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Assessing Text Representations With Recognition: The Interaction of Domain Knowledge and Text Coherence

Debra L. Long, Jeannette Wilson, and Ryan Hurley
University of California, Davis

Chantel S. Prat
Carnegie Mellon University

Readers construct at least 2 interrelated mental representations when they comprehend a text: a textbase and a situation model. Two experiments were conducted with recognition memory to examine how domain knowledge and text coherence influence readers' textbase and situation-model representations. In Experiment 1, participants made remember–know judgments to text ideas. Knowledge and coherence interacted to influence remember judgments differently than know judgments. In Experiment 2, the authors used the process-dissociation procedure to obtain recollection and familiarity estimates. Knowledge and coherence interacted to influence recollection estimates but not familiarity estimates. The authors claim that recollection and familiarity can be used as markers of the different processes involved in constructing a textbase and a situation model.

Keywords: reading comprehension, recognition memory, situation models

An important aim of research on text comprehension is to identify the reader characteristics that predict comprehension proficiency (e.g., word recognition skill, working memory capacity, world knowledge). Reader characteristics alone, however, do not explain the variability in comprehension performance. Comprehension depends critically on the nature of the material that is read—the complexity of the language and the length and genre of the text. Reader characteristics and text properties interact at every stage of language processing. The goal of the current study is to examine one such interaction, the interaction between a reader's prior knowledge about the topic of a text and the text's coherence.

One of the earliest findings in the field of text comprehension was that readers who have relevant knowledge about the topic of a text understand it and remember it better than do readers who lack such knowledge (Bartlett, 1932; Bransford & Johnson, 1972). Experts—readers who have extensive domain knowledge—access a richly interconnected network of learned facts when reading a text relevant to their domain of expertise (Chi, Feltovich, & Glaser, 1981; Chiesi, Spilich, & Voss, 1979; Means & Voss, 1985). Moreover, experts use more effective reading strategies than do novices (Afflerbach, 1986; Lundeberg, 1987) and are faster and more efficient at retrieving information from their knowledge domain (Ericsson & Smith, 1991).

A second factor that strongly influences comprehension is coherence (Kintsch & Vipond, 1979; Van Dijk & Kintsch, 1983). A coherent text is one in which information in adjacent sentences can be integrated easily (local coherence) and in which the ideas can be understood in terms of some overarching theme (global coherence). Texts can be modified to increase both their local and their global coherence. Modifications that increase local coherence involve adding information to help readers resolve anaphoric referents (i.e., cohesion), to identify synonymous terms, to define unknown words, and to make connections among sentences. Modifications to improve global coherence involve making the theme of a text explicit and adding unstated background information. These modifications improve performance on comprehension measures in both children and adults (Beck, McKeown, Sinatra, & Loxterman, 1991; Britton & Gulgoz, 1991; McKeown, Beck, Sinatra, & Loxterman, 1992; McNamara, 2001; McNamara & Kintsch, 1996; McNamara, Kintsch, Songer, & Kintsch, 1996).

The Interaction of Domain Knowledge and Text Coherence

The influence of text coherence on comprehension depends critically on the reader's prior knowledge. McNamara (2001; McNamara & Knitsch, 1996; McNamara et al. 1996) has examined this interaction in light of the distinction between two levels of representation: the textbase and situation model. The textbase consists of a network of explicit ideas from the text and the relations among them. The integration of world knowledge with information presented in a text results in a situation model. The reader reorganizes and elaborates explicit text ideas with his or her world knowledge, creating a flexible and conceptual understanding of the text.

McNamara (2001; McNamara & Kintsch, 1996; McNamara et al., 1996) argued that readers construct a coherent textbase when they find the meanings of words in context, identify the referents of anaphors, match synonymous terms, and identify relations among adjacent sentences. If a text is modified to make these processes easier or more accurate, the reader will have a representation that he or she can use to answer questions about explicit text

Debra L. Long, Department of Psychology and Center for Mind and Brain, University of California, Davis; Jeannette Wilson and Ryan Hurley, Department of Psychology, University of California, Davis; Chantel S. Prat, Department of Psychology, Carnegie Mellon University.

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Correspondence concerning this article should be addressed to Debra L. Long, Department of Psychology, University of California, 1 Shields Avenue, Davis, CA 95616. E-mail: dllong@ucdavis.edu

ideas. In contrast, readers construct a coherent situation model when they integrate explicit information in the text with prior knowledge. Both knowledge that is relevant to the text and active processing are required to form connections between text ideas and domain knowledge. When a text is low in coherence at the local level, readers will engage in active processing, using their world knowledge to establish local coherence. A consequence of activating relevant world knowledge is the creation of an integrated network of explicit text ideas and preexisting knowledge—a situation model. This occurs, however, only when readers possess the relevant knowledge necessary to establish coherence.

McNamara and her colleagues (i.e., McNamara, 2001; McNamara & Kintsch, 1996; McNamara et al., 1996) have investigated the influence of knowledge and coherence on tasks in which performance depends on either the reader's textbase or the situation model. Their textbase measures have included recall of explicit text ideas and answers to questions about explicit information in the text. Their situation-model measures have included recall of thematic information from the text, answers to questions that depend on inferences from world knowledge (e.g., problem solving and elaborative inference questions), and keyword sorting tasks.

According to McNamara and colleagues (i.e., McNamara, 2001; McNamara & Kintsch, 1996; McNamara et al., 1996), readers should learn more from low-coherence than from high-coherence texts because low-coherence texts require more active processing during comprehension. Moreover, this learning advantage should be seen primarily in performance on situation-model measures. This claim, however, has not been unambiguously supported by the data. With respect to performance on situation-model measures, three patterns have been observed: (a) coherence has no effect on performance (McNamara & Kintsch, 1996; McNamara et al., 1996); (b) high-knowledge readers perform better when they read a low-coherence text than when they read a high-coherence one, whereas low-knowledge readers show no effect (McNamara & Kintsch, 1996); or (c) high-knowledge readers perform better when they read a low-coherence text than when they read a high-coherence one, whereas low-knowledge readers show the opposite effect (McNamara et al., 1996).

Assessing Text Representations With Recognition

Our goal in this study was to investigate the influence of knowledge and coherence on comprehension in light of a recent claim by Long and Prat (2002) that recognition memory can be used to assess the nature of readers' text representations. They proposed that qualitative differences in readers' memories for text ideas may result from the different processes involved in constructing a textbase and situation model.

