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The epistemic stance between the author and reader: A driving force in the cohesion of text and writing

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Abstract

This article explores the role of text cohesion in the comprehension and production of text. While most discourse models have considered the roles of the text features and the reader, the crucial role of writers' epistemic stance has not been widely considered. The thesis explored here is that levels of cohesion emerge in text based on the epistemic stance of the author relative to the reader. Evidence is provided indicating that text genres (i.e. science, narrative) show compensatory relationships between different features related to text difficulty. For example, while science texts have more challenging words than do narratives, they tend to have higher cohesion and simpler syntax. These text profiles indicate that skilled writers have an awareness of readers' needs. By contrast, less skilled writers seem to have less sensitivity to the interplay between textual dimensions and less audience awareness. For example, evidence is reviewed showing that more proficient essays are characterized by lower cohesion than less proficient essays: less skilled writers tend to use more cohesive cues (when they are likely unnecessary) than do more skilled writers. To the extent that an author understands the readers' needs, the author has a more successful epistemic stance toward the reader. This stance is partially evidenced by the crucial role of cohesion in text comprehension and writing.

Keywords

Coherence, cohesion, epistemic stance, reading comprehension, text genre, writing, writing proficiency

Cohesive cues are essential elements of text. They bind together clauses, sentences, and paragraphs. They provide the semantic glue to text by specifying the relations between the elements. Without these cues, readers without sufficient prior knowledge about the

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text domain often fail to comprehend the text. Text comprehension crucially depends on text cohesion.

Writing researchers and educators have historically made the same assumptions about text production and text quality. Many have assumed that better writing is characterized by higher cohesion and the use of more cohesive cues. Indeed, there is an intuitive sense that higher quality writing is more coherent, and this coherence is intrinsically tied to cohesion. Hence, there has been a general assumption that the same cohesive cues that facilitate text comprehension are also related to enhanced judgments of text quality. However, the research reviewed in this article has found just the opposite: this research has indicated that judgments of the writing quality are in some cases unrelated to cohesion and in others, negatively affected by cohesion. Low cohesion writing is often judged as higher quality in comparison to writing with more cohesive cues.

Cohesion facilitates comprehension but lowers judgments of writing quality

Why would the presence of cohesion be so crucial for text comprehension but its absence lend to perceptions of higher writing quality? This article explores a potential answer to this apparent paradox. The bases of this account lie in joint considerations of the *knowledge demands of the text* as well as the *epistemic stance of the author* toward the intended audience or reader. The importance of cohesion is examined in relation to the demands of the text, both in terms of knowledge and in relation to other features of the text. Accordingly, multiple features and dimensions of texts operate in concert with one another in relation to the purpose of the text (e.g. genre) and the intended reader. Different dimensions of text work to compensate for one another such that when texts are more challenging in terms of one dimension, they tend to be less challenging in another. Further, the claim is offered here that an author's epistemic stance toward the reader helps to drive these compensatory relationships between features in text, and particularly the level of cohesion in the text. This claim is partially supported by variations in the levels of cohesion across different genres relative to other text features, and the decrease in the use of cohesive cues in text as writers develop.

Cohesion in text

Cohesion refers to the degree of semantic overlap between concepts in text or discourse. Cohesive cues are grounded in explicit linguistic elements (i.e. words, features, cues, signals, constituents) and their combinations (Graesser and McNamara, 2011). Consider the following two examples from Haviland and Clark (1974):

Example A George got some beer out of the car. The beer was warm.

Example B George got some picnic supplies out of the car. The beer was warm.

The second sentence, *The beer was warm*, is read more quickly in the context of Example A where there is overlap in the referent, *beer*, in comparison to Example B where there

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is no common referent between the two sentences. When text is read more quickly, it is assumed that the text is easier to process for the reader. Indeed, there are numerous studies that have provided evidence that referential overlap impacts reading times and recall of words and sentences (e.g. Haviland and Clark, 1974; Kintsch and Keenan, 1973; Kintsch et al., 1975).

Cohesion and cohesive cues are explicit features of text and discourse. Notably, these cues are neither necessary nor sufficient to produce a coherent understanding of that text. Consider the following two examples:

Example C George got some beer out of the car. He grabbed the beer. The beer was warm.

Example D George got some picnic supplies out of the car. Supplies are materials or provisions stored and dispensed when needed. The beer was warm.

