

Tutorial: LANGUAGE COMPREHENSION

(See also Tutorial on [Reading Comprehension](#))

WHAT IS LANGUAGE COMPREHENSION?

Understanding what other people say and write (i.e., language comprehension) is more complicated than it might at first appear. Comprehending language involves a variety of capacities, skills, processes, knowledge, and dispositions that are used to derive meaning from spoken, written, and signed language. In this broad sense, language comprehension includes reading comprehension, which has been addressed in a separate tutorial, as well as comprehension of sign language. **(See [Tutorial on Reading Comprehension](#))** Deriving meaning from spoken language involves much more than knowing the meaning of words and understanding what is intended when those words are put together in a certain way. The following categories of capacity, knowledge, skill, and dispositions are all brought to bear in fully comprehending what another person says.

Communication Awareness

- *Communication awareness* includes knowing (1) that spoken language has meaning and purpose, (2) that spoken words, the organization of the words, their intonation, loudness, and stress patterns, gestures, facial expression, proximity, and posture all contribute to meaning, (3) that context factors need to be taken into consideration in interpreting what people mean to communicate, (4) that it is easy to misinterpret another's communication, and (5) that it often requires effort to correctly interpret another person's intended meaning and that correct interpretation is worth the effort!

Hearing and Auditory Processing

- Understanding a spoken utterance assumes that the listener's hearing is adequate and that the spoken sounds are correctly perceived as phonemes of English (or whatever language is spoken). Phonemes are the smallest units of spoken language that make a difference to meaning – corresponding roughly to the letters in a word (e.g., the sounds that 't', 'a', and 'n' make in the word 'tan'). Auditory processing of language also includes the ability to integrate the separate sounds of a word into the perception of a meaningful word and of sequences of meaningful words.

Word Knowledge and World Knowledge

- *Word knowledge* includes knowing the meaning of words (e.g., understanding them when they are spoken), including multiple meanings of ambiguous words. Knowing the meaning of a word is more than knowing what (if anything) that word refers to. Rather it is possession of a large set of meaning associations that comprise the word's full meaning. For example knowing the meaning of the word "horse" includes knowing that horses are animals, that they engage in specific types of activities, that they have many uses, that they have specific parts, that they have a certain size, shape, and other attributes, that they are characteristically found in specific places, and the like. Understanding spoken language requires an adequate vocabulary, which is a critical component of the semantics of a language. Word meanings may be concrete (e.g., "ball" refers to round objects that bounce) or abstract (e.g., "justice" refers to fairness in the pursuit or distribution of various types of goods and services).
- **World knowledge** includes understanding the realities in the world – objects and their attributes, actions and their attributes, people, relationships, and the like – that words refer to and describe. For example, if a student has no knowledge of computers, then it is impossible to fully understand the word 'computer'.

Knowledge of Word Organization

- **Syntax** (or grammar) refers to the rules that govern the organization of words in a sentence or utterance. Comprehending an utterance requires an ability to decipher the meaning implicit in the organization of words. For example, “Tom fed the dog” and “The dog fed Tom” have different meanings despite containing exactly the same words.
- **Morphology** (a component of grammar) refers to rules that govern meaning contained in the structure of the words themselves. Changes within words (e.g., adding an ‘s’ to ‘dog’ to get ‘dogs’, or adding an ‘ed’ to ‘kick’ to get ‘kicked’) affects meaning. Comprehending an utterance requires an ability to decipher the meaning associated with such modifications of the words.

Discourse

- Just as there are rules that govern how speakers put words together in a sentence to communicate their intended meaning, there are also rules that govern how sentences (or thoughts) are organized to effectively tell stories, describe objects and people, give directions, explain complex concepts or events, influence people’s beliefs and actions, and the like. These are called **rules of discourse**. Effective comprehension of extended language (e.g., listening to a story or a lecture) assumes that the listener has some idea of what to listen for and in what order that information might come.

Social Knowledge and Pragmatics

Pragmatics refers to the rules governing the use of language in context (including social context) for purposes of sending and receiving varied types of messages, maintaining a flow of conversation, and adhering to social rules that apply to specific contexts of interaction. On the comprehension side of communication, the first of these three types of rules is most critical. For example, comprehending the sentence, “I will do it” requires deciding whether the speaker intends to make a promise, a prediction, or a threat. Similarly “We’d love to have you over for dinner” could be an invitation, a statement of an abstract desire, or an empty social nicety. Or “Johnny, I see you’ve been working hard at cleaning your room” could be a description of hard work or a mother’s ironic criticism of Johnny for not working on his room. In each case, correct interpretation of the utterance requires consideration of context information, knowledge of the speaker, understanding of events that preceded the interaction, and general social knowledge. **(See also the Tutorials on Social Competence, Social Perception.)**

