Discourse processing—examining our everyday language experiences

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Studies of discourse processing focus on the ways in which readers and listeners comprehend language. The linguistic segments of interest to the field tend to be larger than sound, word, or sentence-level units; they include the books and conversational communications that comprise our everyday cognitive and social interactions. The current review focuses on discourse comprehension (specifically text processing), highlighting three core issues of primary interest to the research field. First, we outline the particular elements that make up naturalistic discourse activity. Second, we identify potential interactions among the elements, and how investigations of these interactions have resulted in influential frameworks for the field. Finally, we examine contemporary work (both theoretical and applied) that might further enhance current accounts of discourse processing. As appropriate, the review includes references to relevant empirical research outlining the processes that guide, and are guided by, our discourse experiences.

Language comprehension involves several core processes, including letter and sound identification, the binding of those elements into words and sentences, the assignment of meaning to those constituents, and the potential encoding of some of that information into memory. A variety of fields focus on the components that underlie language comprehension, investigating the perception and retrieval of the most basic units of language (e.g., phonemes, morphemes), along with the ways in which those units are combined in organized sequences that become associated with well-formed words and sentences. Such work has considered language processing as a ‘deconstructionist’ activity, examining how comprehension necessitates the integration of linguistic building blocks into larger speech and text elements.

However, any examination of language that devotes sole consideration to sounds, words, or even sentences neglects the importance of broader discourse contexts. Individuals rarely process single words or sentences without supporting context (outside of laboratory conditions); they more commonly experience large segments of language in textbooks, novels, newspaper articles, class lectures, and phone conversations. The goal of research in discourse processing is to understand how individuals build meaning from the extended linguistic events that comprise naturalistic communication. This includes examination of the activation of information from memory, the influence those activations have on moment-by-moment comprehension, the ways in which comprehenders make connections within and across linguistic contexts, and the contributions of factors beyond the linguistic stimuli itself on everyday discourse experiences.

A complete review of the field of discourse processing could comprise several chapters of material, including an explication of the types of methodologies and materials commonly employed in empirical investigations. To more succinctly address recent trends and research projects, this article will outline emergent issues that currently drive research in the area. These issues have motivated important debates that underlie contemporary accounts of discourse processing. For each of these issues, relevant empirical research, theoretical approaches, and computational models will be introduced as appropriate. The review will conclude with consideration of the current work in our own lab that we believe provides exciting insights and challenges for both theory and practice. This overall organization will help focus attention on the kinds of research investigations that attempt to describe, explain, and even influence our everyday discourse experiences.
THE NATURE OF DISCOURSE PROCESSING

Research in the field of discourse processing has been particularly concerned with identifying and describing the basic components of a discourse experience. One of the goals of such research is to explain the types of experiences that occur during everyday reading activities. Consider, for example, the following excerpt from the novel *Kafka on the Shore*, in which a woman named Sakura describes her attempt to run away from home:

I got as far as Abashiri, up in Hokkaido. I stopped by a farm I happened to see and asked them to let me work there. I’ll do anything, I told them, and I’ll work hard. I don’t need any pay as long as there’s a roof over my head and you feed me. The lady there was nice to me, had me sit down and have some tea. Just wait here, she said. The next thing I knew a patrol car pulled up outside and the police were hauling me back home. (p. 75)

Readers can engage in a variety of activities as they process this text. Knowledge that this story is a fictional narrative, likely to be read for entertainment purposes, might encourage attention to different concepts or different rereading behaviors than if the text were read for the purpose of studying story structure for a literature class assignment. Readers must resolve anaphors (e.g., inferring that ‘them’ in the second sentence refers to people who reside at the farm) as they attempt to build coherence within and between sentences in the text. Presumably, readers with greater knowledge of Japan might construct specific inferences about the distance Sakura traveled, as compared to readers with little knowledge of Japan. These activities, all in the service of building an understanding of the information described in the text, exemplify the types of processing phenomena that discourse researchers investigate. Below, we provide a review of the factors that contribute to processing and memory for discourse, referring back to this excerpt to provide concrete examples where appropriate.