Many memory researchers believe that recognition involves at least two component processes: recollection and familiarity. The nature of these two processes differs somewhat across dual-process models (for a review see Yonelinas, 2002). For example, Yonelinas and his colleagues (i.e., Dobbins, Kroll, & Liu, 1998; Yonelinas, 1997, 1999, 2001, 2002) argued that recollection involves retrieval of specific information about a studied item, such as information about the context in which the item appeared. Familiarity, in contrast, involves an assessment of the similarity (perceptual and conceptual) between a test item and a memory trace. Rajaram (1996) has argued that recollection reflects elaborative and distinctive processing that occurs at study, whereas familiarity reflects the fluency of processing that occurs at test. Wixted and Stretch (2004) have argued that both recollection and familiarity are continuous variables reflecting memory strength and that the two are combined into a single memory signal. Although models such as these differ in critical ways, they share the core assumption that recollection and familiarity are distinct processes and can be empirically dissociated.

The dissociation between recollection and familiarity in this study concerns the effects of encoding manipulations. Tasks that encourage conceptual processing of to-be-learned items have shown large effects on recollection and smaller (although reliable) effects on familiarity (Gardiner, 1988; Gardiner, Java, & Richardson-Klavehn, 1996; Gardiner, Rampoini, & Richardson-Klavehn, 1999; Khoe, Kroll, Yonelinas, Dobbins, & Knight, 2000; Rajaram, 1993; Toth, 1996; Yonelinas, 2001). Recollection is affected more than familiarity by levels-of-processing manipulations, including deep–shallow encoding, generate–read instructions, and divided–undivided attention (for a review, see Yonelinas, 2002). On the basis of such findings, Long and Prat (2002) hypothesized that recollection reflects the conceptual processing involved in constructing a situation model, whereas familiarity reflects the perceptual and semantic processes involved in constructing a textbase.

Long and Prat (2002) proposed two means by which recollection might be affected by situation-model construction. First, situation-model processing involves forming associative relations among text ideas and prior knowledge. If a text idea activates extensive knowledge during comprehension, a network of connections will be formed among the idea and the reader's prior knowledge. When the text idea is presented at test, it should resonate with its item representation in memory, and it should also reactivate the network of contextual information that was constructed during comprehension. Retrieval of contextual information about the study context may give rise to an experience of recollection. Second, some text ideas may evoke conscious inferences when readers have extensive knowledge about a topic. For example, readers who are knowledgeable about a particular genre of stories, such as horror stories, may make an explicit prediction in response to a character's action (e.g., if the character says, "I'm going outside; I'll be right back," the reader may consciously predict that the character will be eaten by the monster). If the action is presented at test, the reader may retrieve the inference that was associated with it at study, which leads to an experience of recollection.

Long and Prat (2002) also hypothesized that familiarity should be relatively unaffected by relevant domain knowledge. In many dual-process models, familiarity arises from the perceptual and semantic processing that occurs when participants encode a to-be-learned item. A substantial amount of this type of processing occurs when readers comprehend sentences in texts, even when they do not possess domain-relevant knowledge. Thus, familiarity may support recognition of text ideas in the absence of the elaborative processing involved in constructing a situation model.

Long and Prat (2002) tested their hypotheses using the remember–know paradigm developed by Tulving (1985). Participants made judgments concerning the nature of their memory for recognized items, responding *remember* to items that were accompanied by recollection of details about the item's prior occurrence and responding *know* to items that were recognized from the study episode but were not accompanied by recollection. Readers received a test to assess their knowledge about the science-fiction saga *Star Trek.* They then read a short story about *Star Trek* and received a recognition test consisting of sentences from the story that they had read as well as distractor sentences from a *Star Trek* story that they had not read. In addition, they read a chapter from an introductory psychology textbook and received a subsequent recognition test.

Long and Prat (2002) found no effect of prior knowledge on overall recognition for either the *Star Trek* story or the psychology chapter. They did find an effect, however, when they examined *remember* and *know* responses. High-knowledge readers were more likely to report a vivid, conscious experience of recollection in response to text ideas than were low-knowledge readers, but only for the *Star Trek* items. Long and Prat found similar effects when they examined recollection and familiarity by means of the process-dissociation procedure, a procedure that assesses the extent to which individuals can remember the specific context in which an item appeared.

In the current study, we extend the logic of Long and Prat's (2002) investigation to examine how knowledge and coherence interact to influence readers' textbase and situation-model representations. In Experiment 1, we use the remember–know procedure; in Experiment 2, we obtain recollection and familiarity estimates using the process-dissociation procedure.

Experiment 1

We used the remember–know paradigm to examine recognition in readers who were high or low in knowledge about *Star Trek.* We chose this domain because knowledge about the topic varies widely among students, with some possessing extensive expertise. In addition, hundreds of short stories, novels, and reference materials have been published about *Star Trek* and are suitable for use in memory experiments. We assessed readers' knowledge about the domain; they then read high-coherence or low-coherence texts about *Star Trek.* Subsequently, they received a recognition test that asked them to decide whether sentences were old or new and to make remember–know judgments about old items.

If recollection is a consequence of situation-model construction, then high-knowledge readers should make more remember judgments than low-knowledge readers. Moreover, high-knowledge readers should make more remember judgments in response to low-coherence than in response to high-coherence texts. Low-coherence texts are more likely than high-coherence texts to involve retrieval of relevant domain knowledge during comprehension, leading to a more elaborate situation model and recollection at test. Although we predicted that high-knowledge readers would have more elaborate situation models than low-knowledge readers, we did not expect low-knowledge readers to have poor situation models. These readers lacked knowledge about *Star Trek,* but they had substantial world knowledge that was relevant to the texts. The situations described in the texts occurred in the fictional world of *Star Trek,* but the situations themselves involved events that were likely to be familiar to all adult readers (e.g., war, romance, murder).

Our predictions regarding familiarity depend on how the relation between recollection and familiarity is conceptualized in the remember–know task. If the processes are mutually exclusive (i.e., participants have either an experience of recollection or familiarity), then know judgments should be affected in a manner opposite to that for remember judgments (Gardiner & Parkin, 1990; Jones, 1987; Nelson, Schreiber, & McEvoy, 1992). Familiarity and recollection, however, can also be conceptualized as independent processes. We derived recollection and familiarity estimates from the remember–know judgments using the independence remember–know (IRK) procedure developed by Yonelinas and Jacoby (1995).

Assuming independence of the two processes, we predicted that familiarity would be relatively unaffected by knowledge and coherence. With respect to the effect of knowledge, adult readers are quite knowledgeable about stories. They have knowledge about story structure, characters' goals and actions, cause and effect, setting, and plot. Thus, even readers who are low knowledge about *Star Trek* can use knowledge about the story genre to engage in elaborate semantic processing of text ideas. With respect to the effect of coherence, McNamara and colleagues (i.e., McNamara, 2001; McNamara & Kintsch, 1996; McNamara et al., 1996) have sometimes found that low-knowledge readers can benefit from text revisions that improve coherence. It is important to note, however, that they used expository texts in their studies. Coherence is more difficult to establish in an expository text than in a narrative because expository texts have less familiar content and more diverse structures than do narratives. This means that the low-coherence versions of our stories were likely to be more coherent than the low-coherence versions of the expository texts used in previous studies. Thus, we predicted little influence of coherence on familiarity estimates.