In Example C, the second sentence, *He grabbed the beer*, is unnecessary for most readers because it is easily understood that getting the beer out of the car likely involves grabbing it. In Example D, the word *supplies* in the second sentence overlaps with the same word in the first sentence, technically providing *cohesion*, but this overlap is insufficient for the reader to construct a coherent representation of the situation. Indeed, the information about supplies would likely interfere with the processing of these sentences. Hence, cohesion often facilitates comprehension, but cohesion does not have a one-to-one correspondence with the coherence of a mental representation.

Researchers have also gone beyond the sentence reading time approach by examining the effects of cohesion in the context of longer, more natural texts closer to the length of typical textbook chapters (for a review, see McNamara et al., 2010a). Among the first to tackle this issue, Beck et al. (1984) revised two second-grade narrative passages. Their revisions targeted a variety of problems which they categorized into three types: *surface problems*, including syntactic complexity, unclear relations between reference and referent in the text, and the inappropriate use of connectives; 2) *knowledge problems*, involving readers' lack of familiarity with the meaning and significance of events, and the relations between the events; and 3) *content problems*, attributed to ambiguous, irrelevant, or confusing content. Their revisions targeted cohesion, but also addressed an array of issues that contribute to the coherence of the text for a reader. They found overall benefits of the text revisions on third-grade children's ability to recall the passages as well as their ability to answer multiple-choice questions. Beck et al. (1991) later extended these findings to fifth-grade children's comprehension of social studies texts and to a wider set of dependent measures.

Britton and Gulgoz (1991) demonstrated the benefits of adding cohesion to text with college student readers. They manipulated a text about the war in Vietnam from four different theoretical perspectives. Most relevant here is the *principled version*. For that, they focused primarily on increasing cohesive cues from the perspective of Kintsch and Van Dijk's theory of text processing (e.g. Kintsch and Van Dijk, 1978; Miller and Kintsch, 1980; Van Dijk and Kintsch, 1983). Based on Kintsch and Van Dijk's model of comprehension, they indentified cohesion breaks in the text where there was no explicit cue on how the new information was linked to prior text. To repair these breaks, they added referential (i.e. *argument*) overlap, rearranged parts of each sentence so that readers first

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received old information (i.e. an idea presented previously in the text) and then the new information, or rendered explicit any implicit references that did not have a clear referent.

Britton and Gulgoz (1991) found that the principled revision improved comprehension in comparison to all three of the other versions according to their three dependent measures (i.e. free recall, multiple choice questions, and a keyword association task). McNamara and Kintsch (1996) later replicated the Britton and Gulgoz findings with the same text, showing advantages for the principled revision, and further showing that the cohesion revisions particularly benefited readers who had less knowledge about the topic.

Cohesion and knowledge

To the extent that knowledge plays a role in comprehending a text or discourse, the effects of cohesion become more prominent. Knowledge is among the most important factors to consider in the comprehension of text and discourse. Readers who have more knowledge about the topic of a text or discourse better understand the material (e.g. Alexander et al., 1994; Bransford and Johnson, 1972; Chiesi et al., 1979; Haenggi and Perfetti, 1994; McNamara and Kintsch, 1996). Readers with more knowledge about a domain process the information more quickly, remember more of the information, understand the information at a deeper level, and even more effectively ignore irrelevant information (McNamara and McDaniel, 2004). Clearly reading skill is important to comprehension, but in most cases, the effects of prior knowledge dominate (e.g. Chiesi et al., 1979; for a review, see McNamara and O'Reilly, 2009). Early evidence for the importance of knowledge was provided by Bransford and Johnson (1972), who demonstrated that something as simple as a title can be essential for the reader to activate the appropriate knowledge, particularly for ambiguous texts. Without the title of a text about washing clothes, the text was nearly incomprehensible. While these texts were manipulated carefully to show the desired effects, subsequent studies have consistently replicated the importance of activating knowledge and having sufficient knowledge to understand text and discourse.

What is the nature of the role of knowledge during comprehension? Multiple sources of knowledge are crucial to comprehension. First, the reader must access or activate the words in the discourse or the text. The reader's knowledge of the words themselves is the first step toward comprehension, comprising what is referred to as the *surface structure* of a mental representation (Kintsch, 1988; Van Dijk and Kintsch, 1983). Indeed, word knowledge is highly related to basic comprehension and is a separable construct from comprehension skill (Chiesi et al., 1979; Perfetti, 1989). The second role of knowledge is in the spreading of activation between related concepts in the discourse. This spreading activation results in connections between related concepts within the discourse, or bridging inferences. This aids a reader in the formation of a *textbase*. The third role of knowledge is to go beyond the text, activating concepts that are not explicit in the text, forming links and bridges between concepts within the text and to prior knowledge. To the degree that the reader goes beyond the text, the reader forms a richer, more complete *situation model level* understanding. The reader uses knowledge to integrate meanings of individual sentences into a coherent representation of situations or events depicted by the

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overall text (e.g. Kintsch, 1988, 1998). Thus, the situation model refers to the integration of the textbase and the reader's prior knowledge.

