

Influences beyond the page: Walter Kintsch's impact on multiple document comprehension and mentoring in research

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Abstract

In this commentary, I aim to explore two enduring influences of Walter Kintsch, one scientific and one personal: his impact on the subfield of multiple document comprehension and his influence on my approach to mentoring junior researchers. Throughout his career, Walter primarily focused on understanding how individuals comprehend individual texts, where a single author typically conveys a coherent and comprehensive message. However, as I shall review, his influence transcends this domain and extends to efforts aimed at deciphering how people understand and integrate multiple documents from different authors, that often provide complementary or conflicting messages.

Commentary

In this commentary, I would like to address two relevant longstanding influences of Walter Kintsch, one scientific and one personal: his influence on the subfield of multiple document comprehension, and on my view on how to tutor junior researchers.

During his career, Walter aimed to understand how individuals comprehend texts. One of his major scientific accomplishments was the development of the Construction-Integration model, a computational framework describing the cognitive processes involved in text comprehension (Kintsch, 1998). A significant strength of the C-I model is its ability to accommodate various empirical phenomena, utilizing an architecture compatible with general theories of cognition (McNamara & Magliano, 2009). The model has undergone testing in hundreds of studies, employing a diverse range of text genres as experimental material, including naturalistic stories, expository texts, and even mathematical word problems.

Common to most of the experimental materials used in this research is the involvement of single texts, typically conveying a coherent and comprehensive message. This focus is understandable, given that the model aims to serve as a general theory of comprehension, and single, comprehensive texts are representative of the materials people are traditionally exposed to. However, with the expansion of the Internet over the last two decades, access to shorter, less comprehensive texts from authors of varying expertise and with different intentions has become more prevalent (Bråten et al., 2020).

In this evolving landscape, researchers have sought to understand how individuals comprehend multiple documents (MD), where readers are confronted with information from different authors providing complementary or conflicting messages (Wiley & Voss, 1999). This scenario presents at least two major challenges for comprehension through the lens of the C-I model. The first challenge relates to argument overlap, a significant process for integrating information from text into a coherent representation proposed by the C-I model (Kintsch, 1998). According to this, two idea units from a text that share arguments will be linked in the representation of the text.

Skilled writers facilitate this process by, for example, ensuring that two causally linked idea units explicitly mention the same referent. However, as MD are written by different authors, linked idea units across texts may be expressed in different terms, making it more challenging for the reader to integrate them (Kurby et al., 2005).

A second challenge is related to the level of representation that readers build from the information in texts. The C-I model introduced the notion that readers comprehend a text not only by representing what the text explicitly says (text-based representation) but also by considering other aspects of the situation described, which can be inferred provided the reader possesses the necessary background knowledge (situation model) (McNamara & Magliano, 2009). The challenge presented by MD scenarios stems from the fact that a particular situation described in different texts may vary substantially depending on the authors' perspective, intention, or expertise. Consequently, readers need to represent these pragmatic elements to fully comprehend the situation. As Graesser and Whitten (2000) expressed it, "Additional layers of nodes are needed [in the C-I model] to handle the broader context that situates the act of comprehension." This layer was introduced by Perfetti et al. (1999) in their Documents model, which proposes that in the context of MD, readers should represent critical information from each document (source, rhetorical goal, and content). This information is then incorporated into an intertext model that represents the associations between documents.

The extent to which Kintsch's work has influenced MD research is astonishing, especially considering that the explosion of this subfield coincided with the end of his active research career. As for May 1st, 2024, a search for the query "multiple document comprehension" on Google scholar yielded 279 documents. Restricting the same query to documents that also included a reference to "Kintsch" gave 125. This indicates that Kintsch's work was cited in approximately 45% of scientific papers that used the terms "multiple document comprehension". Three major themes regarding Kintsch's work appear in the MD comprehension literature. First, a major theme is the use of the C-I model as the underlying cognitive architecture for the comprehension processes that take place at the individual text

level. Many studies from the MD literature introduce the construct of situation model, as it is assumed that, for each individual document, readers build a representation of the situation described in the text with the support of readers' prior knowledge (Perfetti et al., 1999). But quite often, the constructs of situation and documents models are treated as independent entities, under the assumption that readers can adequately understand individual texts but still fail to properly integrate the information presented across texts (List et al., 2019). Alternatively, one could argue that the way in which a situation model is constructed, such as its quality or the order in which it was constructed, can have relevant implications in the construction of a documents model. For example, Maier & Richter (2013) found that presenting readers with an interleaved order of documents with opposing views on a controversy, as opposed to a blocked order, helped them to build a more balanced documents model. Future work should further specify the potential interrelations between the construction of situation and documents model.