Although our predictions about the influence of knowledge and coherence were motivated by dual-process models, we should note that these predictions are also consistent with single-process models. In these models, encoding manipulations affect the strength with which an item is represented in memory. Participants make remember–know decisions by adopting two decision criteria, one for *remember* responses and one for *know* responses. The remember criterion is relatively strict and reflects high-confidence judgments; the know criterion is less stringent and reflects lower confidence judgments. We address single-process interpretations of our data in the General Discussion.

Method

Participants. Participants were 108 undergraduate students at the University of California, Davis. They received course credit for their participation.

Materials. Knowledge about *Star Trek* was assessed by means of the *Star Trek* Character and *Star Trek* Life Form tests from Long and Prat (2002). The two-part test has a checklist format in which half of the items are characters or life forms from *Star Trek* and half are foils from other science fiction sources.

The *Star Trek* texts were synopses of 12 *Star Trek Next Generation* TV episodes selected from a *Star Trek* reference manual. We revised each synopsis to create a high-coherence and a low-coherence version, although we made most of the changes to create high-coherence versions. High-coherence and low-coherence versions of two sample texts appear in the Appendix. In the high-coherence condition, the texts were revised to include background information that readers unfamiliar with *Star Trek* would need to make sense of the plot. The background information included the full name of each character in the story (e.g., Deanna Troi), his or her role (e.g., ship's counselor), relevant attributes (e.g., Betazoid, telepath), relevant relationships among characters (e.g., Deanna Troi and William Riker, the ship's first officer, were ex-lovers), and definitions of technical terms (e.g., *warp drive*). We made some of these changes to help readers establish local coherence (e.g., including the full names of the characters, providing definitions of technical terms).

With respect to the manipulation of local coherence, our changes were similar to those made by McNamara and her colleagues (i.e., McNamara, 2001; McNamara & Kintsch, 1996; McNamara et al., 1996) in their revisions of expository texts. They increased local coherence by replacing pronouns with explicit noun phrases, adding elaborations to link new concepts with familiar ones, and replacing words to improve argument overlap. With respect to the manipulation of global coherence, however, they made more substantial changes than we did. They increased global coherence by adding topic headers and adding micropropositions to ease the integration of paragraphs with the overall topic of the text. Our texts were stories rather than expository passages, and the global structure of our stories was already quite clear. We made direct changes to global coherence in only two stories. We added a statement to each story that specified the main character's goal in that episode.

We made relatively small changes to create low-coherence versions. We removed titles from character names that conveyed information about their roles in the story. In addition, we manipulated anaphoric reference by using a variety of anaphors to refer to a character. For example, Geordi LaForge is the chief engineer of the *Starship Enterprise.* We alternately referred to his character as Geordi, LaForge, or the chief engineer without ever explicitly stating that all of these names referred to the same character. It is important to note that our use of the term *low coherence* is a relative one. The low-coherence versions were lower in coherence than the high-coherence versions, but they were not, in fact, low in coherence. We removed *Star Trek*–relevant cues to coherence, but many other cues remained (e.g., syntactic and semantic cues). Thus, we expected low-knowledge readers to be able to establish coherence in the low-coherence versions, just not as easily as they could in the high-coherence versions. The low-coherence versions (M = 350 words) were slightly shorter than the high-coherence versions (M = 384 words), although not reliably so ($F < 1$).

Coherence was manipulated as a between-subjects factor. We chose not to interleave high-coherence and low-coherence texts in a within-subject design because all of the texts were about the same set of characters. In such a design, reading a high-coherence text would provide background information that could be used to comprehend a subsequent low-coherence text. We took the 12 low-coherence texts and created two lists by randomly assigning 6 texts to each list. We used the same procedure to create two lists of high-coherence texts. Thus, we had four material sets, each containing 6 texts (two high-coherence and two low-coherence lists).

A sentence recognition test was constructed, consisting of 60 sentences, 5 from each of the 12 original texts. The test items were selected from sentences that were left unchanged in our revisions. That is, the test items were identical in both the low-coherence and the high-coherence versions. Example test sentences appear in the Appendix. All participants received the same recognition test. Old items were from the 6 texts that they received during study (e.g., items from Story A); new items were from the other list of 6 texts that they did not receive (e.g., items from Story B).

Procedure. Participants began the experiment by completing the two-part knowledge test. They were then randomly assigned to one of the four material sets. After reading all of the texts, participants received the recognition test. They were instructed to press a key labeled *new* if they believed that the sentence did not appear in one of the texts that they read. If they recognized the sentence, the participants were asked to decide whether they had a vivid, conscious awareness of having read the sentence; if so, they were asked to press a key labeled *R* (for *remember*). If they did not have a conscious recollection of reading the sentence but still believed that the sentence had appeared in one of the texts, they were asked to press a key labeled *K* (for *know*).

Results and Discussion

We scored the knowledge test by calculating hits minus false alarms. The maximum possible score was 75. The top third of the distribution (n = 32) was classified as high knowledge (M = 56.40; range = 45 to 75); the bottom third (n = 32) was classified as low knowledge (M = 20.85; range = 0 to 34). We included in our analyses only data from participants classified as high or low knowledge.

We analyzed remember and know judgments separately. The means (proportion of *remember* and *know* responses) appear in Table 1. We also analyzed overall recognition, collapsing across remember and know judgments to calculate hit, false alarm, and *d* prime scores. The *d* prime scores appear in Table 2. All analyses were conducted twice, once with participants as a random factor (F_1) and once with items as the random factor (F_2). The analyses were 2 (knowledge) × 2 (coherence) analyses of variance (ANOVAs). Knowledge (high vs. low) and coherence (high vs. low) were between-subjects and within-item factors. All effects were reliable at $p < .05$ unless otherwise indicated.