Indirect Meanings include metaphor (e.g., “He’s a real spitfire”), sarcasm and irony (e.g., “You look terrific” said to a person who appears to be very sick), idioms or other figures of speech (e.g., “People who live in glass houses shouldn’t throw stones”), hyperbole (e.g., “The story I wrote is about a million pages long!”), and personification (e.g., “Careful! Not studying for a test can jump up and bite you!”). Comprehending indirect meanings often requires abstract thinking and consideration of context cues. Students with brain injury often have significant difficulty deciphering the meaning of such indirect communication unless the specific use of words was familiar before the injury. Understanding new metaphors, figures of speech and the like makes significant demands on cognitive processing (e.g., working memory, reasoning), discussed next.

Cognitive Functions that Support Language Comprehension

- **Attention:** Comprehending spoken language requires the ability to focus attention simultaneously on the speaker’s words and nonverbal behavior (e.g., gesture, facial expression, body posture), to maintain that focus over time, to focus simultaneously on one’s own response, and to flexibly shift attentional focus as topics change.
- **Working Memory:** Comprehending spoken language requires the ability to hold several pieces of information in mind at the same time, possibly including the words that the speaker just uttered, previous turns in the conversation, other information about the speaker, the topic, and the context, and the like.
- **Speed of Processing:** Because the units of spoken language arrive in rapid succession, comprehension requires the ability to process information quickly.

- **Organization:** Comprehending spoken language requires that the listener put together (i.e., organize) the various comments that the speaker makes, together with the listener's own comments, background information, and the like. This assumes considerable organizational skill.
- **Reasoning:** Comprehending a speaker's intended meaning is often a reasoning process. For example, if a speaker says, "I'm really busy today" and later in the conversation says, "I can't come over to your house after school today," the listener should be able to reason that the speaker is not being rude in rejecting an invitation, but rather is unable to come over because of his busy schedule.
- **Abstract thinking ability:** Comprehending abstract language, metaphors, figures of speech, and the like often requires a reasonable level of abstract thinking ability. (See Indirect Meanings, above.)
- **Perspective Taking:** Comprehending the intent underlying a speaker's message critically relies on the ability to take that person's perspective. For example, when a speaker says, "Don't worry; it's not a problem," he just might intend to communicate that it is a huge problem! Correctly interpreting this message requires "mind reading" – getting inside the speaker's frame of reference and understanding the issues and the words from that person's perspective.
- **Comprehension Monitoring and Strategic Behavior:** Effective comprehension of spoken language requires routine monitoring of comprehension, detection of possible comprehension failures, a desire to fix breakdowns, and a strategic ability to repair the breakdown, for example by saying things like, "I'm not sure I understand what you mean; could you explain?"

In light of the wide variety of skills, knowledge, and dispositions that come together to support language comprehension, it is not surprising that language comprehension is a communication difficulty for many students, including many students with TBI.

WHY IS LANGUAGE COMPREHENSION IMPORTANT FOR MANY STUDENTS AFTER TBI?

Depending on age and location and severity of the brain injury, students with TBI can have varied profiles of strengths and weaknesses with components of language comprehension and language expression. Often, basic language knowledge and skills acquired before the injury, including word meanings, are recovered after the injury. However, children are commonly impaired in areas that are developing rapidly at the time of injury. For example, at ages 6, 7, and 8, children are learning vocabulary related to success in the classroom (e.g., the words that teachers use in giving instructions) and success in social life (e.g., the language of peer interaction, compliments, teasing, and the like). The transition into adolescence is similarly a time when new and abstract vocabulary and a new and complex social code are being learned. Therefore, an injury at those times may disrupt the process of learning and cause persisting problems with language comprehension in school and social life.

More generally, students with TBI often have problems with memory and new learning, related to damage to the vulnerable hippocampus and also to the frontal lobes. **(See Tutorials on Memory, Retrieval)** Therefore, students injured at a relatively young age may have difficulty learning new words, rules of grammar, rules for organizing discourse, and pragmatic/social rules typically learned at older ages. The student may appear increasingly delayed in these areas over time. This gap between language knowledge and developmental expectations may become increasingly obvious in adolescence. Adolescents are expected to comprehend increasingly abstract and academic language, and also to comprehend increasingly subtle social language and nonverbal cues. A student injured before adolescence or in the early adolescent years may have difficulty in these domains and may therefore require intensive teaching and considerable support to meet these later developmental expectations as effectively as possible. **(See Tutorials on Concrete versus Abstract Thinking; Social Perception, Social Competence)**

Because procedural learning tends to be better preserved after TBI than declarative memory, learning rules of grammar is often less problematic than learning new and abstract word meanings, and considerably less problematic than succeeding in the discourse and social pragmatic domains. **(See Tutorial on Memory)** Both discourse and social pragmatic competence presuppose effective organization, reasoning, social perception and cognition, and working memory. Each of these cognitive domains is vulnerable following TBI.

