciences.
Key words:
Systems thinking, social representation, rehabilitation practitioners, patient-caregivers relationship, lexicometry.
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Introduction

Rehabilitation is a fragmented field of care (Cieza, 2019); however, in its "Rehabilitation 2030" program, the WHO considers it to be a public health priority (Rehabilitation 2030, s. d.). It is therefore important to understand professional practices (WHO | Rehabilitation in health systems, s. d.) and representations. Rehabilitation is provided by both physiotherapists and other health professionals (Conti, 2014; WCPT, s. d., 2019). As Conti says, “physiotherapy,” […] is one of the cornerstones of physical rehabilitation” (2014, p. 2). The history of rehabilitation is linked with disability and the status of disabled people in society. Thus these populations may have been excluded or allowed to regain their social roles (Conti, 2014), which means that rehabilitation and by extension physiotherapy, has a social purpose by nature. The epistemology of rehabilitation and physiotherapy in recent times has mainly developed worldwide within the western positivist biomedical paradigm (Gibson, 2018). This implies that different processes of domination (cultural, gender, colonial, and language, among others) have led to the hegemony of this paradigm (Giraldo-Pedroza et al., 2021). Within this perspective of physiotherapy and even though its goals have a social dimension, the body is perceived as a machine and the "holistic ways of thinking" is less represented (McPherson et al., 2015, p. 98). Recently, a current of thought has emerged that criticizes and questions these constructs through non positivist approaches (Barradell, 2017; Gibson et al., 2018; Giraldo-Pedroza et al., 2021; Nicholls & GradDipPhys, 2012). Such approach completes and strengthened the medical approach. Our work belongs to this current. In France, a process of emancipation from medical domination (Freidson, 1970) has led to the recent universitarisation of physiotherapy training
(Delauney, 2010; Gaubert, 2006; Øvretveit, 1985). In this context, Jeulin, a French physiotherapy researcher, proposed an epistemological approach to physiotherapy based on a philosophical approach and states that "scientific production is a social and historical process. Its study is an epistemological one" [our translation] (Jeulin, 2016, p. 16). We propose to expand on the existing research on the socio-historical construction of French physiotherapy (Gaubert, 2006; Monet, 2003) through the study of a disciplinary literary work. Indeed, literature, even scientific literature, gives its author’s representation, but it can also be the reflection of a particular region (Contarello, 2008; 1991). Our study is part of a larger survey that examines the social representations (Abric, 2003; Gregory Lo Monaco et al., 2016) of physiotherapy. In this framework, we used different methodologies (interviews, questionnaires, the analysis of dictionary definitions) to highlight and compare the representations of the three main stakeholders in physiotherapy care in the French context (patients, physician and physiotherapist). By studying Boris Dolto's book, The Body in the Hands [our translation] (Dolto et al., 2006) our objective is threefold. First, we examine the historical foundations of the social representation of French physiotherapy. Second, we explore a point addressed by physiotherapists in the other stages of the survey, which is the holistic dimension of physiotherapy care, and is considered essential by physiotherapists regardless of the research method (authors work). As a researcher involved with the research object (socio-constructivist posture), we are aware of the potential interest of the corpus selected for this study. Third, this paper aims to disseminate this research design in the social sciences by explaining the lexicometry process.

**Materials and Methods**

*Research process*
This research is based on a socio-constructivist paradigm (Raudsepp, 2005) and follows a mixed logic (inductive and deductive, qualitative and quantitative). This paradigm considers that knowledge is constructed by the interaction of the observed subjects with each other, with the research object and with the researcher (Mucchielli, 2005b, 2005a; Piaget, 2008). Thus, we adopted the posture of physiotherapist-researcher participating in the co-construction of realities (Santiago Delefosse et al., 2017). We conduct a multidimensional analysis of Boris Dolto's book, “The Body in the Hands”. This approach was motivated by the scarcity of literary works by French physiotherapists beyond technical textbooks and scientific articles or theses.