Cohesion gaps in the text increase the demands of knowledge for the reader. A good deal of research has demonstrated that the effects of cohesion on comprehension and learning become particularly apparent when knowledge comes into play. Consider, for example, the following three sets of sentences:

Example 1 Some animals have the ability to grow back entire body parts lost through accident or injury. This process is called regeneration.

Example 2 Some animals have the ability to grow back entire body parts lost through accident or injury. For example, the lizard can grow back his entire tail. This process is called regeneration.

Example 3 Some animals have the ability to grow back entire body parts lost through accident or injury. For example, the lizard can grow back his entire tail. The process of growing back lost body parts is called regeneration.

Through this text, it appears that the author intends for the reader to learn the meaning of the term *regeneration.* Many readers will have a sufficient level of knowledge to understand and potentially remember the term by reading the first set of sentences (i.e. Example 1). At a minimum, the reader is required to generate a backwards referential inference that *this process* refers to *the process of growing back lost body parts*. Example 2 also requires this inference, but provides an example that allows the reader to more readily connect either prior knowledge or a grounded example to the concept. The third example scaffolds the reader by providing the example and also relieving the need for the referential inference.

Low knowledge readers comprehend text and discourse best when there are fewer cohesion gaps, as in the third example (McNamara et al., 1996; for a review, see McNamara et al., 2010b). Low knowledge readers are particularly challenged by cohesion gaps because knowledge is required to bridge the gaps. The reader who lacks sufficient knowledge struggles to generate the required inferences and is unlikely to form a coherent mental representation of the text. For low knowledge readers, cohesion is often necessary to construct a coherent representation of the text, at least at the textbase level. Returning to the prior example, the backwards inference that *this process* refers to *the process of growing back lost body parts* requires knowing that *growing back body parts* is a process, and that this process did not refer to *losing body parts*. It further requires some knowledge of the word *generation* and linking that word to *growing* as well as knowing that the prefix *re* indicates repetition, and hence *growing back.* Moreover, without any experience of having seen an animal grow back body parts, this sentence may seem nonsensical to many children who are quite sure that body parts do not grow back when they are lost. Hence, while on the surface these two sentences seem quite easy to comprehend, for many readers they may be challenging, if not impossible to understand.

A high knowledge reader who already knows what regeneration means will be relatively unaffected by the levels of cohesion in the three examples in terms of recall or learning. However, a reader who is learning what regeneration means, but also possesses the knowledge such as described above, will benefit from reading the lower cohesion

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version as in the first example. *High knowledge readers can benefit from reading low cohesion text.* When high knowledge readers are not likely to generate inferences on their own (e.g. O'Reilly and McNamara, 2007), cohesion gaps induce them to generate inferences that benefit learning. Those inferences serve to connect the new information in the text with prior knowledge (e.g. experiences of seeing animals that have regrown body parts) and to form more connections between concepts within the text. For these readers, cohesion is not necessary, and can even potentially interfere with the active inference processes that emerge when cohesion gaps are encountered. Comprehension is more successful and deeper if the reader activates relevant knowledge and integrates that knowledge with the information explicitly stated in the text. This deep, *constructionist* processing on the part of the reader (Graesser et al., 1994) contrasts with *minimalist* processing, where the reader makes few inferences and processes the text at a shallow level (McKoon and Ratcliff, 1992).

In sum, comprehension is enhanced to the extent that the reader generates inferences while reading (Vidal-Abarca et al., 2000; Wolfe and Goldman, 2005). However, a sufficient level of knowledge is necessary to generate inferences. When there are copious cohesion gaps combined with insufficient knowledge, comprehension fails. Thus, high cohesion benefits low knowledge readers, but low cohesion can benefit high knowledge readers, particularly those who need to be pushed to generate inferences (O'Reilly and McNamara, 2007).

