Chapter 10
Linguistic Analysis of Science Teachers’ Narratives Using AntConc Software

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ABSTRACT

This chapter presents the linguistic analysis of science teachers’ narratives regarding their worldviews in the digital age and their views of technology. The analysis was performed using Laurence Anthony’s software AntConc, which is suitable for analyzing large data corpora. The language behavior of the following groups of teachers was analyzed by exploring three distinctive linguistic markers: personal pronouns to study participants’ foci of attention; emotion words, to measure the extent of their emotional immersion in the discourse; and semantic fields of specific word collocations. The results, based on the variations in the language behavior, indicated differences between the three groups of teachers’ worldviews. In addition, the examination of the degree of descriptive elaboration, expressed through the use of sense, motion, and exclusion words, revealed similar levels of truthfulness in all three groups. The linguistic analysis, enhanced by various computational linguistic technologies available through the AntConc software, made it possible to identify implicitly conveyed thoughts and feelings, thereby affording a better understanding of complex education-related processes and phenomena.

INTRODUCTION

The connection between the human mind and language has fascinated scientists from various fields since the concept of “Freudian slips” was first introduced over a century ago – a Freudian slip is a linguistic behavior which unintentionally reveals an individual’s true thoughts and feelings (Freud, 1901; Taus-
czik & Pennebaker, 2010). Since then, the value of analysis of language (linguistic analysis) has been widely acknowledged in psychology (e.g., Freda, Esposito, & Quaranta, 2015; Gottschalk & Gleser, 1969; Weintraub, 1989), psychiatry (e.g., Bersudsky Fine, Gorjaltsan, Chen, & Walters, 2005; Fine, 2006; Nienow & Docherty, 2004; Smirnova et al., 2014; Smirnova et al., 2015; Stirling et al., 2006), and forensic sciences (e.g., McMenamin, 2002; Sudjana & Fitri, 2013). However, in educational research its significance and affordances are still underestimated. Although studies in education often rely on content analysis methods, the specific analytic practices used are often insufficient for delving deeply into complicated educational phenomena. Specifically, studies are often conducted without employing computational linguistics technologies (Ursúa & Vásquez, 2008), thereby limiting the sample size and making the inquiry more time-consuming. Only a limited number of studies have addressed this issue directly (Tsybulsky & Muchnik-Rozanov, 2019; Ursúa & Vásquez, 2008).

The digital age, with its huge technological advances and emerging technologies, has created new possibilities for integrating linguistic analysis into educational research. With the emergence of computational linguistics technologies, such as the Linguistics Inquiry and Word Count (LIWC) software programs (Pennebaker, Booth, & Francis, 2007; Tausczik & Pennebaker, 2010), researchers can computationally assess the effect of certain linguistic features found throughout large text corpora. For analyzing non-English corpora, however, LIWC dictionaries need to be especially designed, which adds to the complexity of analyzing data in relatively rare languages or in languages with graphically unique characters. An example is the development of the Chinese LIWC dictionary by the National Taiwan University of Science and Technology in 2007 (Li, Cai, Graesser, & Duan, 2012). In other words, if the data obtained need to be translated from the participants’ mother tongue into English (or into any other globally used language), the undeniable advantage of analyzing writers’ and speakers’ authentic language samples is rendered null and void. The AntConc program, created by Laurence Anthony, a professor in the Faculty of Science and Engineering at Waseda University, Japan, successfully solves this problem.

The aim of the chapter is to show that linguistic analysis of large text corpora utilizing the AntConc software enables researchers to identify implicitly conveyed thoughts and feelings, thereby making it possible to better understand complex processes and education-related phenomena. More specifically, the focus of the chapter is on the ways in which the linguistic analysis described herein works to reveal science teachers’ worldviews regarding the digital revolution and their views of technology. To this end, out of many viable options, three linguistic markers were selected for observation in the current analysis: personal references, emotion words, and semantic fields. While the personal reference tends to reflect speakers’ foci of communication, the valence of the emotion words tends to reveal the way the speakers perceive the world around them. For example, positive emotion words (e.g., love, kind, sweet) are observed when participants describe events to which they ascribe a positive valence, and negative emotion words (e.g., hurt, ugly, nasty) are used to describe events perceived as negative (Kahn, Tobin, Massey, & Anderson, 2007). Moreover, the frequency with which emotion words appear in speakers’ language performance has been associated with the degree of immersion in the processes or events described (Holmes et al., 2007; Pennebaker, Mehl & Niederhoffer, 2003; Tausczik & Pennebaker, 2010). Additionally, the linguistic analysis presented herein examined specific word choices made by the participants, specifically, the most prominent collocations which they used with the lexemes digital and technology, two central concepts of the digital revolution. Identifying the semantic fields to which the collocating lexemes belong (Jackson, 2013) tends to provide further insight into the participants’ views of technology.