Remember judgments to old items. The analyses yielded main effects of knowledge, $F_1(1, 60) = 17.79$, $MSE = 0.04$; $F_2(1, 28) = 82.22$, $MSE = 0.02$, and coherence, $F_1(1, 60) = 7.98$, $MSE =$

Table 1
Experiment 1: Hits and False Alarms (in Proportions) as a Function of Judgment Type, Domain Knowledge, and Text Coherence

Judgment type and domain knowledge	High text coherence				Low text coherence			
	Hits		False alarms		Hits		False alarms	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Remember judgments								
High knowledge	.61	.27	.05	.19	.90	.13	.02	.08
Low knowledge	.53	.24	.03	.04	.54	.19	.06	.17
Know judgments								
High knowledge	.19	.11	.05	.05	.08	.08	.14	.27
Low knowledge	.24	.12	.21	.26	.26	.11	.17	.22

Table 2
Experiment 1: Overall Recognition as Assessed by d Prime Scores

	High text coherence		Low text coherence	
Domain knowledge	*M*	*SD*	*M*	*SD*
High knowledge	2.87	1.62	3.31	1.45
Low knowledge	1.88	1.15	1.98	1.01

0.04; $F_2(1, 28) = 97.06$, $MSE = 0.01$. These effects were qualified by the predicted Knowledge × Coherence interaction, $F_1(1, 60) = 7.02$, $MSE = 0.04$; $F_2(1, 28) = 42.18$, $MSE = 0.01$. High-knowledge readers made more *remember* judgments in the low-coherence than in the high-coherence condition, $F_1(1, 30) = 15.71$; $F_2(1, 28) = 127.43$. In contrast, low-knowledge readers showed no coherence effect (Fs < 1).

Know judgments to old items. Our analyses of know judgments mirrored the remember results. We found a reliable effect of knowledge, $F_1(1, 60) = 21.57$, $MSE = 0.01$; $F_2(1, 28) = 18.98$, $MSE = 0.01$, and a coherence effect that was reliable in the items analysis, $F_2(1, 28) = 29.37$, $MSE = 0.01$, but only marginally reliable in the participants analysis, $F_1(1, 60) = 3.16$, $MSE = 0.01$, $p = .08$. We also found a Knowledge × Coherence interaction that was reliable in the participants analysis, $F_1(1, 60) = 6.22$, $MSE = 0.01$, and marginally reliable in the items analysis, $F_2(1, 28) = 3.08$, $MSE = 0.01$. High-knowledge readers made fewer know judgments in the low-coherence than in the high-coherence condition, $F_1(1, 30) = 11.33$ and $F_2(1, 28) = 30.75$. In contrast, low-knowledge readers showed a coherence effect that was marginally reliable in the items analysis, $F_2(1, 28) = 3.08$, but not reliable in the participants analysis ($F < 1$). They made slightly more know judgments in the low-coherence than in the high-coherence condition.

Remember and know judgments to new items. We conducted separate analyses of participants' remember and know judgments to new items. They made relatively few remember judgments to new items, and we found no reliable effects (Fs < 1). We also found no reliable effects in our analysis of know judgments to new items (Fs < 1).

Overall recognition. Our analyses of the *d* prime scores yielded a reliable effect of knowledge, $F_1(1, 60) = 11.94$, $MSE = 1.64$; $F_2(1, 28) = 155.44$, $MSE = 0.25$. High-knowledge readers recognized more items than did low-knowledge readers ($M = 3.08$ and $M = 1.94$, respectively). High-knowledge readers also recognized more items in the low-coherence than in the high-coherence condition; however, the interaction between knowledge and coherence was not reliable (Fs < 1).

IRK analyses. We used the IRK procedure proposed by Yonelinas and Jacoby (1995). In this procedure, remember judgments are conceptualized as an index of recollection (remember judgment $= R$). Familiarity is conceptualized as the probability of an item receiving a *know* response given that it was not recollected: $F =$ know judgment$/(1 - R)$.

In applying this procedure, we encountered a problem resulting from a ceiling effect among high-knowledge readers in the low-coherence condition. Many of these readers (69%) made remember judgments in response to all of the old test items. This resulted in scores of zero in the denominator of the IRK formula. To conduct the analysis, we adjusted remember scores such that the denominator in the IRK formula was not zero. Each remember score equal to 1.00 was lowered to .99.

The familiarity estimates appear in Table 3. The pattern of means was similar to the one we observed for remember judgments; however, our analyses revealed no reliable effects (Fs < 1). We are cautious about interpreting these analyses, however, because our procedure for handling the ceiling effect in the low-coherence condition is not entirely satisfactory. Lowering the scores from 1.00 allowed us to use the IRK formula, but it did not remove the ceiling effect. Thus, the reliability of the familiarity estimates is open to question. We note, however, that Long and Prat (2002) found no reliable effects of knowledge on familiarity in two experiments. Neither of those experiments had conditions in which participants' performance was near ceiling.

Our results in this experiment are consistent with the predictions that we described. We argued that the perceptual and semantic processing involved in constructing a textbase leads to a sense of familiarity when the reader receives a sentence from the text at test. Recollection, however, results from the inferential processing involved in integrating explicit text ideas with relevant domain knowledge. The contextually specific information associated with the sentence results in recollection during retrieval. Thus, high-knowledge readers were more likely to report a vivid, conscious experience of remembering in response to sentences from the *Star Trek* texts than were low-knowledge readers. More important, they reported more of these experiences after reading low-coherence texts than after reading high-coherence texts.

Our results with respect to recollection are straightforward and consistent with the claim that low-coherence texts promote the integration of explicit text ideas and world knowledge. McNamara and her colleagues (i.e., McNamara, 2001; McNamara & Kintsch, 1996; McNamara et al., 1996) have argued that such integration leads to the development of a situation model in readers who have the requisite domain knowledge. In their experiments, readers' situation models were assessed by means of keyword sorting tasks and open-ended questions. Our results extend these findings by showing that knowledge and coherence have the same effects on remember judgments, judgments that reflect a conscious remembering at retrieval.

Our results with respect to familiarity are more difficult to interpret. A ceiling effect in the low-coherence condition led to problems in deriving familiarity estimates under the independence assumption. A second procedure for obtaining recollection and familiarity estimates under this assumption is the process-

Table 3
Experiment 1: Familiarity Estimates Calculated Using the Independence Remember–Know Procedure

	High text coherence		Low text coherence	
Domain knowledge	*M*	*SD*	*M*	*SD*
High knowledge	.60	.24	.69	.42
Low knowledge	.62	.26	.62	.23

dissociation procedure (Jacoby, 1991; Jacoby, Toth, & Yonelinas, 1993; Yonelinas & Jacoby, 1995). We use this procedure in Experiment 2 to provide additional evidence about the influence of knowledge and coherence on recollection and familiarity.

Experiment 2

Jacoby (1991) developed the process-dissociation procedure as a means of assessing the relative contribution of automatic and intentional memory processes to recognition. Recognition of studied words is compared in two conditions: the inclusion condition, in which participants are asked to respond *old* to target items on the basis of either recollection or familiarity, and the exclusion condition, in which participants are asked to reject target items whenever they can recollect them as old.