Based on our multidisciplinary theoretical framework in the human and social sciences of health (social representations, models of care, relational models), we developed a categorical framework a priori (table 1). Independently of this approach, we analysed the text corpus using the free IRaMuteQ software (Ratinaud & Déjean, 2009) to carry out several successive statistical analyses, including a lexicometry, a hierarchical top-down classification (Reinert method), and a factorial correspondence analysis of the classes of the first stage. Classes are groups of words with statistical similarity. We also conducted a similarity analysis of both the classes and the global corpus. Overall, this approach is called a multidimensional textual analysis (Ratinaud & Déjean, 2009), and the process is summarized in Figure 1. Finally, the class themes were compared with the categorical framework in order to identify possible new themes. This protocol is part of the French-speaking tradition of “discourse studies combining interpretive, hermeneutic approaches with lexicometry’s techniques” (Guihaumou, 2008, quoted by 2016, p. 47).

Corpus Collection
Boris Dolto (1899 - 1981) was a French doctor and physiotherapist. He directed the first French physiotherapy school for nearly thirty years and is considered to be one of the founders of French modern physiotherapy (Macron, 2015). According to WorldCat Identities, he is the author of 26 publications between 1931 and 2006. The book in question, “The Body in the Hands”, has 18 editions in French and Spanish, which were published between 1976 and 2006 (Dolto, Boris J., s. d.). In this book, considered as an emblematic contribution to the history of French physiotherapy, Dolto develops his vision of the practice (Heuleu, 1982). His legacy is perpetuated by a foundation in his name, whose primary objective is “to provide initial and continuing education for the health professions in the spirit of Boris Dolto” [our translation] (La fondation EFOM Boris Dolto, s. d.). Recent doctoral theses also refer to him and perpetuate his legacy (Guyet, 2019; Macron, 2015) (and a co-author work). We transcribed the complete French 2006 edition of Dolto’s book "The Body in the Hands", from a personal copy. For this transcription we first digitalized the text using character recognition. Unrecognized sections were dictated using a speech-to-text function. The transcribed text corresponds to the title, the titles of the chapters, the preface, the foreword, the outline captions and the authors' text.

**Data analysis methods**

Analyses were conducted on the French corpus.

Lexicometry is a method of analysis derived from linguistics. It appeared in France in the 1970s with the development of discourse analysis methodologies applied to political discourse (Scholz, 2019). It is based on a posture of epistemological rupture in relation to the classical approaches of the time. Thus, this approach considers that it is not the word count that reveals the ideological underpinnings of the texts, but the cooccurrences
and the meta-data (i.e author, period, text type, etc.) (Scholz, 2019). It is also relatively fast and automated, and as such is appropriate for a large corpus (Fallery & Rodhain, 2007). The software first performs a lemmatization, which means that the words (occurrence) are put in the form of lemmas (masculine singular or infinitive). Then the software counts the words (number of occurrences) and conducts a census of the different forms. It also segments the text into units of 40 occurrences. During this first analysis, the software calculates the average number of occurrences per form, per text, and also indicates the number of unique words (hapax).

The Reinert method, created by A. Reinert, is a hierarchical top-down classification of text segments (Reinert, 2003). The objective is to obtain a classification of statements in a corpus according to the statistical similarity or dissimilarity of the relevant vocabulary in order to highlight lexical worlds (Kalampalikis, 2003). The profile of each class corresponds to the set of words that are most significantly present in that class. The degree to which a word and/or a variable belong to a class is calculated by a Chi-squared association test. These analyses are visualized in the form of a dendrogram, which can be understood much like a phylogenetic tree. That is to say, the semantic proximity of the classes is indicated by their relative geometric proximity (Ratinaud & Déjean, 2009). Each class corresponds to a semantic universe (Kalampalikis, 2003; Lahlou, 1995) which must be put into perspective with the production context and is impacted by the subjectivity of the researcher. This method is used to reveal the content of the social representations and the semantic proximity between classes (Kalampalikis, 2003; Lahlou, 2003). In order to identify the theme of each class we used characteristic text segments whose score was the sum of the Chi-squares.
A correspondence factor analysis is a statistical technique that allows us to visualize variations in responses according to different classes and variables. The data are summarized in a contingency table alongside the units of meaning and variables (Moliner et al., 2002; Moliner & Lo Monaco, 2017). This is a specific method for the study of social representations which is very widespread in France. It was developed in the sixties by Claude Flament and has for theoretical basis the theory of graphs (Moliner et al., 2002). The graphic representation shows the main words from each class on a Cartesian plane. The frequency is represented by the size of the word; its colour identifies it to a class. Each axis corresponds to an inertia factor representing a proportion of the corpus.