Coh-Metrix and measuring language

The importance of cohesion to comprehension and learning pointed toward the need for an automated tool to measure cohesion. Coh-Metrix was developed to meet this need. Coh-Metrix is an automated tool that provides estimates of cohesion as well as numerous other features of language (Graesser and McNamara, 2011; McNamara and Graesser, 2012; McNamara et al., 2010b). It was constructed based on theories of text and discourse, most predominantly the Van Dijk and Kintsch (1983; Kintsch and Van Dijk, 1978) model of discourse comprehension. Accordingly, our goal was to provide information about text corresponding to the different levels of comprehension, such as the surface structure, textbase, and situation model. Coh-Metrix provides, indices of language automatically by combining and integrating lexicons, part-of-speech classifiers, syntactic parsers, latent semantic analysis (a statistical representation of world knowledge based on corpus analyses), and other common computational linguistics components. A wide range of measures are provided, including descriptive indices (e.g. number and length of words, sentences, paragraphs), word indices (e.g. word frequency, hypernymy, polysemy, concreteness), sentence indices (e.g. syntactic difficulty), lexical diversity (i.e. the variety of words), referential cohesion (i.e. overlap in words or concepts), connectives (e.g. because, so, moreover), and indices reflective of the situation model (e.g. temporal cohesion, causal cohesion).

Numerous studies have been conducted using Coh-Metrix (for reviews, see McNamara and Graesser, 2012; McNamara et al., 2010a). Coh-Metrix is often used to understand the characteristics of texts that other researchers have selected or created in experimental studies of text comprehension. We have also used Coh-Metrix in studies of natural

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language and discourse processing examining a wide range of topics and tasks, such as paraphrasing, explaining, answering questions, writing essays, tutoring, and detection of deception (McNamara and Graesser, 2012).

The primary motivation for the development of Coh-Metrix was to augment traditional formulas used to estimate the difficulty of text. Readability formulas such as the Flesch Reading Ease (Flesch, 1948; Klare, 1974–1975) and Degrees of Reading Power (DRP; Koslin et al., 1987) have been used for decades to estimate text difficulty in relation to the grade level or reading ability of the reader. One limitation of traditional readability measures is that they consider only the superficial characteristics of text reflected by the length or frequency of the words in the texts and the length or syntactic complexity of the sentences in the text. These readability measures can provide excellent predictors of sentence level understanding and the amount of time it takes to read a passage. However, while they successfully predict readers' surface understanding in terms of their understanding of the words and of individual sentences, readability formulas fall short in aligning with deeper levels of comprehension. Moreover, it is clear that there is more to language than the words and separate sentences.

To provide estimates of other sources of difficulty in text, Graesser et al. (2011) conducted a principal components analysis (PCA) on Coh-Metrix indices for 37,520 texts in the Touchstone Applied Science Associates (TASA) corpus. PCA reduced the large multivariate database to eight functional dimensions that accounted for 67.3% of the variance between texts. These dimensions were well aligned with theories of text and discourse. Of these eight (*narrativity*, *syntactic simplicity*, *word concreteness*, *referential cohesion*, *deep cohesion*, *verb cohesion*, *temporal cohesion*, *logical cohesion*), the first five components accounted for 54% of the variance and were most closely aligned with the construct of text difficulty. These five are described below.

1. *Narrativity*. Narrative text tells a story, with characters, events, places, and things that are familiar to the reader. Narrative is closely affiliated with everyday, oral conversation. This component is highly affiliated with word familiarity, world knowledge, and oral language. Non-narrative texts on less familiar topics lie at the opposite end of the continuum. They contain more information, and more of that information will tend to be unfamiliar to some readers.
2. *Syntactic simplicity*. This component reflects the degree to which the sentences in the text contain fewer words and use more simple, familiar syntactic structures, which is generally less challenging to process. At the opposite end of the continuum are texts that contain sentences with more words and use complex syntactic structures.
3. *Word concreteness*. Texts that contain content words that are concrete, meaningful, and evoke mental images are easier to process and understand. Abstract words represent concepts that are difficult to represent visually. Texts that contain more abstract words can be more challenging to understand.
4. *Referential cohesion*. A text with high referential cohesion contains words and ideas that overlap across sentences and the entire text, forming explicit threads that connect the text for the reader. Low cohesion text is typically more difficult to process because there are fewer connections that tie the ideas together

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for the reader. However, if the reader has sufficient knowledge, then the required inferences in low cohesion text may benefit comprehension.

5. *Deep cohesion*. This dimension reflects the degree to which the text contains causal and intentional connectives when there are causal and logical relationships within the text. These connectives help the reader to form a more coherent and deeper understanding of the causal events, processes, and actions in the text. When a text contains many relationships but does not contain those connectives, then the reader must infer the relationships between the ideas in the text. If the text is high in cohesion, then those relationships and global cohesion are more explicit.

These components paint a multi-dimensional picture of text difficulty. They convey the fundamental notion that the challenges within a text emerge from different aspects of the text. As depicted in Figure 1, multiple aspects of language affect what can be experienced as the difficulty of the text. By contrast, a unidimensional model of text difficulty assumes that word and sentence challenges combine to produce difficulty.