Discourse Content

Investigations of discourse comprehension often focus on how text content influences reader comprehension and memory. The findings, taken together, generally suggest that language provides a set of processing cues to the reader that guide the construction of memory for the discourse. These cues indicate what warrants attention and what can be ignored or deemphasized. In fact, as individuals process unfolding text, discourse concepts (e.g., characters and events) fluctuate in activation over time, based on both their mention within the actual discourse and in reader memory. Outlining the dynamic activation and deactivation of concepts over the course of a discourse experience has been incredibly useful in identifying the moment-by-moment activities that accompany language understanding, as well as predicting the final products of those activities (e.g., what readers remember from the text).

Examination of these content-driven fluctuations has focused on linguistic cues that are lexical, structural, and genre-based in form. Lexical cues include connectives that help provide relational information between concepts. Words that are included in larger discourse segments, such as ‘because,’ ‘and,’ ‘not,’ and so on, indicate causal logic, conceptual associations, and coherence relations between linguistic segments. These types of relations help determine the elements of a discourse that remain in reader focus. The activation and continued maintenance of concepts in memory during unfolding discourse depends upon the types of relations that are established within sets of sentences. For example, anaphor resolution (e.g., from our opening example, finding the referent for ‘she’ in the two-sentence sequence, ‘The lady there was nice to me. . . . Just wait here, she said.’) impacts processing activity by encouraging the maintenance of important concepts previously introduced in the discourse. Both explicit connectives (such as ‘because’) and inferred connections (such as resolved anaphors) can establish coherence across texts, which is particularly important with longer texts that include multiple characters and plotlines. Structural cues serve a similar purpose; but rather than employing specific lexical tokens or relations among tokens, they involve organizational features that guide reader attention to discourse elements. For instance, syntax can highlight the subject or objects of linguistic input (e.g., nouns specify concepts of interest whereas verbs specify how those nouns interact). In addition, pragmatic structural cues based on expectations for how text typically functions can help guide focus: Consider that the earliest described detail in a text often helps guide comprehension of later information. Titles, for example, enhance understanding of the relationships among sentences. Readers tend to recall more text content after reading titles that disambiguate important topic information than after reading texts lacking those titles. Additionally, readers’ self-reported comprehension is higher for texts with titles and organizational cues than texts without them.

Structural cues also include the textual events that constitute story, plot, and the narrative descriptions that make up those events. Our opening example
includes several events, such as Sakura running away from home, her interactions at the farm, and the consequences of those interactions. These events are associated with particular locations, time periods, characters, character goals, and action sequences. Shifts in event dimensions including time, space, characters, goals, and causality often result in reductions in the accessibility of text content from memory.\textsuperscript{14,15} For example, information preceding the sentence ‘An hour later, he turned very pale,’ is less accessible than information preceding ‘A minute later, he turned very pale.’\textsuperscript{16} The shorter time period is more likely to represent a single current event, with information remaining available in memory longer than information from multiple events that have previously taken place. Evidence indicates that individuals structure their memory for language experiences around these dimensions, with concomitant activations and deactivations of concepts as a function of whether those concepts are within (e.g., in short time periods; in consistent spatial locations) rather than across events (e.g., between long time periods; in different spatial settings).\textsuperscript{17–19} The number and type of event shifts in a text influence the amount of time it takes participants to read the text, as well as what they can easily retrieve from memory after reading is completed.

A third, specifically discourse-level cue is genre. Genre serves as a macro-level structural cue by helping to outline the kinds of information that might be included in a discourse, the ways in which that information might be presented, and the intended purpose of the material. Narratives, such as novels, historical tales, and gossip, include story-driven fictional or nonfictional accounts that focus on characters and events.\textsuperscript{20} Narratives usually include an explicit temporal and causal structure that can encourage expectations for how stories might unfold; for example, tragedies often end with unfortunate conclusions for main characters, whereas comedies tend to include unexpected confluences of events. Expository materials (e.g., textbooks, newspaper columns, and scientific articles) consist of explanatory or persuasive descriptions that are intended to provide details and insight with respect to concepts or facts, including the antecedents and consequences of processes.\textsuperscript{21} Procedural materials (e.g., furniture construction manuals, software installation guides, and prescription labels) include directions that indicate the components and steps necessary to complete an activity. Genres guide expectations for the particular kinds of content included in a discourse, thus influencing what individuals attend to and remember from their readings.\textsuperscript{22,23} Knowledge that \textit{Kafka on the Shore} is a fictional narrative should lead readers to have different expectations for the unfolding of Sakura’s story than if this excerpt were taken from a newspaper account of teenage runaways. Violations of genre expectations, as well as violations of expectations established by lexical or structural organizations, can lead to processing difficulty and potential attempts by readers to reconcile any comprehension problems.