The similarity analysis indicates links between the elements of a class based on co-occurrence indices between words. It is represented in the form of a network of words. The links between the words correspond to the words that are quoted together (co-occurrences) (Rateau & Lo Monaco, 2016). It shows the logic of social representation on the basis of a quantitative link (Lo Monaco et al., 2017).

**Results**

**Corpus description**

The complete book has 398 pages written in French. The total corpus was produced by four different authors. We have coded two variables to describe:

- The profession of the writer: physiotherapist, paediatrician psychoanalyst, or physician.
- The section of the book: introduction, preface, foreword, body of the text, perspective, or back cover.
The corpus of interest corresponds to Boris Dolto's text alone (modalities: body of the text, physiotherapist), a total of 359 pages. It was divided by IRaMuteQ software into 3064 text segments of 40 occurrences. It contains 112080 occurrences with 7699 different forms and 3279 hapaxes after lemmatizations that correspond to 42.59% of the forms and 2.93% of the occurrences.

*The top-down hierarchical classification*

The top-down hierarchical classification reveals five classes that make up 70.43% of the classified segments. The main active forms are presented in Table 2. The dendrogram of classes (Figure 2) is a visual representation of their correlations. We observe two distinct branches: one branch with classes 1, 3 and 5; another with classes 2 and 4. Classes 2 and 4 correspond to 44.4% of the corpus (class 2: 22.6%; class 4: 21.8%) and are marked by anatomical and descriptive vocabulary. The main theme of class 4, for example, is the biomechanics of the body. And class 2 corresponds to descriptions of manual techniques applied to the patient, but also the positions taken by the operator.

The second branch includes the majority of classified speech (55.7%) with classes 1, 3 and 5. Class 3 (21.8%) deals with the indications of physiotherapy. Class 1 (15.1%) has a theme centred on relational aspects, for example this citation with a cumulative Chi2 of 364.15: "...by making him walk the opposite path, helping him to decipher the language of his body. Whatever the ups and downs of manual treatment and the accidents that occur, the physiotherapist develops the relationships between the body and speech" [our translation] (Dolto et al., 2006, p. 357). We have analysed the sub-corpus of this class, which produced no significant results. In class 5 (18.5%), the semantic universe shows the author's systems thinking. This is marked by terms such as "systems" (Chi2: 125.72), "cybernetics" (Chi2: 42.67), “process” (Chi2: 19.25),
“behaviour” (Chi²: 26,16) and “unity” (Chi²: 9,00). The author links different levels of systems: chemical, biological, physiological, psychological, social and epistemological.

In the following excerpt, with a cumulative Chi² of 272.15, he is embedded in a complex systemic approach: "The maturation of the nervous system and socialization lead to the neglect of physical expression in favour of symbols, which are words. The physiotherapist is on the borderline between the two worlds: he must know how to listen to what the patient says” [our translation] (Dolto et al., 2006, p. 356-357).

The correspondence factor analysis

The correspondence factor analysis of the classes reveals 4 distinct factors. The first two explain 58.2% of the corpus and the five classes (figure 3). Factor 1 (34.28%) refers to health care dimensions ranging from technical descriptions (A from 0 to -2) to epistemological postures (B from 0 to +2). Along this axis, on the one hand, there are themes of biomechanical description (class 4) and the therapist's techniques and positions (class 2). On the other hand, there are descriptions related to experience: therapeutic relations (class 1), indications (class 3) and the author's theoretical point of view (class 5). There is a great semantic proximity between the terms of classes 1 and 3, so therapeutic relations and indications are strongly correlated for this author. Factor 2 (23.92%) refers to theoretical aspects, along an axis which opposes empirical situations (D from 0 to -2) and theory (C from 0 to +2). This axis is associated with class 4, which deals with descriptions of the biomechanics of the body; and with class 5, which refers to the author's theoretical position (systems thinking).