Assuming that recollection and familiarity make independent contributions to recognition performance, it is possible to estimate recollection's contribution to recognition by subtracting false alarms in the exclusion condition from correct responses in the inclusion condition. The probability of responding to a target item in the inclusion condition is equal to the probability that the item is recognized on the basis of recollection (R) plus the probability that it is not recollected but is recognized on the basis of familiarity (F), or $P(\text{inclusion}) = R + (1 - R)F$. The probability of responding to a target item in the exclusion condition is equal to the probability that the item is recognized on the basis of familiarity alone, or $P(\text{exclusion}) = (1 - R)F$. Quantitative estimates of recollection can be obtained by subtracting the exclusion probability from the inclusion probability, or $R = P(\text{inclusion}) – P(\text{exclusion})$. This estimate can then be used to solve for F to obtain an estimate of familiarity, or $F = P(\text{exclusion})/(1 - R)$.

We used this procedure in Experiment 2 to examine the effects of knowledge and coherence on recognition. Participants read the *Star Trek* texts from Experiment 1 and received recognition tests under both inclusion and exclusion instructions. We expected high-knowledge readers to have higher recollection estimates than low-knowledge readers. We also expected high-knowledge readers to have higher recollection estimates in the low-coherence condition than in the high-coherence condition. We were particularly interested in the familiarity estimates. If knowledge and coherence affect familiarity in a manner similar to levels-of-processing manipulations, then both knowledge and coherence should affect familiarity estimates, albeit to a smaller degree than they affect recollection estimates. Alternatively, knowledge and coherence may have no effect on familiarity. Text processing is a deep encoding condition even among low-knowledge readers. Thus, the somewhat deeper processing that occurs among high-knowledge readers may not have a detectable influence on familiarity.

Method

Participants. Participants were 240 undergraduate psychology students at the University of California, Davis. They received course credit for their participation.

Materials. The materials included the knowledge tests and the high-coherence and low-coherence versions of the texts from Experiment 1. In addition, we selected four additional texts and revised them using the same procedures as in the previous experiment. The low-coherence versions of these 16 texts were shorter than the high-coherence versions ($M = 374$ and $M = 405$ words, respectively), but not reliably so ($F < 1$).

The 16 low-coherence texts were randomly divided into two material sets: 8 texts in each set. The same was done with the 16 high-coherence tests. Thus, we had four material sets (two high-coherence and two low-coherence). Within each set, the 8 texts were randomly divided into four blocks (2 texts in each block). The 2 texts in a block were labeled Story A and Story B. A block of texts was followed by inclusion or exclusion instructions (counterbalanced across blocks and sets) and a sentence recognition test. Each recognition test consisted of 20 sentences: 10 "old" sentences (5 from Story A in the block and 5 from Story B) and 10 "new" sentences. The new sentences were from the set of *Star Trek* texts that those participants had not read (i.e., the set of texts in another material set).

Procedure. Participants began the experiment by completing the *Star Trek* knowledge tests. They were then randomly assigned to a material set. Each participant read four blocks of high-coherence texts or four blocks of low-coherence texts and received a recognition test after each block. Participants were given inclusion instructions for two of the blocks and exclusion instructions for the other two blocks. Inclusion instructions asked participants to respond *yes* if the sentence appeared in either Story A or Story B. They were told to respond *no* to any new item. Exclusion instructions asked participants to respond *yes* only if the sentence was in Story B. They were told to respond *no* if they recognized the item from Story A or if the item was new.

Results and Discussion

Scores on the knowledge test were used to classify participants as high-knowledge or low-knowledge about *Star Trek.* High-knowledge readers had scores that ranged from 37 to 69 ($M = 48.12$, $n = 96$); low-knowledge readers had scores that ranged from −2 to 24 ($M = 7.19$; $n = 96$).

We calculated inclusion and exclusion probabilities for each participant. Both probabilities reflect *yes* responses to sentences from Story A in a block of texts. Thus, inclusion probabilities were hits, whereas exclusion probabilities were false alarms. The probabilities appear in Table 4. The inclusion and exclusion probabilities were used to calculate recollection and familiarity estimates for each participant according to the formulas presented earlier. These estimates also appear in Table 4. We performed separate 2 (knowledge) × 2 (coherence) ANOVAs on the estimates. Knowledge (high vs. low) and coherence (high vs. low) were between-subjects and within-item factors.

Table 4
Experiment 2: Inclusion and Exclusion Scores (in Proportions) and Recollection and Familiarity Estimates as a Function of Domain Knowledge and Text Coherence

Domain knowledge and memory estimates	High text coherence		Low text coherence	
	M	*SD*	*M*	*SD*
High knowledge				
Inclusion	.81	.14	.82	.13
Exclusion	.25	.33	.13	.22
Recollection	.56	.35	.69	.24
Familiarity	.38	.40	.30	.38
Low knowledge				
Inclusion	.71	.20	.72	.21
Exclusion	.24	.24	.31	.30
Recollection	.47	.33	.41	.38
Familiarity	.41	.31	.45	.35

Recollection and familiarity estimates. Our analyses of the recollection estimates revealed a reliable main effect of knowledge, $F_1(1, 188) = 15.06$, $MSE = 0.11$; $F_2(1, 9) = 132.35$, $MSE = 0.001$. This effect was modified by the predicted Knowledge × Coherence interaction, $F_1(1, 188) = 4.00$, $MSE = 0.11$; $F_2(1, 9) = 29.22$, $MSE = 0.001$. High-knowledge readers had higher recollection estimates in the low-coherence condition than in the high-coherence condition, $F_1(1, 94) = 4.54$; $F_2(1, 9) = 41.33$. In contrast, low-knowledge readers showed no effect of coherence (Fs < 1).

Our analyses of the familiarity estimates revealed a main effect of knowledge that was marginally reliable in the participants analysis, $F_1(1, 170) = 3.80$, $p = .06$, but not in the items analysis ($F_2 < 1$). Low-knowledge readers had somewhat higher familiarity estimates than did high-knowledge readers. We found no reliable effect of coherence, nor did we find a reliable Knowledge × Coherence interaction (Fs < 1).

We conducted a second analysis of the familiarity estimates to determine whether higher estimates for low-knowledge than for high-knowledge readers were due to differences in the groups' false alarm rates. We subtracted false alarms to new items from the familiarity estimates. Analysis of the corrected estimates yielded no reliable effects or interactions (Fs < 1). The corrected mean familiarity estimates were .32 and .35 for high-knowledge and low-knowledge readers, respectively.

One possibility for our failure to find knowledge and coherence effects on the familiarity estimates is that our analysis lacked sufficient power. We conducted two statistical power tests to examine this possibility: one test to determine our power to detect an effect of coherence, and one to detect an effect of knowledge. We used the effect sizes from our analyses of recollection estimates in our calculation of the tests. Our power to detect a coherence effect given our sample size was 99.7%. Our power to detect a knowledge effect was 100.0%.

False alarms to new items. We analyzed responses to new items to examine the effect of inclusion–exclusion instructions. We calculated a false alarm rate for each instruction condition and conducted a 2 (instruction) × 2 (knowledge) × 2 (coherence) ANOVA on the data. Instruction was a within-subject variable; knowledge and coherence were between-subjects variables. The means appear in Table 5.