**Discourse Participants**

Readers possess knowledge, skills, preferences, predilections, strategies, and goals that impact how they process discourse. Classically, these contributions have been investigated by considering the individual differences that people bring with them to their linguistic experiences, such as variability in working memory capacity (i.e., the ability to maintain and process multiple concepts in memory simultaneously).\textsuperscript{24} In the current section, we focus on three types of differences that have proven crucially informative in analyses of discourse processing.

Prior knowledge constitutes the information that readers hold in memory. This information includes facts, personal recollections, concepts, and procedural understandings held in permanent, long-term memory, as well as information currently in short-term memory as a result of recent experience (e.g., statements processed a few minutes ago). Existing accounts have emphasized the influence of both the quantity and quality of prior knowledge on language processing. For example, experts tend to have more experience than novices in their domain of expertise, and can thus draw from those rich memories to answer questions and solve problems. In addition, experts also tend to have fewer misconceptions that might interfere with building accurate understandings. Prior knowledge differs as a function of an individual’s culture, educational experiences (both formal and informal), areas of interest, motivation, and other factors. For example, readers with prior knowledge of travel and transportation in Japan might be expected to make more accurate inferences about how Sakura traveled to Abashiri (e.g., perhaps by train) than those who lack this knowledge. Importantly, most models of discourse argue that prior knowledge can be both spontaneously and strategically brought to bear on processing activity in the service of successful comprehension.\textsuperscript{25,26} Prior knowledge proves crucial in helping comprehenders disambiguate concepts, generate predictions, and evaluate the veracity of statements. Without prior knowledge, all incoming text would be perceived as new, and constructing connections among concepts would be challenging if not impossible.
Language ability is another factor that discourse participants bring to their experiences. One such ability is reading skill, broadly construed as being composed of basic-level (e.g., decoding and fluency), or higher-order processes (e.g., inference construction). When individuals must devote resources to identifying and understanding the main idea of a text, fewer resources are available to allocate to other activities that can enrich understandings, including visualizing story events, building thematic understandings, making connections across texts, or evaluating authors’ claims. For example, a reader who has difficulty identifying words will certainly have trouble following the plot of Kafka on the Shore; conversely, readers who are reticent or unable to build bridging inferences will similarly have difficulty understanding the plot, even if they can easily decode words.27 Skill level, which differs among individuals, can have direct repercussions on what people will understand and remember from a text.

Discourse participants’ goals for their experiences also exert a direct impact on understanding and memory for text.28 Individuals can read with the intention to acquire knowledge, be entertained, pass time, brainstorm, evaluate arguments, or judge others’ understandings. These goals influence what readers attend to and how they process information as they attempt to construct a coherent understanding of a text. For example, reading for entertainment or study can lead to different concomitant cognitive processes; when participants are asked to verbalize what they are thinking about as they read, contrasting patterns of inferences and elaborations emerge for these two types of goals.29 Depending on their goals, readers attend to different aspects of texts (e.g., for entertainment, noting the jokes and building opinions; for study, recognizing important definitions and generating explanations), and remember different aspects of those texts. It is worth noting that readers’ goals can be developed prior to engaging with the text (e.g., proofreading) or during reading (e.g., noticing many errors may lead to proofreading), and similarly, might be motivated by individuals’ personal decisions and preferences.

**Memory for Discourse Contents**

Interactions between content and reader characteristics are responsible for determining what might be encoded and stored in long-term memory. The goal of many discourse experiences (but not all) is to acquire information that can be used later.30 Therefore, it proves crucial to not only understand the types of processes that people utilize to comprehend language, but also to evaluate the products that remain in memory after the discourse concludes. Such products are examined by considering the nature of mental representations for discourse, and how content and reader variables influence the strength of those memories.