Students with TBI also frequently have difficulties with other components of cognition and self-regulation that influence language comprehension. These include problems in the areas of attention, organization, reasoning, abstract thinking, perspective taking, and comprehension monitoring. **(See Tutorials on Attention; Organization; Concrete versus Abstract Thinking; Egocentrism; Self-monitoring)** Each of these areas of difficulty is associated with damage to the vulnerable frontal lobes. It is also extremely common for students with TBI to process information slowly. Slow processing can be caused by damage to the structure that connects the two halves of the brain (i.e., the corpus callosum), to the long axons that connect nerve cells (neurons) and networks of neurons throughout the brain, or to the frontal lobes themselves. **(See the Tutorial on Slow Processing.)**

Comprehending spoken language might not seem to be an organizational task, but consider what needs to be done to understand the following little story: “I went to a game yesterday with my dad. I caught a foul ball. I’m really happy to have the ball, but my hands still sting!” Understanding this story requires bringing to bear some background understanding of baseball. It also requires perceiving the relations among the sentences. For example the happiness and pain referred to in the third sentence relate to catching the ball referred to in the second sentence. Language comprehension is an ongoing process of “making connections” of this sort, connecting ideas to one another as the speaker expresses them and also to background knowledge of the world. Making these connections is difficult for students with organizational, memory, and reasoning impairments, common after TBI. **(See Tutorials on Organization; Memory)**

Difficulty with the social aspects of language and language pragmatics, for effective expression and comprehension alike, is also common after TBI. In some cases this is due to the fact that the child was injured at a young age and may not have matured sufficiently to engage in effective social interaction with peers later in development. In other cases, difficulty with the social and pragmatic aspects of language is a direct result of damage to parts of the brain that facilitate processing of social information. Damage to vulnerable prefrontal areas, in association with the amygdala, parietal lobes, insula, anterior cingulate gyrus, and basal ganglia (possibly right hemisphere more than left) results in difficulty interpreting the emotional states of others and “reading” the non-literal aspects of their communication. **(See Tutorials on Social Perception; Social Competence; Cognitive Egocentrism/Theory of Mind)**

WHAT ARE THE MAIN FEATURES OF INTERVENTION AND SUPPORT THAT ARE IMPORTANT FOR STUDENTS WITH LANGUAGE COMPREHENSION PROBLEMS AFTER TBI?

Understanding the Problem

As always, step one in helping students with complex disability is understanding the problem. For example, difficulty with comprehension of language could be a consequence of weakness in any of the domains (outlined above) that contribute to successful comprehension. The problem exploration steps on this web site should help staff and family identify the factors associated with the student’s difficulties. Intervention and support can then be targeted to the set of problems known to contribute to the student’s difficulty with language comprehension

Environmental Compensations

Students with language comprehension problems should receive some combination of the intervention strategies outlined later in this tutorial to improve their comprehension. However, there are also compensatory environmental procedures or accommodations that might be useful in addition to more direct teaching strategies.

- **Understanding:** Parents, teachers, other relevant adults, and possibly even peers should understand the nature of the student’s language comprehension weakness so that they will be in a position to make appropriate adjustments as they speak to the student, without speaking in a condescending or infantilizing manner.