We found a reliable effect of knowledge, $F_1(1, 188) = 22.36$, $MSE = 0.01$; $F_2(1, 9) = 30.22$, $MSE = 0.001$, but no effects of instruction or coherence (all Fs < 1). Low-knowledge readers made more false alarms than did high-knowledge readers.

Table 5
Experiment 2: False Alarms (in Proportions) to New Items as a Function of Instruction Condition, Domain Knowledge, and Text Coherence

Domain knowledge and instruction condition	High text coherence		Low text coherence	
	M	*SD*	*M*	*SD*
High knowledge				
Inclusion	.03	.07	.03	.07
Exclusion	.02	.06	.02	.05
Low knowledge				
Inclusion	.06	.10	.06	.11
Exclusion	.08	.14	.07	.13

Our goal in this experiment was to examine the influence of knowledge and coherence on recollection and familiarity under the independence assumption. We observed a knowledge effect on both inclusion and exclusion probabilities. High-knowledge, relative to low-knowledge, readers were better at discriminating old from new items (inclusion instructions) and at identifying the specific context in which an item appeared (exclusion instructions). In contrast, we observed a coherence effect only in the exclusion condition. Low coherence facilitated high-knowledge readers' ability to associate a test item with its study context. In most studies using this procedure, encoding manipulations tend to affect performance in both instruction conditions. We offer a tentative explanation for this finding in the General Discussion section.

Our analyses of the recollection estimates suggest that recollection was affected by knowledge and coherence differently than was familiarity. High-knowledge readers were more accurate at linking an item with the specific text in which it appeared than were low-knowledge readers. However, this effect depended on text coherence. Recollection estimates were larger in the low-coherence than in the high-coherence condition.

Our analyses of the familiarity estimates revealed a different pattern than the one we saw for recollection. We found a slight effect of knowledge that disappeared when we corrected the familiarity estimates for false alarm rates. Of particular interest is the absence of a coherence effect. If our coherence manipulation was akin to a levels-of-processing manipulation similar to those used in list-learning studies, then we would have expected to observe coherence effects for both recollection and familiarity.

In both Experiments 1 and 2, we have assumed that recollection and familiarity are independent processes. This assumption is controversial, as we discuss in the next section. Nonetheless, we have demonstrated clear dissociative effects on recollection and familiarity. Knowledge and coherence interact to influence recollection but have no effects on familiarity.

General Discussion

This study was motivated, in part, by prior research on the influence of knowledge and coherence on readers' text representations. McNamara and her colleagues (i.e., McNamara, 2001; McNamara & Kintsch, 1996; McNamara et al., 1996) have argued that readers learn from a text when they can create a situation model of it—that is, a text representation that is strongly linked to the reader's existing world knowledge. In the absence of a situation model, readers may remember the text but will not be able to use their representation to support problem solving, generalization, or knowledge-based inferences. Moreover, low-coherence texts can promote active processing among high-knowledge readers, facilitating situation-model construction.

We investigated the influence of knowledge and coherence on readers' text representations using recognition memory. We hypothesized that the different processes involved in constructing a textbase and situation model would give rise to different retrieval experiences during recognition. Our hypothesis has its foundation in dual-process models of recognition memory in which recognition is supported by two distinct processes: recollection and familiarity. In previous research, we found that knowledge about the topic of a story increased recollection but not familiarity (Long & Prat, 2002). Our current study extends these findings. Knowledge had robust effects on remember judgments and recollection estimates. Moreover, this effect interacted with coherence such that high-knowledge readers who received low-coherence texts made more remember judgments and had higher recollection estimates than did high-knowledge readers who received high-coherence texts. In contrast, knowledge and coherence had little effect on familiarity.

In the introduction, we mentioned two means by which recollection may be influenced by knowledge. When high-knowledge readers comprehend a text in their domain of expertise, they may make conscious inferences in response to text ideas. Consider Story A in the Appendix. After reading the sentence "Deanna realizes that her long-arranged marriage to the Miller's son, Wyatt, is suddenly imminent," a high-knowledge reader may become consciously aware of information retrieved from the original TV episode (e.g., "Oh, I remember—this is the episode where Lwaxana wanted everyone to be naked at the wedding ceremony"). When the sentence is presented at test, readers may remember thinking about the original episode in response to the sentence. Thus, the item is recollected. A second means by which knowledge may affect recollection concerns the integration and organization of text ideas in light of the readers' domain-relevant knowledge. The high-knowledge reader integrates text ideas with a large existing network of relevant information. If a test item functions to reactivate this rich network of interconnected ideas, readers will experience this as recollection.

This latter explanation for the influence of knowledge on recollection may seem counterintuitive in light of some proposals about the representations that support recollection and familiarity. For example, Brainerd, Reyna, and Mojardin (1999) argued that recognition is affected by two types of representations: item-specific information, including its surface form (i.e., verbatim trace), and relational information among items (i.e., gist trace). Retrieval of a verbatim trace evokes an experience of recollection, whereas retrieval of a gist trace typically evokes feelings of familiarity. If high-knowledge readers are more likely to develop relations among items than are low-knowledge readers (i.e., represent the gist), then we might expect them to rely more on familiarity and to make more false alarms to new *Star Trek* items. It is important to note, however, that gist retrieval can also contribute to recollection. If the gist representation of one list is distinct from the gist of another list, then gist retrieval will lead to recollection rather than familiarity at test.

Imagine a list-learning experiment using the process-dissociation procedure. Participants are high or low in knowledge about gardening. At study, they receive two lists containing names of flowering plants. List A contains only annuals (e.g., *impatiens, marigolds, begonias*); List B contains only perennials (e.g., *violets, verbena, daisies*). Low-knowledge participants are likely to form a gist trace for the two lists that are similar (i.e., both are flowers). This would result in poor discrimination of List A and List B items. High-knowledge participants, however, are likely to form different gist traces for the lists: annuals for List A and perennials for List B. In this case, we would expect excellent discrimination of List A and List B items. This would be particularly helpful in the exclusion condition. If participants are asked to respond *old* only to List B items, they should have little difficulty rejecting List A items. This may explain why, in Experiment 2, we found that knowledge and coherence had their largest effect in the exclusion condition. This logic can also be applied to the remember–know procedure. If all studied items are annuals and all distractors are perennials, high-knowledge participants will have high confidence that an annual was on the study list and that a perennial is a new item.