The similarity analysis

The similarity analysis produces graphs of co-occurrences that allow us to visualize the relationships between words. Letters in brackets refer to a graph zone.
Figure 4 shows the author's text as a whole, regardless of the top-down hierarchical classification. It illustrates the logical connection of the semantic fields of the technical descriptions centred on voluntary movements (A). They are linked to the themes of categories of action applied (B) to the different anatomical (C) and functional (D) elements. They are produced in a succession of patient-physiotherapist interaction situations which constitute the treatment (E). The hands and body of the physiotherapist (F) are used following a logic which successively considers the different levels of the patient's locoregional physio-pathological systems (H, I, J). This empirical approach works according to a cybernetic loop of therapist action and the reaction of the patient (G) where time and relationship are therapeutic (L) and where pain is an important indicator for treatment and relational adjustment (K).

The graph for class 5 (Figure 5) presents, more precisely, the logic described above. It shows that the author's approach combines theoretical knowledge (M, N, P, Q, S, T, U) with the situation (O, R) and consists of thinking, finding, proposing and showing [our translation].

The class 1 graph (Figure 6) illustrates the representation of the patient-physiotherapist relationship (Y, Z). Patients must understand their problem in order to heal (Y), a process that is enhanced by a therapeutic relationship (V) during sessions where the physiotherapists must express that they care about the patient (W) and where it is essential to feel and perceive (X). According to the author, for the physiotherapist it is a practice that tries to help and heal by taking into account various aspects such as speech or family (Z). He considers the physiotherapist to be operating in the medical field in connection with the doctor (AA). For Dolto, it is a subtle manual medicine which allows the expression and mobilization of feelings (CC). This is of particular interest in
pediatrics (BB). The graph also shows that the physiotherapist has a privileged link with the body (EE), which is both an instrument that allows functional dimensions to be reached (GG), but also the place of a psycho-affective language that needs to be deciphered (FF).

**Discussion**

In this chapter we discuss both the results and the methodologies.

*Boris Dolto's social representation of physiotherapy care*

This article explores Boris Dolto's social representation of physiotherapy care in the book "The Body in the Hands" [our translation] (Dolto et al., 2006). The results reveal that the author offers both a technical and epistemological contribution. Thus, we find evidence of systems thinking. In his discourse, he also exposes elements relating to the knowledge, practices, indications and patient-practitioner relationships. These results complete and expand the findings on social representations of physiotherapy care we obtained with the other methodologies (interview, questionnaires, academic literature and dictionary definitions) (authors work). The study of all the themes obtained makes it possible to identify general themes that organise the discourses about physiotherapy care (categories of discourse). They refer to the nature of care, the meaning given to it, the processes that take place, the expected or unexpected effects on somatic, psychic, relational and/or social health. In the field of social representations, our research introduces the possibility of deepening studies on professional representations using a historically constructed corpus in a given group. On the one hand, the descriptive character of the representation expressed is a common feature of professional representations (Mias & Piaser, 2016). On the other hand, it sheds light on the conceptual foundations of the discourse, which is an innovation. In the field of
rehabilitation, the author’s thinking is a precursor example of the “International Classification of Functioning, Disability, and Health” (ICF model) of the WHO (Jahan & Ellibidy, 2017, p. 48) because it considers care as part of dynamic, interactive and contextualized processes. This corpus communicates Dolto’s vision of the world and allows him to develop his thinking (his knowledge, his experience, his practices and his meaning or raison d’être) which led to the genesis of the representation (Jodelet, 2015) of physiotherapy in France. From the point of view of the socio-historical construction of rehabilitation, this shows the difficulty of introducing avant-garde philosophies of care in a predominantly anglophone context, fragmented by the medical profession where the most represented paradigm of thought is positivist (Conti, 2014; Freidson, 1970; Gibson, 2018; Giraldo-Pedroza et al., 2021; Jahan & Ellibidy, 2017; Pettman, 2007; Sharma, 2012). Putting the results of this paper into perspective with our theoretical framework highlights three important points: systems thinking, a merged model of care, and a horizontal relational model with an extended active role for the patient. These points are developed below.