- **Adjustments in the rate of speech:** For students who process information (including language) slowly, adjustments should be made. This does not mean speaking each word slowly in a drone-like manner. Rather it means speaking clearly and allowing greater than normal pause time (processing time) between meaningful units of information (phrases or short sentences). However, for students with a significantly reduced attention span, slowing the rate of speech input may be counter-productive; the student's attention may be lost. Lengthy instructions should be accompanied by simple written instructions or possibly picture cues to which the student can refer when necessary (assuming adequate reading ability for written instructions). If lecture notes are available in advance, the student can be "primed" for the content of the lecture in order to comprehend more effectively.
- **Adjustments in the amount of speech:** For students who process information slowly or have difficulty organizing information, reasonable limits should be placed on the amount of information given at one time. After a few units of information, it may be useful to have the student summarize what she has understood of the information already given. Then the speaker can proceed. Lengthy instructions should be broken into parts and also accompanied by simple written instructions that the student can refer to when needed (assuming adequate reading ability), or pictured instructions. High school or college students who are required to take lecture courses may need condensed versions of the lectures – organized summaries – in written form or notes taken by an assistant teacher.
- **Adjustments in the abstractness of language:** For students who are concrete thinkers and who have difficulty processing abstract meanings and abstract or indirect forms of language (e.g., metaphor, sarcasm), reasonable adjustments should be made. This does not mean eliminating abstract and indirect language from the speech directed to the student. Rather it means some combination of the following adjustments: (1) Use metaphors and figures of speech that you know the student understands, or accompany an unfamiliar metaphor or figure of speech with a simple embedded explanation (e.g., "John, you're going to fall flat on your face if you don't study... you know what I mean... you'll fail and then be very unhappy"). (2) Similarly, words with abstract meanings should be accompanied by simple definitions built into the speech directed to the student (e.g., "The judicial branch of government is responsible for interpreting the laws, that is, judges and courts must decide exactly what a law means and whether a person or organization has broken the law").
- **Supports for understanding social interaction:** As explained in the tutorial on Social Perception, students who have difficulty understanding the intent of a speaker's message may need to have that intent made explicit. For example, a communication partner may need to say "Let me tell you a joke..." rather than just telling the joke; or the communication partner may routinely add "Just kidding" after a tease rather than leaving it up to the student with social perception impairment to figure out that it is teasing. In these and other ways, communication partners can make their mental states known to the student with social perception and comprehension deficits.
- **Visual supports:** Visual supports are useful for students with impaired comprehension of spoken language. These supports can range from visual schedules and ample gestural support for young students to written instructions and lecture summaries for older students. Some experimentation may be required to determine the appropriate mix of spoken language and visual supports.

Instructional Procedures

Teaching Word Knowledge and World Knowledge

Critical to comprehending the language that one hears is an understanding of the words that are spoken and at least a general understanding of the topics included in that language directed to the child. Students with TBI often retain their word knowledge (vocabulary) and general knowledge of the world acquired before the injury. Knowledge of this sort is stored in posterior brain regions, which are not especially vulnerable in TBI (closed head injury).

However, because of problems with new learning, the student may fall progressively further behind in vocabulary knowledge and world knowledge over the years after the injury. Therefore attention to both types of knowledge may be a component of the student's comprehensive language and reading comprehension programs. What follows are some common suggestions regarding vocabulary acquisition and acquisition of world knowledge.

Vocabulary Practice: Words from the Curriculum: Given the many thousands of words that exist in any language, teaching vocabulary can seem to be a daunting task. For example, during the preschool years, typically developing children learn on average 8 to 10 words per day! The most reasonable way to simplify and organize the task of teaching vocabulary is to select words from the student's academic and social curricula. Thus the words to be focused on by teachers, speech-language pathologists, special educators, and parents should be words that the student needs to learn in order to comprehend the language used in the classroom, on the playground, and at home. These include words that teachers use in giving instructions, words that peers use in play and other social interaction, and words from reading books and from science, social studies, and other content classes.

Teaching the meaning of a word includes exploring the many associations that comprise the word's meaning. (See below for principles of vocabulary teaching.) In the case of a noun, for example, it is not sufficient for the student to point to a picture of the item when named. She should know what category the item falls into, what it does (if anything), what it is used for, what parts it has, what features it has, what it is made of, where it is commonly found, and other common associations. This broad and deep understanding is true knowledge of a word's meaning. Thus teachers and therapists should teach word meaning in this organized associative manner. Furthermore, context is important in the teaching. Students should have exposure to a variety of contexts in which the word can be used, especially contexts relevant to the classroom curriculum.

Parents can use and explore targeted words and their meanings during dinner time, car time, and other relaxed conversational times. Teaching word meaning at home need not be a boring "school-like" activity, but rather conversational use and exploration of the word, using language at the student's level of comprehension and connected as much as possible to the student's interests. Home-school communication should include lists of words that are currently focused on in school. However, these lists should not be so long that the student and family are overwhelmed!

In addition, the more students read, the faster their vocabularies grow. Therefore there is a strong rationale for encouraging students to read as much as they can. Homes should have interesting and engaging reading materials at an appropriate reading level for the student. For example, topically interesting magazines are available at many reading levels, including sports, current events, and popular culture magazines. And students should be encouraged to request a definition when they encounter words they do not understand.

World Knowledge: Themes from the Curriculum: Given the infinite extent of possible knowledge of things, places, events, and people in the world, teaching world knowledge is a genuinely daunting task. Again, the most reasonable way to simplify and organize the task is to select themes from the student's academic curriculum. General education teachers, special educators, therapists, and parents can focus on and discuss themes and issues that are found in reading texts or in the student's content classes.