Now consider the materials used in our study. Participants received a block of two stories (e.g., Story A and Story B). Low-knowledge readers are likely to develop gist traces for the two stories that are less distinctive than those of high-knowledge readers, which results in some confusion about whether an item came from one story or the other. For example, they may represent Story A as "an arranged marriage between Deanna and Will" and Story B as "a deaf mediator tries to bring peace to a planet." These representations may be insufficient to determine whether an item such as "The Enterprise crew keeps a close eye on them" came from Story A or Story B. High-knowledge readers, in contrast, are likely to have gist representations that include information from the texts and information from the TV episodes that the texts describe. The episode summarized in Story A included information that was not contained in the story (e.g., the Tarellians have a disease that is highly contagious; the *Enterprise* crew is concerned about the risk of infection; the crew takes measures to prevent contact with the Tarellians). This knowledge may help high-knowledge readers associate a test item such as "The *Enterprise* crew keeps a close eye on them" with its appropriate story context.

If we are correct that recollection indexes the reader's situation model, then high-knowledge readers should easily reject distractors that come from unstudied stories because these items do not overlap with either their verbatim or their gist traces. Our findings in both experiments are consistent with this prediction. We would make a different prediction, however, about these readers' ability to reject distractors that occurred in the original TV episode but were not presented in the story. In this case, we would predict that high-knowledge readers would make numerous false alarms. Moreover, we would predict that the false alarms would involve recollection because the distractors would have the same status in the readers' situation models as do ideas that were explicitly presented. This raises an interesting question about the dual-process interpretation of such a finding. How can readers "recollect" information that was never presented?

In list-learning studies, false alarms involving recollection (e.g., remember judgments to new items) are generally low, and dual-process models have treated them as noise or guesses. Single-process models, in contrast, claim that these false alarms are affected by the same factors that underlie recognition of old items. In these models, recognition is determined by the strength with which an item is represented in memory. Remember and know judgments reflect different levels of confidence about a recognized item. Remember judgments are made when the trace strength of items exceeds a relatively stringent criterion, whereas know judgments are made when the trace strength exceeds a less stringent criterion but does not meet the remember one.

According to a single-process interpretation of our results, knowledge and coherence are likely to influence the strength with which a text idea is represented in memory. Ideas that have been integrated with the reader's prior knowledge become part of the reader's situation model and have trace strength that exceeds the remember criterion. Other items, those that are part of the reader's textbase, have memory strength sufficient to evoke know judgments but insufficient to evoke remember ones. Thus, the data that we have presented in this study can be accommodated by either dual-process or single-process memory models. These models might be discriminated, however, by a careful examination of false alarms to different types of distractors. Single-process theories make predictions about when new items will evoke remember judgments, whereas dual-process models have no mechanism to explain the systematic variation in false alarm rates. Knowledge and coherence may be two factors that systematically influence false alarms. High-knowledge readers who comprehend low-coherence texts may "remember" information that is represented in their situation model but was never presented in the text. This would be similar to the remember false alarms that participants make in the Deese–Roediger–McDermott procedure (Roediger & McDermott, 1995).

Our discussion so far has focused primarily on the influence of knowledge and coherence on recollection. As we discussed in the introduction, numerous studies have shown that both domain knowledge and text coherence facilitate performance on comprehension measures. Our failure to find effects of knowledge and coherence on familiarity seems inconsistent with these studies. Moreover, it appears to undermine our claim that familiarity indexes the reader's textbase representation.

One explanation for our failure to find effects of knowledge and coherence is that familiarity is not a marker of the processes involved in constructing a textbase. This would occur, for example, if familiarity indexed lower level processes involved in perceptual fluency. The act of reading a sentence at encoding—word recognition, syntactic parsing, semantic analysis—is likely to facilitate processing of the same sentence at test. Fluency at rereading may give rise to familiarity even if the test item is not well integrated into the reader's textbase representation. If this were the case, familiarity would be sensitive to reading but not sensitive to comprehension.

An alternative explanation is that our coherence manipulation was not strong enough to influence familiarity. McNamara and her colleagues (i.e., McNamara, 2001; McNamara & Kintsch, 1996; McNamara et al., 1996) have used expository texts in their studies. As we mentioned earlier, it is more difficult to establish coherence in expository texts than it is in narratives. The textbase of a story may be constructed easily even when the text does not provide multiple cues to coherence. More research is necessary before we can fully evaluate our claim that familiarity indexes the reader's textbase.

Our failure to find knowledge effects on familiarity may be somewhat surprising in light of previous research investigating the influence of encoding manipulations. In list-learning experiments, both recollection and familiarity increase as a function of elaboration. It is important to keep in mind, however, that these experiments compare a shallow-processing condition (e.g., read instructions) with a deep-processing condition (e.g., generate instructions). In contrast, we compared a very deep-processing condition (low-knowledge readers and high-coherence texts) with a somewhat deeper processing condition (high-knowledge readers and low-coherence texts). Although our low-knowledge readers were unfamiliar with *Star Trek,* they had extensive knowledge relevant to our stories (e.g., arranged marriages, mothers-in-law, plagues, war, mediation, deafness). These readers could elaborate their representations with considerable world knowledge, just not knowledge about *Star Trek.* Thus, we were not surprised to find different effects for familiarity and recollection.

The results of this study suggest one explanation for why experts and novices show both quantitative and qualitative differences in performance. We found quantitative effects of knowledge in both experiments. High-knowledge readers had better overall performance than did low-knowledge readers. We also found qualitative differences. High-knowledge readers were more likely to report a conscious, vivid sense of memory in response to text ideas than were low-knowledge readers, particularly in the low-coherence condition. The ability to consciously reflect on information obtained from a text may be critical in using it to perform a variety of tasks and may explain why experts are so much better than novices at using their knowledge in novel and flexible ways.

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(*Appendix follows*)

Appendix

Sample Stories and Recognition Items

Story A

High-Coherence Version

The *Starship Enterprise* arrives at Haven, a paradise planet renowned throughout the galaxy. The ship's telepathic counselor, Deanna Troi, receives a package containing a talking chest. The chest delivers the message that Lwaxana Troi, Deanna's mother, and her late husband's friends, the Millers, are on the planet below. Deanna realizes that her long-arranged marriage to the Miller's son, Wyatt, is suddenly imminent.

Wyatt and his parents come aboard the *Enterprise* and Deanna meets Wyatt for the first time. Wyatt, of the telepathic Betazoid race, is puzzled because Deanna is not the blonde he has seen in visions since childhood. After the Millers leave, Lwaxana comes aboard with her valet, Mr. Homn. Lwaxana, also a Betazoid, is a tad eccentric and takes great delight in informing people of their thoughts. She is rather vocally convinced that every male she's encountered has lustful thoughts about her, including the *Enterprise*'s captain, Jean-Luc Picard. The captain gracefully escapes their interaction as quickly as possible.