While their simplicity and alignment with grade level is appealing to many, unidimensional representations of comprehension are unsatisfactory for a number of reasons. First, unidimensional representations of comprehension ignore the importance of readers' deeper levels of understanding. Traditional readability measures do not tap the more global levels of discourse meaning, cohesion, and differences between text genre (e.g. narrative vs informational texts). Most comprehension models (Graesser and McNamara, 2011; Kintsch, 1998; McNamara and Magliano, 2009; Van Dijk and Kintsch, 1983) propose that there are *multidimensional* levels of understanding that emerge during the comprehension process, including (at least) surface, textbase, and situation model levels.

Unidimensional models also give no information about the genre of a text. Whether the reader can develop a global, deep-level comprehension of the overall text meaning is greatly affected by text genre (e.g. narrative vs expository), primarily because of the relationship between knowledge and genre. Narrative texts usually present reoccurring topics and events (e.g. friendship, love, travel, death) in specific contexts involving

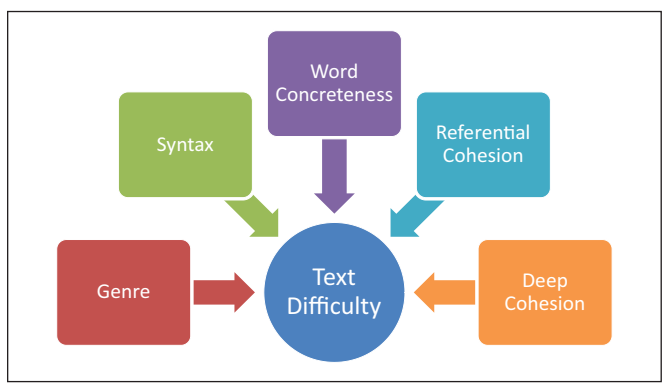

Figure 1. Multiple dimensions contributing to text difficulty.

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particular characters, settings, and times. Readers generally have had a vast amount of experience related to the events and situations described in typical narrative texts. The purpose of a narrative is to create a novel story around generally familiar people, places, events, and things. By contrast, the purpose of expository texts (e.g. science texts) is to present new information that is to be learned by the reader. Expository texts usually present specific facts and relations between those facts to provide the reader with information about concepts and events. Importantly, and by design, readers are likely to be relatively unfamiliar with much of the text's content. Thus, whereas readers may easily draw on background knowledge to comprehend narrative texts, they may struggle to develop situation model representations of expository texts as they lack necessary background knowledge.

In addition, the relative challenges of expository and narrative text lie in their relationship to the reader as well as what the reader must do with the text: the reader learns from the text or enjoys the text. Learning from text requires activating and connecting to prior knowledge. However, unidimensional models ignore complex relationships between the characteristics of the text and the reader's individual differences. For example, a reader's prior knowledge will interact with some aspects of text such as narrativity, word concreteness, and cohesion. However, reading skill will have larger interactions with others, such as syntactic complexity. Without separate measures of the different characteristics of text, predictions of how well an individual will comprehend a text are limited.

A dance among linguistic factors

Another reason that the difficulty or ease of a text should not be assessed unidimensionally is because multiple levels often work to compensate for one another (McNamara et al., 2012a). When texts are challenging in terms of one dimension, they will tend to be easier in another. Texts will rarely have challenges at all levels of difficulty. Consider for example an informational text, with unfamiliar, abstract words, long complex sentences, and with few explicit connections or cohesive cues between sentences. At extreme levels, this would be a relatively unnatural text. For example, turning to the TASA corpus of texts used in the study reported by Graesser et al. (2011), only 89 out of 37,520 (0.24%) TASA texts are below the 30th percentile on all five of the Coh-Metrix components, and likewise, only 88 out of 37,520 (0.23%) TASA texts are above the 30th percentile on all five of the Coh-Metrix components. Hence, over 99% of the texts have at least one dimension that is below or above the 30th percentile.

Thus, texts vary in difficulty along different dimensions. Coh-Metrix augments readability formulas by providing information about multiple sources of challenges and scaffolds within texts. We can visualize this dance among the linguistic features of texts using the Coh-Metrix Text Easability Component Scores.