**Evidence of the empirical practice of systems thinking**

The analyses of classes 1, 3 and 5 (CHD and AFC see table 2 and figures 2 - 3) and the similarity analyses of the entire corpus and class 5 (figures 4 and 5) reveal the author's theoretical approach. It is based on a multi-level empirical systemic integrative approach. It is characteristic of systems thinking in its analogical reasoning, its recursive approach, its anchoring at different levels (from the microscopic to the social level) and its multi-disciplinary anchoring (biology, biochemistry, biomechanics, psychology, etc.) (Durand, 2010; Lugan, 2009; Von Bertalanffy et al., 1973). Dolto's contribution proposes a complex approach to care, as Morin puts it, "a whole that is not
reduced to the 'sum' of its constituent parts" [our translation] (E. Morin, 2015, p. 29). It is complex because "this notion of complexity implies that of the unpredictability of a given system" [our translation] (Lugan, 2009, p. 100). This complexity is underpinned by recursive processes that modulate the treatment in each care situation. It is an innovative example of a “Bio-Psycho-Social model” (Jahan & Ellibidy, 2017, p. 49) both for the time (1976) and for “fragmented specialized medicine” (Durand, 2010, p. 94). As Gibson says, non-positivist thinking is still marginalized (2018) even though rehabilitation models are mainly built around psychosocial factors and context (Jahan & Ellibidy, 2017). Incorporating psychosocial strategies in rehabilitation and physiotherapy has positives effects: functional results, adherence, reduced treatment duration, improved patient confidence, autonomy and psychosocial wellbeing (Archer et al., 2016; Driediger et al., 2006; Driver et al., 2019; McGrane et al., 2015; Medley & Powell, 2010; Rock & Jones, 2002; Skolasky et al., 2013; M. J. Sullivan et al., 2005; M. J. L. Sullivan & Adams, 2010). Thus, the bio-psychosocial model extends and strengthened the biomedical model. It is not opposite nor alternative. But in a recent study of Australian physiotherapists views and practice of psychosocial strategies (Driver, 2019), while respondents placed a high value on such strategies in their practice, the findings revealed that these strategies were mainly carried out empirically and that the respondents felt a need for training (Driver et al., 2019). In Dolto’s reasoning, we observe a similarity with the diagnostic approach described by Delplanque (2009). It also resembles a mixed clinical reasoning (Nendaz et al., 2005, p. 239) because it combines the "recognition of similarities" (similar clinical cases, physiological or pathophysiological system) and "hypothetico-deductive confirmation" mainly through touch. The most significative element that shows Dolto’s systems
thinking is the importance given to dynamic processes and inter-relationships. This vision contrasts with the Platonic tradition at the origin of Cartesian thought and positivism where “truth is eternal” (Herfel et al., 2011, p. 1). In France, univerisitarisation has led to the experimentation and implementation of the application of systemic approaches to the training system (Cochet, 1996; Guyet, 2019; Panchout et al., 2019; Signeyrole, 2015). This is becoming more widespread in other countries (Soussi et al., 2021). However, our results suggest that systems thinking should not only be applied to the training system but should also be taught in training programs. That is to say that an initiation to the systemic approach could be of interest in the initial or continued training (« Can We Train for Systems Thinking? », 2012; Yatchinovsky, 2018) of physiotherapists and other rehabilitation practitioners. Such training would provide the theoretical tools necessary to understand and put into practice the different layers of knowledge combined with skills and attitudes. This would make it possible to move from an empirical and unaware practice of systems thinking and psychosocial thinking to a reflexive practice (Hallo et al., 2021; Schon, 1994; Tramonti et al., 2021).

