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A critical review of proposition analysis in Alzheimer's research and elsewhere

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ABSTRACT

Propositional analysis of text, including the generation of proposition density ratios, is examined within the context of Alzheimer's research. A discussion of linguistic modularity raises questions regarding the outcomes of propositional analysis and its applications in Alzheimer's research.

1. Introduction

In 1996, *The Journal of the American Medical Association* (JAMA) published a remarkable study that linked Alzheimer's disease in older nuns with analyses of essays that they had written earlier in their lives. "The Nun Study," as the research came to be known, was widely circulated and eventually made the cover of *Time* (Fig. 1). According to Mortimer, one of the authors in the *JAMA* report, "we. . .show(ed) that certain characteristics of autobiographical essays written by Catholic sisters when they were an average age of 22 reliably predicted who would develop Alzheimer's disease 60 years later" (Mortimer and King, 2008, p. 2) (cf. Snowdon et al., 1996). In Mortimer and King's quote, "characteristics" refers to the results of proposition density analyses for the essays, reported as propositions density ratios (PDR), a comparison of the number of propositions (roughly, ideas) with the total number of words written.

Mortimer and King go on to claim "Of substantial interest, one of these markers [independent linguistic measures in the study, e.g., PDR] predicted not only cognitive deterioration, but the severity of the Alzheimer's neuropathology at autopsy as well." Here, "neuropathology" refers to tangles of proteins (infarcts) and plaques. And "[a]dditional essays in this cohort showed that the relative linguistic deficits [that is, differences in lower PDR ratios] detectable at age 22 were also seen later in life, with subsequent essays written by the same nuns showing the same relative deficits" (cf. Kemper, Greiner, Marquis, Prenovost, & Mitzner, 2001)

1.1. Proposition analysis

These research findings are predicated upon the use of a particular linguistic analytic procedure, propositional analysis of texts (Turner & Greene, 1977). The purpose of this critical essay is to examine the theory and procedures that generate proposition density ratios, and to provoke larger questions regarding the appropriateness of the use of this linguistic measure in research, both medical and educational.

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Fig. 1. *Time Magazine*, May 2001.

Proposition analysis (PA) is based on predicate structures that derive from generative semantics (Huck & Goldsmith, 1995) and in particular Fillmore's (1968) case grammar. For example, the sentence *Eve ate the red apple* is represented by two separate propositions, as P1 (ATE, EVE, APPLE); and P2 (RED, APPLE), indicating the two propositions (ideas) that are conveyed by the surface structure. Yet, the theoretical premises of PA, generative syntax and semantics, have themselves undergone a great deal of revisionist scrutiny. According to Seuren (1999), generative semantics is not about semantics at all, and may more appropriately be labeled "semantic syntax." (p. 503) These apparent "hair-splittings" are actually very important to the construct validity of the measure proposition analysis, and what it can be said to represent. When a linguistic