Figure 2 provides the average easability scores for 3292 language arts texts and 2741 science texts above grade level 8 (using Degrees of Reading Power) from the TASA corpus. As should be expected, the science texts are lower in narrativity compared to the language arts texts. High narrativity texts are characterized by a greater number of events and characters and a lower density of informational content. Low narrativity reflects the use of more challenging words and concepts and a greater density of information about

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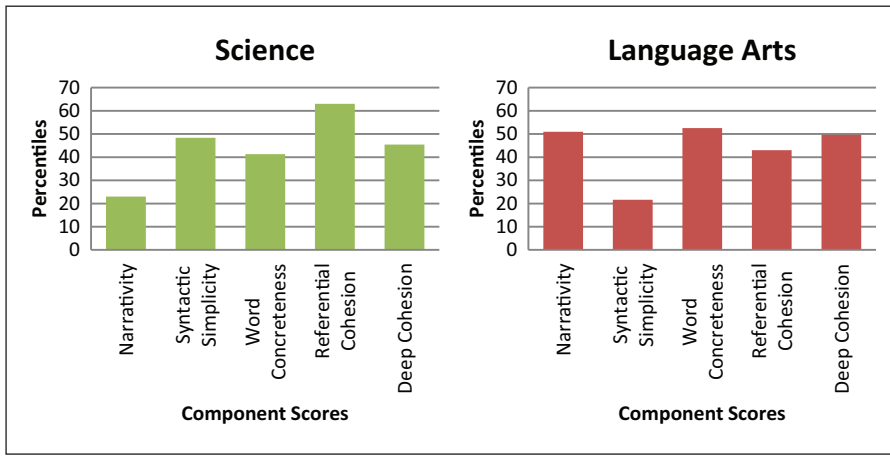

Figure 2. Coh-Metrix Text Easability Component Scores for science and language arts texts above DRP grade 8 from the TASA corpus.

objects and ideas. Science texts also tend to have somewhat lower word concreteness because science concepts tend to be more abstract than are concepts in the language arts. Figure 2 further indicates that these challenges associated with low narrativity are offset by greater syntactic simplicity (e.g. shorter, less complex sentences) and higher referential cohesion. That is, science texts are relatively high in both syntactic simplicity and referential cohesion. By contrast, the language arts texts have more syntactic challenges for the reader and include more cohesion gaps. These challenges are generally surmountable for most readers, and may even make a narrative text more interesting and enjoyable. Indeed, highly cohesive stories with simple syntax are not generally considered to be among the greatest literary works.

These patterns in Figure 2 comparing science and language arts texts correspond with findings reported by McNamara et al. (2012b), in which linguistic features were compared across text genres (science, history, and language arts) and an estimated grade level for the texts. The results of this study confirmed assumptions that science texts are composed of rare words, making it challenging for students to understand the concepts in the text. The results further indicated that the challenges of science texts are offset in various ways. Similar to the results depicted in Figure 2, science texts were found to have lower syntactic complexity and greater overlap in words and concepts (i.e. referential cohesion) in comparison to the language arts texts. In contrast, the latter tended to have lower referential and verb cohesion. Thus, they tend to have sentences that make sense to the reader, but have little explicit overlap in objects (nouns) or verbs (actions). By themselves, these indices may imply that narratives are difficult to read. However, narratives also tend to be composed of more frequent, familiar words, and they often have high causal and temporal cohesion. This situation model cohesion allows the reader to form a coherent, mental model of the text's contents.

As discussed earlier, the text genres themselves have certain characteristics, by their very natures and purposes. For example, readers learn from science and other expository

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texts, and thus the words and concepts are by necessity unfamiliar. Narratives are intended to weave a story in a fictional world, and thus the words and concepts will tend to be more familiar. There is certainly a great deal of variation within each of the genres. For example, some of the language arts texts in the TASA corpus are academic texts about literature, and some are excerpts from stories and other types of narrative text. Similarly, there will be variation among the different subtopics of science. Chemistry texts will not have the same profile as biology texts. Nonetheless, as a whole, text genres appear to have distinct profiles of linguistic characteristics.

These profiles indicate that there is a give-and-take among the challenges within the texts. There are times when language in narrative texts at the situation model levels compensates for the more challenging sequences of sentences that might result from low overlap in words and concepts. In turn, while the reader is challenged by the unfamiliarity of the concepts in expository texts, processing is partially eased through simpler syntax and greater cohesion. Of course, there is only so much that can be done for a reader who is low in knowledge about a domain – and thus, despite these potential compensations within texts, expository texts are far more challenging than narrative texts.