Generally, much of the work in discourse processing has considered mental representations by appealing to the tri-partite model.31 This model outlines three different levels or types of representations that can result from linguistic input. The most basic level is the surface level, which includes memory for the exact words experienced. This level contains the form of what has been read, rather than the meanings underlying those linguistic constituents. Surface level representations are short-lived; without continued rehearsal, they can be displaced from memory by other information.32 The next level of representation is the propositional or textbase. At this level, individuals encode the underlying meanings of language. This involves understanding the specific idea units conveyed within a discourse.33 Textbase representations are crucial for recall and comprehension of discourse content. However, textbase representations contain only the meanings conveyed within a particular text, and do not include information beyond that content.

The third level of representation, which is the focus of many investigations of discourse processing, is the situation or mental model.15,31 At this level, comprehenders represent the information described by but not necessarily contained within the text. This involves connecting prior knowledge with linguistic content to build inferences about the discourse. For instance, a situation model might contain information about a character’s appearance, whether information is being presented sarcastically or sincerely,34 the relationships between concepts that have been mentioned but remain unconnected within the text,35 and other types of constructions that necessitate going beyond the material explicitly described. From our opening example, situation models might contain inferences about why Sakura ran away, how old she is, and even what she looks like. Situation models are often associated with successful comprehension and long-term memory for discourse material.

The tri-partite model has informed theoretical accounts of comprehension. In addition, the model provides insights relevant to applied work. Consider that rich representations of discourse (exemplified by situation models) allow individuals to not just mentally manipulate concepts they read about, but to (1) explain those concepts to others on demand, and (2) transfer that information to other, disparate domains when appropriate.21 As a result, educational materials and tasks are often designed...
to encourage the encoding of coherent mental representations. Tasks that foster such activity include those that require comprehenders to actively engage with material, to interactively manipulate discourse information, to discuss the information in ways that might introduce new perspectives, and to generate connections between the material and other disparate domains. For example, the SQ3R reading intervention requires students to skim, ask questions, read, recite, and review material. As another example, story maps ask students to complete worksheets that highlight core elements of narrative structure to foster comprehension skills. Thus, the types of situation model representations that are associated with adequate comprehension might be fostered through the careful implementation of tasks and goals designed to encourage connections between individuals’ prior knowledge and text content.

THEORIES AND MODELS OF DISCOURSE PROCESSES

Although the factors that influence processing and memory for discourse as we have described them thus far have been considered in relatively separate ways, their contributions are necessarily interactive. For example, the products of previous discourse experiences influence the prior knowledge a comprehender might possess, which in turn interacts with the current linguistic input. An important issue, then, involves describing how these factors influence each other during naturalistic language processing. Addressing this issue necessitates consideration of when and how content and prior knowledge impact discourse processing during moment-by-moment reading activities. Much of the work on this issue has focused on the notion of knowledge activation; that is, how discourse contexts influence information retrieval from memory, and how retrieved information influences comprehension. Two theoretical approaches have resulted from such considerations. Although these two approaches were initially positioned as competing views of the knowledge activation process, contemporary accounts unite them into a single, powerful model.

Knowledge activation in memory can occur relatively quickly and without strategic control, as demonstrated in classic studies of priming. Consider that participants’ processing of lexical items is facilitated when those items are related (e.g., semantically, phonologically) to previously presented items, in contrast to unrelated items. For example, if participants are asked to decide whether a letter string is a real word or not, they are faster to say 'bread' is a word if it is immediately preceded by a semantically related word such as ‘butter’ than if it is preceded by an unrelated word such as ‘doctor.’ Based on this classic work, the memory-based or resonance view of memory activation describes a process in which any information in memory that matches the current text input becomes activated quickly and automatically. For example, the concept ‘garage’ might activate notions of cars, bands, buildings, other words that phonetically overlap with garage, and so on. This broad-based activation leads to multiple concepts being activated simultaneously, with some of those concepts reaching a sufficient threshold for retrieval. The activation associated with the memory-based view is considered passive and unrestricted; activation occurs without strategic processing, activating a variety of concepts that match the text input as a function of their degree of overlap (e.g., semantically or phonologically related). This activation is outside of the reader’s control. The memory-based view relies on the types of general cognitive processes (e.g., priming) that have been articulated in existing models of memory, thus requiring no special processing architectures beyond those considered in existing work. The view has found support in a variety of text processing situations.