A merged model of care

The successive analyses of class 1 terms (CFA and similarity analysis in figure 3 and 6) allow us to explore the second point. This point concerns the model of care. Traditionally, there is a dichotomy between cure and care (Molinier, 2016; M. Morin, 2004) and between caring functions and therapeutic functions (M. Morin, 2004; Morvillers, 2015). We also observed this dichotomy in the discourse of patients and physicians in the other methodologies in our framework (authors work). Here, the author merges the models and gives a personal meaning to the expression "therapeutic relationship" where the terms are related and of equal importance. This posture is
reminiscent of the ancient Greek medical posture adopted by the doctors of the time with their wealthy patients. According to Poisson, ancient Greece medical practice combined ethical and technical conceptions, and at times took into account the limits of healing possibilities (2015). Some things can be healed, and others cannot. When healing is possible, the doctor sets up a "medical friendship", which is an ethical expression, associated with techniques. This friendship takes the form of respect due to the patient who is considered as "naturally gifted with the capacity to heal" [our translation] and is free to accept or refuse help. At the time, not all individuals were given the same consideration, so this concept only applied to free and rich men (Poisson, 2015, p. 28-29). Reference can be made to this idea because Dolto, as a trained physician, necessarily took the Hippocratic oath which is a legacy of that time. It seems that for Dolto, treatment corresponds to a combination of patient-physiotherapist relations repeated over time that the pain symptom modulates in a multi-level systemic logic (biomechanical, physio pathological, psychological and social). This concept of treatment is innovative for three reasons. The first is based on his representation of the body. In the positivist biomedical paradigm, the body is described as a machine (Adam & Herzlich, 2014; McPherson et al., 2015; Nettleton, 2020), whereas for Dolto, the patient's body can be represented by way of analogy with an orchestra where instruments play, expresses and resonates in interaction with each other, with the environment and with the practitioner (who is not the conductor or the composer). Secondly, his representation of pain also contrasts with positivism. For him, pain is not limited to a physiological process (Pék’h, 2014) but plays the role of a compass for the therapist. It guides the treatment process and serves to change the direction and diagnosis, and speed up, slow down or stop the treatment. However, in order to be a
compass, this representation must take into account different dimensions (phenomenological, praxeological, biological and cultural), where "pain may be seen as a dynamic, constantly evolving shape whose interactions, transactions and feedback between four dimensions suggest a complex approach" [our translation] (Péoc’h, 2014, p. 12). Finally, the time component of care allows the healing processes to occur as the patient takes ownership (intellectually and sensorially) of the treatment. This approaches the concept of “psychoanalytic cure” as will be developed in the next paragraph.

**A horizontal relational model with an extended active role for the patient**

The third point allows us to complete this interpretation, particularly with regard to the context in which the work was produced. Indeed, the usual medical relational model at the time was vertical with the expectation of a passive patient (Adam & Herzlich, 2014; Freidson, 1970; M. Morin, 2004; Pierre et al., 2014). The author, however, shows consideration for the psychosocial and emotional context of the patient. The body is not limited to an object of treatment; the patient and his body in particular are both active in the expression of the problem and in the healing process through an empathic therapeutic relationship. This conception is close to the psychoanalytical relational model (Durand, 2010), which is consistent with the author's marital situation. His wife Françoise Dolto, a paediatrician psychoanalyst probably influenced his practice. “The innovative aspect brought by Françoise Dolto at the time was to consider the child as a being in its own right, capable of expressing itself, whatever its age” [our translation] (Ricaud-Droisy, 2008, p. 1). But this conception is also part of the approach of psychosomatic medicine (Del Volgo, 2003). This interdisciplinary field studies "the relations between psychic processes and pathological physical manifestations, be they
functional or organic" [our translation] (Del Volgo, 2003, p. 127). It also echoes the bio-psycho-social model later proposed by Engel (Engel, 1980) or more recently by Hallo (Hallo et al., 2021) and by Tramonti (Tramonti et al., 2021) as explained previously.

**Research design and methodology interest for social sciences**

Our mixed approach (qualitative and quantitative) combines rigor, reproducibility and novelty. The joint use of inductive and deductive approaches allows the emergence of new themes and points of view. However, the main limitation of this work lies in the combined approach (theoretical and methodological) because of its complexity. Moreover, the corpus has a value as a historical example that cannot be generalized even though it is of epistemological interest for both rehabilitation practitioners and social science researchers. Technical and theoretical difficulties were encountered when carrying out this research. From a technical point of view, the transcription of a book in paper version proved to be particularly time-consuming; a digital version of the book would have made it possible to overcome this difficulty. From a theoretical point of view, the inductive approach by revealing new models forces the researcher to go outside his field. Researcher triangulation (Apostolidis, 2006) could improve multidisciplinary analysis. The particularity and interest of lexicometry is that it switches the subjective, qualitative phase in the process of interpretation and contextualization of data after an initial quantitative phase. This inversion of stages allows for an "epistemological break" and is in line with the thinking of Bachelard and Foucault who consider, along with the constructivist approach, that the researcher necessarily influences the interpretation of the data and that this must be taken into account (Scholz, 2019, p. 127). According to Wiedemann, "this makes these tools compatible with a range of poststructuralist methodological approaches of text analysis.
such as (Foucauldian) Discourse Analysis, Historical Semantics, Grounded Theory Methodology, or Frame Analysis” (2016, p. 47). However, while its proponents consider it a heuristic method, social scientists have been difficult to convince. This is based on both a cultural and an epistemological misunderstanding. The first is due to a late translation of French research, the second to the ambiguity resulting from the negative image of computer-assisted analysis traditionally associated with the positivist paradigm (Lejeune, 2010; Lejeune & Bénel, 2012; Santiago Delefosse et al., 2017; Scholz, 2019; Wiedemann, 2016).