The author's dance

While the nature of the words and concepts are fundamental to genre, other characteristics of text are often rhetorical choices on the part of the author. An author tasked to write about cell mitosis must use certain words to convey the concepts associated with these biological processes. The nature of the words is at least partially driven by the purpose of the text (i.e. genre). By contrast, many features of the text such as the complexity of the sentences and the cohesion between the sentences are largely driven by the author. Whether sentences are long or short, whether causal and temporal relationships are explicitly expressed with connectives, whether one sentence overlaps with another, are examples of choices that the author makes during the writing process, or they emerge from the author's writing style (and the editor's).

The profiles that we observe in texts indicate that authors do not make random choices, but rather that these choices must be driven by some awareness of the needs of the reader. Indeed, the compensatory patterns observed in texts point toward an *epistemic stance* on the part of writers, editors, and publishers. Epistemic stance is the expression of epistemic relationships between interlocutors with regard to a domain, or their epistemic status (Heritage, 2013).

Do writers have an epistemic stance toward their intended audience that results in a compensatory play among the linguistic and semantic characteristics of a text? Clearly, good writers have a stance toward their audience. This is not a novel idea. Indeed, composition students are instructed in increasing awareness of their intended audience. Skilled writers more effectively judge the interests, knowledge levels, and even reading abilities of their audience. In turn, more skilled readers have greater awareness of authors' intentions, and providing instruction to question the author enhances readers' comprehension (Beck and McKeown, 2006). Hence, a writer's intentions and stance to a reader are crucial to the comprehension process. Indeed, the profiles in Figure 1 indicate that texts that are published, such as those in the TASA corpus, are characterized by

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more skilled writers who have an epistemic stance toward their readers. And this stance is observable in the Coh-Metrix component profiles. By contrast, there are also writers who gauge their audience less skillfully. These writers may be those who produce the incomprehensible expository texts or the tragically boring narratives.

If it is the case that more skilled writers, that is, those who are more likely to have published texts, have greater audience awareness, how might this manifest for developing writers? It is clear that cohesion is an important factor to consider in reading comprehension, and particularly for expository texts. Expository texts are intended for readers who are relatively low in knowledge in the sense that they are likely reading the text to learn information. Very often we have seen that writers (and textbook publishers) slightly misjudge their audience in terms of their prior knowledge of the domain because studies show that increasing their cohesion improves comprehension (for a review, see McNamara et al., 2010a). Yet overall, science texts are written with higher cohesion than narratives, indicating that there is some awareness of the need to scaffold the knowledge-seeking reader. Or, on the other side of the coin, narratives and language arts texts are written with lower cohesion, indicative of some awareness that higher cohesion, or spelling everything out for the reader, makes for poor and boring literature.

How does cohesion manifest in text for developing writers? Experts in the areas of English Language Arts and Composition have long assumed that cohesion is a crucial component of writing. Cohesive cues such as semantic overlap between sentences and paragraphs and connectives between sentences have been consistently pointed to as crucial components of skilled writing. There is a clear 'sense' that skilled writing is more *coherent* and better organized. However, for the most part, many conflate the terms cohesion and coherence. It is important to distinguish between the cues that are objectively observable in the text or discourse (i.e. cohesion) as compared to the connections that are formed in the mind of the reader or listener (i.e. coherence). Many composition researchers assume that better writing is more coherent and that this coherence is grounded in cohesive cues in the writers' text. Until recently, there have been more claims in this regard than actual research. And there have been few tools available to investigate the assumption. Coh-Metrix and other text analysis tools have provided us with the means over the past few years to investigate the role of cohesion and other linguistic features in essays produced by developing writers.

In our research, we have focused on prompt-based essays that are used to assess writing skill in high school exit examinations (or college entrance exams). These essays are generally time limited (the writer is given 25 minutes to complete the essays) and on relatively familiar topics, such as the significance of heroes and celebrities, or the value of choices in life. The writer is asked to take a position on a particular question and support that position with evidence and examples. We focus on this genre of essay because we have developed a writing strategy tutoring system called the Writing Pal (McNamara et al., 2012b). This game-based intelligent tutoring system provides instruction in writing strategies and essay writing practice. For the latter, we have developed automated essay scoring algorithms to provide feedback on the essays. Undergirding this development process has been research to examine the linguistic features characterizing good and poor essays.