In contrast to the automatic retrieval described by the memory-based view, the constructionist approach emphasizes the importance of directed, strategic searches of memory. For example, a student might actively search memory for details about particular historical events while attempting to complete an assignment. This type of processing involves a targeted search for meaning from memories related to the concepts presented in a text. Several researchers have identified conditions under which such a search-after-meaning might play an important role in comprehension. According to this view, reading can involve goal-driven considerations of prior knowledge in the service of constructing relevant inferences and enhancing understandings.

In the past, discussions of these two frameworks have been rather contentious. Researchers have, at times, opted to consider one view over the other as the more viable account of knowledge activation and information retrieval during moment-by-moment comprehension. These disagreements have been most explicit in works examining whether particular types of inferences are constructed automatically or strategically during text processing. Evidence for automaticity would tend to support a memory-based view, in which information that informs inference construction would be spontaneously activated; in contrast, evidence for strategic inferencing would be consistent with a constructionist view, in which readers engage in effortful processing to make
associations and elaborations with discourse material. Although some evidence demonstrates that particular types of inferences may be constructed without careful analysis (e.g., bridging inferences), other projects have also shown that other types of inferences are less than spontaneous or are constructed only under restricted conditions (e.g., predictive inferences). The accumulated evidence from inference studies suggests that both memory-based and constructionist frameworks are necessary to account for the range of inferential activities that individuals can engage in during discourse processing.

In line with this work, contemporary theoretical and computational accounts of discourse processing have integrated the two frameworks into a single, particularly promising model. According to this view, text content and prior knowledge interact in a relatively stage-like manner. In the first stage, linguistic input broadly activates concepts in memory. At this stage, the unconstrained activation generally activates concepts that might later be retrieved by the reader. In the second stage, the reader can search these activated concepts with the goal of selecting the most appropriate or relevant information for further processing. This type of model integrates the memory-based view as the first step in reading activity, with the constructionist view as the second step, identifying both components as necessary for discourse comprehension (but to differing degrees).

Such two-stage models have been articulated by a variety of researchers including Kintsch, van den Broek and colleagues, and Goldman. The viability of such models has been tested by comparing the results of computational simulations to actual human performance. In general, this involves designing simulations that specify existing representational concepts in the system (i.e., prior knowledge), introducing input to the system (i.e., content), and assessing the system’s performance when the concepts are acted upon by (1) separate memory-based or constructionist activities or (2) a cascaded, interactive sequence of memory-based followed by constructionist processes. The degree to which the products of the simulations (e.g., type and number of inferences, amount of information recalled, etc.) match actual human performance provides a type of existence proof for the simulations, and hence model assumptions. To date, several models including the Collaborative Activation-Based Production System (CAPS), the Landscape Model, and the Construction-Integration (CI) model have each shown that integrated processes, as compared to single processes, reveal simulated patterns that are comparable to profiles of human data. For example, simulation performance better predicts reader recall when both memory-based cohort-activation and constructionist-based coherence processes dynamically interact over the course of a text presentation, as compared to separate contributions from each process.

**TRENDS IN DISCOURSE PROCESSING RESEARCH**

What factors and effects still need to be accounted for in contemporary models and theories of discourse processing? One could consider a host of potential issues, but here we provide a sampling of research from our own lab addressing topics that we believe both warrant investigation and may enhance our understanding of the nature of text experiences.

**Emotion**

Many accounts of cognitive processing have tended to downplay the role of emotion in cognition (but see, e.g., Ref 53). Discourse research stands to make useful contributions to this area of research. Consider that texts are often designed to invoke emotional responses on the part of readers, and expectations about emotional states are crucial in helping individuals disambiguate meaning. To fully understand the ways in which individuals process text, discourse theories must necessarily account for when and how emotion impacts comprehension. It might be the case that emotion directly guides the construction of meaning; alternatively, emotion might serve a complementary role that is recruited only as necessary. Of course, both of these possibilities might be differentially appropriate depending upon particular discourse contexts (e.g., in highly arousing situations vs. under more mundane conditions).