Meanwhile, an unidentified ship appears at the limit of the *Enterprise*'s sensor, a device that can detect and monitor objects in space. As they near the ship, the crew realizes that it is a Tarellian vessel. The Tarellians are victims of an old biological war and are treated as pariahs because of the contagious and incurable Tarellian Plague they carry. Surviving Tarellians travel from place to place both looking for a new place to live and for new curative technologies that might end their plight. The *Enterprise* crew keeps a close eye on them.

Although Deanna and Wyatt are attracted to each other, she starts to have second thoughts about the vows she took as a child. Just as their mothers' arguments over the marriage ceremony reach a feverish level, the Tarellians hail the *Enterprise.* To Wyatt's surprise, the blonde girl of his visions is one of the plague victims aboard the Tarellian ship. Wyatt, a doctor, decides to board their ship to be with her and follow his perceived destiny of helping to find a cure for the Tarellians. Deanna is glad that the marriage plans are over and Captain Picard is relieved that he won't be losing his ship's counselor. The Millers depart, as does Lwaxana, with one last parting jab at Picard, pretending to be shocked at his lustful thoughts.

Low-Coherence Version

The *Enterprise* arrives at Haven, a paradise planet renowned throughout the galaxy. The ship's counselor receives a package containing a talking chest. The chest delivers the message that Lwaxana, and her late husband's friends, the Millers, are on the planet below. Deanna realizes that her long-arranged marriage to the Miller's son, Wyatt, is suddenly imminent.

Wyatt and his parents beam aboard the *Enterprise* and Troi meets Wyatt for the first time. Wyatt is puzzled because the ship's counselor is not the blonde he has seen in visions since childhood. After the Millers leave, Deanna's mother beams aboard with her valet, Mr. Homn. Lwaxana is a tad eccentric and takes great delight in informing people of their thoughts. She is rather vocally convinced that every male she's encountered has lustful thoughts about her, including Picard. The captain gracefully escapes their interaction as quickly as possible.

Meanwhile, an unidentified ship appears at the limit of the *Enterprise*'s sensor. As they near the ship, the crew realizes that it is a Tarellian vessel, carrying the contagious and incurable Tarellian Plague. The *Enterprise* crew keeps a close eye on them.

Although Deanna and Wyatt are attracted to each other, she starts to have second thoughts about the vows she took as a child. Just as their mothers' arguments over the marriage ceremony reach a feverish level, the Tarellians hail the *Enterprise.* To Wyatt's surprise, the blonde girl of his visions is one of the plague victims aboard the Tarellian ship. Wyatt, a doctor, decides to beam over to their ship to be with her and follow his perceived destiny of helping to find a cure for the Tarellians. Troi is glad that the marriage plans are over and Jean-Luc is relieved that he won't be losing his ship's counselor. The Millers depart, as does Lwaxana, with one last parting jab at the captain, pretending to be shocked at his lustful thoughts.

Recognition Items

1. Deanna realizes that her long-arranged marriage to the Miller's son, Wyatt, is suddenly imminent.
2. The captain gracefully escapes their interaction as quickly as possible.
3. Meanwhile, an unidentified ship appears at the limit of the *Enterprise*'s sensor.
4. The *Enterprise* crew keeps a close eye on them.
5. Although Deanna and Wyatt are attracted to each other, she starts to have second thoughts about the vows she took as a child.

Story B

High-Coherence Version

To help settle a civil war on the planet Solais 5, the *Enterprise* takes on board a famous Ramataisian mediator, Riva. The crew is surprised to learn that Riva and his ruling family were born deaf and use a three-member chorus to communicate. Receiving his thoughts telepathically, the chorus speaks for him, each conveying a different part of his personality: the Woman, the Scholar, and the Warrior/Adonis. Riva quickly becomes attracted to the ship's telepathic counselor Deanna Troi.

When the peace negotiations begin on Solais 5, one of the delegates who isn't so thrilled by the concept of peace tries to kill Riva. He fails and instead kills his Chorus. Hostilities between the warring factions recommence, as Riva and the *Enterprise* crew beam back aboard the ship. Realizing that Riva uses some kind of gestured language, Captain Jean-Luc Picard orders the ship's android, Lieutenant Commander Data, to learn it. After learning the language, Data finds that Riva, overwhelmed with grief and helplessness, only wants to go back home. He tells Data that he is a fine machine, but he cannot take the place of his Chorus. Picard agrees to take him back, but says his decision is regrettable.

Deanna comes to Riva and tells him she is going to take over his role as mediator and asks him for suggestions. Riva suggests she find something the two factions have in common, no matter how small, saying the real trick is "turning a disadvantage into an advantage." Deanna challenges him to do the same. Inspired by her suggestion, he decides to beam back down to the planet and resume negotiations.

When all is in place, Riva tells the *Enterprise* crew they can leave. Everyone is puzzled, except for Deanna who tells them that Riva plans to teach the Solari his sign language, which will help them communicate, not only with him, but also with each other. The *Enterprise* leaves, confident that he will resolve the war, and Picard thanks Deanna warmly for all she has done.

Low-Coherence Version

To help settle a civil war on Solais 5, the *Enterprise* takes on board a famous Ramataisian mediator. The crew is surprised to learn that Riva and his ruling family were born deaf and use a three-member chorus to communicate. The chorus speaks for him, each conveying a different part of his personality: the Woman, the Scholar, and the Warrior/Adonis. The mediator quickly becomes attracted to Deanna.

When the peace negotiations begin, one of the delegates who isn't so thrilled by the concept of peace tries to kill Riva. He fails and instead kills his Chorus. Hostilities between the warring factions recommence, as Riva and the *Enterprise* crew beam back aboard the ship. Realizing that Riva uses some kind of gestured language, Picard orders Data to learn it. The android finds that the Ramataisian mediator, overwhelmed with grief and helplessness, only wants to go back home. He tells Data that he cannot take the place of his Chorus. Picard agrees to take him back, but says his decision is regrettable.

Troi comes to Riva and tells him she is going to take over his role as mediator and asks him for suggestions. He suggests that Deanna find something the two factions have in common, no matter how small, saying the real trick is "turning a disadvantage into an advantage." The ship's counselor challenges him to do the same. Inspired by her suggestion, he decides to beam back down to the planet and resume negotiations.

When all is in place, Riva tells the *Enterprise* crew they can leave. Everyone is puzzled, except for Deanna who tells them that the mediator plans to teach the Solari his sign language, which will help them communicate, not only with him, but also with each other. The *Enterprise* leaves, confident that he will resolve the war, and Picard thanks Troi warmly for all she has done.

Recognition Items

1. The crew is surprised to learn that Riva and his ruling family were born deaf and use a three-member chorus to communicate.

2. He fails and instead kills his Chorus.

3. Picard agrees to take him back, but says his decision is regrettable.

4. Inspired by her suggestion, he decides to beam back down to the planet and resume negotiations.

5. When all is in place, Riva tells the *Enterprise* crew they can leave.

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