Second, research on MD cites the C-I model as a reference framework for "traditional text comprehension," against which researchers introduce additional mechanisms to cope with the complexities introduced by MD scenarios, particularly when considering reading on a digitalized world. For instance, MD research emphasizes the need to account for readers' tasks and contexts that go beyond the assumption of "reading for comprehension," frequently used in studies framed by the C-I model (Rouet et al., 2017). In this way, the field endeavors to unravel how text comprehension serves practical purposes, such as synthesizing information from multiple webpages for a presentation or conducting online searches to make informed personal decisions. Researchers in MD also challenge the overreliance on texts that only contain truthful and non-controversial information, as typically done in studies framed by the C-I model.

Although Kintsch already pioneered work on how people comprehend texts that include contradicting information (Otero & Kintsch, 1992), such contradictions were treated as anomalies in the text rather than as a natural occurrence in separate documents providing conflicting claims. Alternatively, researchers in MD advocate for the need to study reading situations that consider the presence of low quality, biased, and even contradictory information

in texts, as those texts are increasingly present in our daily lives due to the lack of editorial filters on the Internet (Stadtler & Bromme, 2014). In our own research, we have challenged the view assumed by the C-I model that comprehension is amodal. We suspect that the current digitalization of reading practices, characterized by quick and short interactions with mostly disconnected documents, may induce in some readers a superficial mindset when interacting with digital tools. In a series of metaanalyses we have identified the screen inferiority effect, i.e. many readers tend to comprehend slightly less from a text when this is presented on screen rather than in paper (Altamura et al., 2024; Delgado et al., 2018; Salmerón et al., 2024). The literature on the screen inferiority effect on MD is still scarce, and depicts a complex pattern in which students' goals and reading media may shape readers' attempts to integrate documents (Latini et al., 2019). Third, research on MD has been inspired, to a lesser extent, by computational applications associated with the implementation of the C-I model, particularly the use of the statistical technique Latent Semantic Analysis (LSA) to obtain indicators of argument overlap for understanding the processes and products of MD comprehension. In our previous work with Walter, we used LSA to identify argument overlap as an efficient mechanism employed by proficient readers to navigate across hypertexts that provided complementary perspectives on complex topics (Salmerón et al., 2010; Salmerón & García, 2011). These studies were heavily influenced by previous works on hypertext comprehension that came from Walters' lab, such as Foltz (1996). Other efforts have been devoted to using LSA and other natural language techniques (NLP) to automatically analyze students' intertextual integration, as reflected in their post-task essays (Hastings et al., 2012). Still, theory development on MD comprehension could benefit from future efforts to adopt computational perspectives to explain how the process of intertext integration takes place during reading. For example, strength of argument overlap across documents has been recently used to predict the level of integration of a documents model (Sonia et al., 2022). This approach could be integrated with process data (e.g. eye-tracking) to further understand how argument overlap across documents influences students' strategic reading and/or studying behavior, such as rereading a document or taking notes of a recurrent argument.

In reflecting on my invaluable experience working alongside Walter, I am grateful for the transformative impact it had on my approach to research and mentorship. I was fortunate to work with Walter as a Fulbright scholar for a year and a half during the last phase of his distinguished research career. I arrived as a junior researcher from Spain, a country where - at least by then - professors' strong sense of hierarchy could limit students' intellectual autonomy and critical thinking. Against this backdrop, I was pleasantly surprised to meet a great scholar who treated a young researcher as a colleague, not as a subordinate. During our meetings, he insisted on knowing my opinion on every aspect of our scientific work, refraining from providing strong guidance. This was at odds with my initial expectations, as a young researcher coming from a rather traditional system, where I was supposed to sit and listen to the expert. Even on the many occasions where my ideas or research decisions in designing a study proved to be fatally wrong, our follow-up discussions focused on the lessons learned, not on the time lost, as for Walter, failure was part of the research work. It took me a while to understand that this attitude, even if not explicitly stated, was meant to have a long-term influence. The time I spent with Walter significantly shaped many of my skills as a researcher, including building intellectual autonomy and perseverance. Since then, back to Spain, I have tried my best to replicate Walter's encouraging way of mentoring with the junior researchers who have joined our lab. My enduring hope is that the positive influence of Walter's mentorship will echo through the endeavors of this new generation of researchers, shaping the future landscape of our academic journey.

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