Research in our own lab has examined the impact of readers’ emerging emotional responses and preferences on moment-by-moment text processing. Readers have exhibited the tendency to generate expectations about story events that are consistent with their understandings of previous character behaviors. But data from several studies have shown that even strongly held expectations can be overridden if what readers want or hope for in a story contradicts those expectations. For example, when readers prefer characters to succeed, based on their emotional investments in story outcomes, contexts that strongly suggest impending failure may be ignored or discounted. While story contexts influence processing, readers’ unfolding empathies and wishes for story events can at times interact with those processes. The types of preferences under investigation here are but
one form of emotional investment concomitant with immersion in stories; they nonetheless exemplify the importance of acknowledging and investigating how emotion might guide discourse processing.59

**Careful Comprehension**

Recall that accounts of discourse processing emphasize the critical impact of prior knowledge on successful comprehension. However, a growing body of research indicates that readers do not always rely on prior knowledge to carefully evaluate what they read. For example, consider the following excerpt60:

Now class, you know this can be fun. To help motivate you, we have a special prize this year—the winner of the science fair will win a trip to the national contest, which will be held in Wilmington, the capital of Delaware. (p. 1149)

Note that the above excerpt includes misinformation—the capital of Delaware is in fact Dover, not Wilmington. Yet, studies from a variety of labs indicate that readers appear to rely on information they have read without carefully considering the accuracy of that information.61,62 For example, after reading a text containing the above excerpt, if participants are asked ‘What is the capital of Delaware,’ they may actually report Wilmington rather than Dover, despite that particular fact being well known to people as measured in norming surveys. Even more problematically, readers not only rely on the false information they read, but also exhibit difficulty determining the source of that information (e.g., if they knew a particular fact before reading or actually acquired it from the text).63 These effects indicate that everyday text processing may not involve the kinds of skeptical, evaluative activities that are often associated with critical reading skills.

Under what conditions might readers more carefully scrutinize what they read? Unfortunately, existing work demonstrates that both slowing readers down64 or asking them to note problematic content during reading65 fail to substantially help readers become more critical consumers of information. Recent work in our own lab66 has similarly shown that asking readers to retrieve relevant information from memory prior to reading also fails to encourage careful evaluation of text content. This might be surprising given that previous work in education has shown that the pre-activation of prior knowledge can often be a helpful mechanism for overcoming misconceptions. (Importantly, however, those educational projects often examine prior knowledge use during retrieval activities, whereas the projects described in the current section are focused on activating prior knowledge to foster critical evaluation during both encoding and retrieval.) To date, it remains unclear what conditions might encourage moment-by-moment critiquing of text content during discourse experiences. Future work will need to consider other motivational, social, and instructional methods that potentially help readers avoid ‘believing everything they read.’

**Updating**

Related to the previous issue, text processing involves not just the encoding and retrieval of information from memory, but also the potential revising of existing knowledge to reflect new information (i.e., updating). For example, when students learn new information from their physics textbooks about the way the world works, they often have to revise their existing intuitive beliefs and understandings. Research on conceptual change has extensively studied such issues, examining the ways in which knowledge remains relatively resistant to many kinds of interventions.6 These general examination of updating in discourse processing has proven similarly important, and recent work in this area has attempted to determine the types of texts, tasks, and reader variables that influence the likelihood of updating.

For example, information appearing early in discourse continues to exert an impact on moment-by-moment comprehension even when that information is directly contradicted by later details.40 This indicates that earlier information can remain available and accessible, potentially influencing ongoing processing in problematic ways. An important issue is whether the impact of earlier text information is reduced when readers adopt particular goals. Some researchers have claimed that the ways in which alternative possibilities are provided in a text might discourage readers’ reliance on discredited alternatives.67 Work in our own lab supports this notion: When participants were asked to carefully read and judge the likelihood of text descriptions, targeted causal refutations as well as more general contradictions encouraged updating. In contrast, when participants were not explicitly instructed to read carefully, they exhibited evidence of updating only with causal explanations.68 These findings indicate that updating occurs when readers consider careful tracking as necessary for their understanding, or when the text provides sufficient cues (and motivation) to encourage revision. The results are consistent with previous work on the utility of updating with educational materials,69 which, taken together, seems to converge on a developing model of updating effects. More research is necessary.
to understand which types of refutations are effective for particular types of materials, and whether such models of updating might have important applications for persuasive rhetoric and educational design.