**Conclusion**

Our case study presents an innovation from both a theoretical and a methodological point of views. We offer a detailed description of the lexicometric methodology in order to explain its epistemological basis rooted in socio-constructivism, which until now has only been familiar to French-speaking researchers. Although lexicometry is struggling to develop in the social sciences because its methods were primarily accessible in French until now and its epistemological foundations were poorly understood, our study shows its heuristic and complementary value compared to other manual qualitative methods (Santiago Delefosse et al., 2017; Scholz, 2019; Wiedemann, 2016). Thus, it gives access to latent content and semantic macro-structures (Scholz, 2019; Wiedemann, 2013). It gives the researcher the ability to reflect on his/her involvement with the research object. In the field of human and social sciences of health, this study illustrates the concept of a merged model of care in physiotherapy (Delplanque, 2009). It highlights a unique aspect of systems thinking in rehabilitation that Dolto contributed to French physiotherapy. This thinking distinguishes the empirical practice of
professionals working according to a functional rehabilitation logic from the rest of the medical profession. The introduction of the systemic theory in the initial or ongoing training of physiotherapists and other rehabilitation practitioners could make the profession more reflexive and effective. This case study also paves the way for further research on rehabilitation practices in other cultural contexts.
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https://doi.org/10.1179/106698107790819873


https://doi.org/10.1177/1354067X05058587


https://doi.org/10.3917/spi.048.0168


https://doi.org/10.1007/978-3-319-97370-8_5


<table>
<thead>
<tr>
<th>Healthcare model category</th>
<th>Indicator</th>
</tr>
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<tbody>
<tr>
<td>Cure</td>
<td>Higher social status</td>
</tr>
<tr>
<td></td>
<td>Acute stage</td>
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<tr>
<td></td>
<td>Therapeutic function</td>
</tr>
<tr>
<td></td>
<td>Technical</td>
</tr>
<tr>
<td></td>
<td>Skills division</td>
</tr>
<tr>
<td></td>
<td>Process</td>
</tr>
<tr>
<td>Care</td>
<td>Relational</td>
</tr>
<tr>
<td></td>
<td>Associated with women</td>
</tr>
<tr>
<td></td>
<td>Socially depreciated</td>
</tr>
<tr>
<td></td>
<td>Non-work</td>
</tr>
<tr>
<td></td>
<td>Private area</td>
</tr>
<tr>
<td></td>
<td>Non-technical</td>
</tr>
<tr>
<td></td>
<td>Lay knowledge and practices</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category of social representations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
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<tr>
<td>Structure</td>
</tr>
<tr>
<td>Categories of care relationship models</td>
</tr>
<tr>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Horizontal</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Vertical</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Differentiated</td>
</tr>
</tbody>
</table>

Table 1: Categorical framework from the humanities and social sciences of health

<table>
<thead>
<tr>
<th>Classes</th>
<th>Main active forms</th>
<th>Chi-squared</th>
<th>Characteristic segments (score= sum of Chi-square)</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Corps</td>
<td>102.28</td>
<td>“by making him/her travel the opposite way to help</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Go out</td>
<td>62.13</td>
<td>him/her to decipher the language of his/her body,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physician</td>
<td>60.31</td>
<td>whatever the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Language</td>
<td>47.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Talk</td>
<td>41.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Therapeutic</td>
<td>38.68</td>
<td></td>
<td>Therapeutic relational</td>
</tr>
</tbody>
</table>
avatars of the manual treatment and the accidents which mark out, the physiotherapist elaborates the reports of the body and the speech”.