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We set out on this research agenda with a particular interest in the role of cohesion. On the one hand, it may be expected that cohesion would be positively related to the quality of the essay. Cohesion facilitates the ease of processing for the reader and thus better writers might be expected to provide more cohesive cues in their writing. On the other hand, better writers may take an epistemic stance toward their *true* reader, who is the person scoring the essay. As depicted in Figure 3, a more skilled writer may be more in tune with the probability that the person scoring the essay will be high in knowledge and a highly skilled reader. Given that the domain of prompt-based persuasive essays tends to be relatively familiar, then the characteristics of essays written by the more skilled essay writer ought to be more similar to the profiles observed for the language arts texts. Compared to essays written by less skilled writers, they should have greater syntactic complexity, more unfamiliar words, and lower cohesion. If the writer holds an epistemic stance that the reader has sufficient knowledge about the topic, the writing should be more sophisticated than that of less skilled writers. That is, the writer should use words that the reader can be expected to know and sentence structures that the reader can be expected to successfully parse. In addition, the reader can be expected to successfully generate inferences to bridge cohesion gaps in the text. As such, the better essays may also exhibit fewer explicit cohesive cues.

We have found these trends in several studies. In McNamara et al. (2010a), we examined which linguistic features were most predictive of essay quality for 120 college student writers who wrote take home (untimed) essays. We found that better essays were more syntactically complex, had a greater diversity of words, and included more rare, unfamiliar words. By contrast, no measures of cohesion from Coh-Metrix correlated with essay quality. These results indicated that higher quality essays were more likely to contain linguistic features associated with text difficulty and sophisticated language. However, cohesion was unrelated to essay quality.

In another study, Crossley et al. (2011b) examined differences between essays written by ninth-grade, eleventh-grade, and college students. Thus, this study examined differences between the essays as a function of the development of the writer. As expected, the essays increased linearly in quality as a function of grade level of the writer. Fortunately, the college students wrote higher quality essays than the eleventh-grade students, who in turn wrote better essays than the ninth-grade students. The ninth-grade essays were characterized by higher word frequency (i.e. more familiar words) and lower syntactic complexity (i.e. simple sentences). Similar to McNamara et al. (2010b), the higher quality

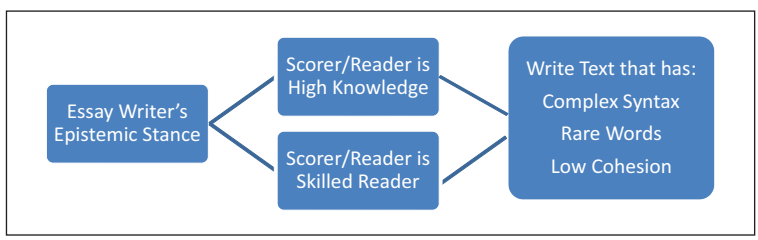

Figure 3. The successful developing writer's epistemic stance toward their target reader, the scorer of the essay.

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essays were more syntactically complex, had a greater diversity of words, and included more rare, unfamiliar words as a function of grade level. In addition, cohesion decreased as a function of grade level. The ninth-grade essays included more explicit cohesive cues such as connectives and word overlap, whereas the college student essays included the least cohesive cues (see also Crossley et al., 2011a).

Hence, writers are aware of and able to use cohesive cues in the writing early in their development. Indeed, research indicates that children learn and use cohesive devices in their writing as early as grade 2 and continue developing in their use at least until around grade 8 (King and Rentel, 1979; McCutchen, 1986; McCutchen and Perfetti, 1982). After approximately grade 9, however, it appears that the use of these cues decreases as writers become more proficient (see also Freedman and Pringle, 1980). At the same time, they learn and are able to use more sophisticated language such as rare words, more diverse words, and more complex syntax. The decrease in the use of explicit cohesive cues indicates that skilled writers increase in their awareness of when these cues are needed to support comprehension. Such awareness requires an increased understanding of the intended audience, the reader of the essay.

Conclusion

Cohesion plays an important function in text. To better understand the role of cohesion in text, we need to consider multiple factors. First, there is the text. Second, within the text, the level of cohesion in the text is only meaningful relative to other features of the text. All of the dimensions of a text interact, each one depending on the other. Considering one aspect of text in isolation is much like viewing a Monet from a foot away. Considering multiple aspects of text is analogous to backing away from the dabs of color in an impressionist painting to see the full picture.

A third consideration is the reader. The reader has varying levels of knowledge, reading ability, interests, and goals, which in turn interact with the various dimensions and characteristics of the text. A fourth consideration is the author. The author creates the text. To the extent that the author understands the characteristics of the reader, there can be an epistemic relationship between the two, and the author has a more or less successful epistemic stance toward the reader. Published texts certainly vary in their quality, appeal to readers, and success in engaging readers. On the whole, however, we might assume that authors of published texts have some sense of the reader. In these texts, we observe compensatory patterns between sources of difficulty in text that imply that authors have some sense of the interplay between the sources of challenges in text with relation to their reader. By contrast, less skilled writers are less aware of their audience and also show less evidence of epistemic stance within their writing.

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