CONCLUSION

As a summary of the above review, much of the work on text processing has been particularly concerned with articulating or developing theoretical and computational models that can simulate and predict the underlying components of discourse comprehension. But additionally, an increasingly important consideration involves utilizing these findings to enhance everyday discourse experiences. For instance, understanding the ways in which individuals access information during reading might have implications for the design of educational interventions to improve struggling readers’ comprehension. Indeed, current work in our lab and those of our colleagues aims to improve reading interventions by developing cognitive profiles of struggling readers’ activities, and then designing interventions that target those difficulties and focus on enhancing discourse skills sets. For instance, querying students at particular text points with causal questions, or asking students to relate text material to their prior knowledge, might be useful as a first step at helping them build coherence during their reading experiences. Continued practice and use of tools designed to enhance spontaneous transfer of such skills will also be necessary to generally foster such higher-order comprehension skills.

Other applications of work in discourse processing might be more specific to particular activities. For instance, ongoing work in our lab is investigating how to enhance the design of prescription labels and medical documentation to foster comprehension. The importance of this issue is evident when we consider that many patients have low literacy skills, and yet are prescribed multiple drugs with relatively obscure, ambiguous, and confusing directions (e.g., take two pills every four hours over the course of the day but not after midnight). How might those labels and directions be redesigned to enhance comprehension of and memory for appropriate procedures? Questions for future work also include whether different instructions might be necessary for different patient populations, as a function of a number of individual difference factors like familiarity with medicine, reading ability, working memory capacity, and so forth.

Clearly, other types of applications can be developed including the design of texts for helping novices and experts understand materials, the development of procedural instructions for building objects such as furniture or electronics, the development of tutorial systems, and the construction of multimedia tools for teaching scientific concepts. Future work in the field will likely continue to apply research findings to the design and implementation of novel learning systems, curricula, and other technologies.

In summary, to advance both theoretical and applied interests, discourse processing research seeks to explain how discourse input and the characteristics of particular readers interact to yield meaningful memory for the books, newspapers, and blogs we peruse everyday. What do readers ultimately take away from their experiences with texts like Kafka on the Shore? We hope that our brief review of the field suggests that they might learn and remember discourse information by generating connections between the events described in the text and their own prior experiences. We might also ask what readers will take away from the excerpt we specifically presented earlier. They may generate expectations for what might happen next in the story, make inferences about why Sakura might have been sharing this anecdote, or (potentially) develop an interest in reading the rest of the novel. Understanding both the processes that underlie these experiences, and the consequences of those processes on our understanding and appreciation for texts are important elements in building (and testing) models of discourse processing.

NOTES

a The discussion here will be limited to discourse comprehension (specifically, text processing). We will not focus on other forms of discourse research that have rich research histories, including gesture and ESL, computer-supported cooperative work, conversational interactions, and group learning activities. These topics are clearly important for theories and models of discourse, but in the interest of space, we limit the focus to reading comprehension.

b A variety of methodologies have been utilized in such investigations, but in the interest of space, we refrain from providing a detailed discussion. The interested reader is referred to existing reviews of methodologies specific to reading research, eye-tracking, approaches to studying inference generation, and the methods for investigating both online and offline reading processes.

c It is worth noting that in the section titled ‘Careful Comprehension,’ we described how readers fall victim to what they read, whereas work on conceptual change indicates that individuals often fail to change what they know as a function of new experiences. There are a few reasons for...
this apparent discrepancy. For example, studies of conceptual change examine existing mental representations that structure how people think about the world (e.g., understandings of physics), whereas studies of careful comprehension tend to examine knowledge about unitary facts (e.g., state capitals). Another difference is that the knowledge at issue in conceptual change has often been known for a long time, and may even have been supported by individuals’ repeated experiences (e.g., having difficulty reconciling the experience of a flat horizon line with the notion that the Earth is round); in contrast, careful comprehension studies have looked at single experiences with particular facts or concepts. Nevertheless, understanding when comprehenders fall victim to false information, and when they hold fast to their existing knowledge, proves an interesting challenge. Addressing this issue will be useful in the enumeration of models of discourse processing, particularly in understanding the relative contributions of content and prior knowledge, as focused on in this review.

REFERENCES


**FURTHER READING**