(score: 364.15)  (p357)

<table>
<thead>
<tr>
<th>Class 2</th>
<th>Hand</th>
<th>240.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumb</td>
<td>85.25</td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td>47.74</td>
<td></td>
</tr>
<tr>
<td>Grasps</td>
<td>43.09</td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td>27.63</td>
<td></td>
</tr>
<tr>
<td>Slowly</td>
<td>22.11</td>
<td></td>
</tr>
</tbody>
</table>

"we can use the manipulative technique known as locking, the patient always in the same position.

With his left hand the operator grasps and firmly holds the two femoral condyles of the right knee, with his right hand he impales the Description of the techniques and positions of the practitioner’s body
Class 3 Pain 174.79 “The physiotherapy of painful feet is as necessary as that of lumbo-sacral pain. In the situation that concerns us, it is a matter of primary or secondary painful syndrome occurring in the feet level, excluding those caused by progressive organic and inflammatory affections”. (score: 497.13) (p330)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Class 4 Foot 201.45 “this external rotation is</th>
<th>Body Biomechanics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoliosis</td>
<td>74.24</td>
<td></td>
</tr>
<tr>
<td>Affection</td>
<td>47.46</td>
<td></td>
</tr>
<tr>
<td>Disorders</td>
<td>44.67</td>
<td></td>
</tr>
<tr>
<td>Coxarthrosis</td>
<td>40.18</td>
<td></td>
</tr>
<tr>
<td>Problem</td>
<td>25.24</td>
<td></td>
</tr>
<tr>
<td>Angle</td>
<td>54.63</td>
<td>transmitted to the foot by the subtalar or subtastragalar joint. Diagram of the Tibialis Posterior. Cross section of the mediotarsus. the anterior step is conditioned by the pelvic-podal balance. internal talus feet, external calcaneus feet*. (score: 998.01) (p320)</td>
</tr>
<tr>
<td>--------------</td>
<td>-------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pronation</td>
<td>54.25</td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td>33.46</td>
<td></td>
</tr>
<tr>
<td>Unlock</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>Class 5</td>
<td>System</td>
<td>125.72</td>
</tr>
</tbody>
</table>
Cybernetics  42.67  favor of symbols which are *words*.

Behaviour  26.16  The physiotherapist is at the confines of the two worlds: he must know how to *listen* to the patient's speech"

Conditioning  34.76  (score: 272.15) (p357)

Process  19.25  

Unity  9.00  

| Lexical classes obtained following the hierarchical descending classification of the corpus. For each class we propose the main words, their Chi-square and the theme of the class. |
|---|---|---|
| Cybernetics | 42.67 | favor of symbols which are *words*. |
| Behaviour | 26.16 | The physiotherapist is at the confines of the two worlds: he must know how to *listen* to the patient's speech" (score: 272.15) (p357) |
| Conditioning | 34.76 |  |
| Process | 19.25 |  |
| Unity | 9.00 |  |

*Figure 1: Study design. Representation of the different steps of the study*
Figure 2: Corpus class dendrogram. Graphs resulting from the descending hierarchical classification of the corpus. Represents the semantic proximity of groups of words.

Figure 3: CFAs applied to speech classes and class content. Each class is represented by a colour and the height of the words is proportional to the link between the word and the class:
- Red: relational (class 1).
- Gray: description of the techniques (class 2).
- Green: indication (class 3).
- Blue: biomechanics (class 4).
- Pink: systemic approach (class 5).
Figure 4: Graph of similarity analysis of B. Dolto's complete text.  
Word size proportional to the Chi square; letters in brackets refer to a graph zone, the colour represents the links between cooccurrences of the words similar to the branches of a tree.
Figure 5: graph of similarity analysis of Class 5 (systemic approach theme).
Word size proportional to the Chi square; letters in brackets refer to a graph zone; the colour represents the links between cooccurrences of the words similar to branches of a tree.
Figure 6: graph of similarity analysis of Class 1 (relational theme).
Word size proportional to the Chi square; Letters in brackets refer to a graph zone, the colour represents the links between cooccurrences of the words similar to branches of a tree.