As in the case of word meanings, parents can help the child acquire relevant world knowledge by knowing what is being taught at school and then weaving those curricular themes into dinner time, car time, and other relaxed conversations. In addition, discussion of daily events presented in the newspaper or on TV can help the student broaden her horizons and learn about events occurring in the world. Furthermore, the more the student reads, the more she learns about the world; therefore fun reading beyond school assignments should be encouraged.

Principles of Vocabulary Instruction: The following eight principles of vocabulary instruction are paraphrases of principles of vocabulary instruction published by Roth (2002). These principles capture the best

evidence-based practices known to language specialists at that time for teaching vocabulary to children who have language-learning difficulties, regardless of the cause of that difficulty. However, it may be that effectiveness of specific vocabulary teaching procedures is more dependent on the student's age, nature of the impairment, and specific vocabulary objectives than this general list of procedures suggests.

Principle 1: Teach organized systems of word associations (i.e., semantic knowledge). Common word associations for a noun include what category the item falls into, what it does (if anything), what it is used for, what parts it has, what features it has, what it is made of, where it is commonly found, and other common associations. (See the Tutorial on Graphic Organizers for a description of an organizer used in teaching word meanings.)

Principle 2: Teach the student word-learning strategies. For a young student, this may mean asking "What's that?" when encountering something unfamiliar. For a somewhat older student, this may mean getting into the habit of asking "What does _____ mean?" when encountering an unfamiliar word. For an older student, routine use of a dictionary should be added to these strategies.

Principle 3: Teaching vocabulary should include direct and explicit instruction as well as everyday incidental word learning.

Principle 4: Teaching vocabulary should involve relevant context associations and active child engagement with the to-be-learned meanings. A variety of activities and examples of the meaning should be included in the teaching.

Principle 5: Students need to learn the meanings of both common (high frequency) words and rare (low frequency) words.

Principle 6: Students need to learn both core definitions and also relevant context information. For example, when learning that "weird" means strange or unconventional, a student should also learn that it is offensive to apply the word to people.

Principle 7: To fully understand a word's meaning students should be given both examples and non-examples of that word's meaning. For example, to understand the meaning of "red", students should know what shades of color are called red and what shades are not called red; similarly, to understand the meaning of "legislative responsibilities", students should know what the legislative branch of government is responsible for (e.g., writing laws), but also what it is not responsible for (e.g., interpreting the laws and determining their constitutionality).

Principle 8: Students typically learn most efficiently from a multidimensional approach, appealing to all of their senses and to their activity as they learn the word's meaning. For example color words can be learned while finger painting; words related to government functions can be learned while having mock legislative and judicial sessions.

Roth also offers additional teaching suggestions: (1) Use adult-child shared book reading as a context for teaching vocabulary; (2) Incorporate new vocabulary into stories to heighten comprehension; (3) Use graphic organizers to facilitate comprehension; (4) With young children, focus on the physical action dimensions of meaning.

Improving Listening Comprehension By Teaching Strategies

The Tutorial on Reading Comprehension lists a number of strategies that students can use to improve their understanding of what they read. Some of these strategies can also be used by well selected students to improve their listening comprehension. However, teachers and clinicians should exercise caution in attempting to teach any of these listening comprehension strategies to students with restricted space in working memory. Thinking about strategies or using strategies may distract the student with brain injury,

causing a reduction rather than an improvement in comprehension. Furthermore, some of the strategies, like requesting clarification, may be resisted by students who understandably do not want to call attention to their disability. Sensitive counseling may be a necessary component of this strategy instruction.

With these qualifications as background, listening comprehension strategies include:

- Clarifying the topic or theme in what the communication partner is saying. This is analogous to the reading comprehension strategy of doing a “book walk” or in other ways orienting to the topic before reading.
- Summarizing – out loud or silently – the main points in what the person is saying. This is analogous to the summarizing strategy in reading comprehension.
- Elaborating – out loud or silently – on what the person is saying. This is analogous to the elaboration or self-questioning strategy in reading comprehension.
- Creating a visual image to associate with the main point made by the person. This is analogous to the visual imagery strategy in reading comprehension.
- Requesting repetition or clarification of what the other person has said. This is analogous to the reading comprehension strategy of re-reading a passage or requesting help.
- Making a judgment about the meaningfulness or value of what the person has said. This is analogous to the parallel strategy in reading comprehension.

Teaching Rules of Grammar

In most cases of pediatric TBI, grammar is less problematic than vocabulary or the social/pragmatic domains of language. However, a child with TBI may also have a congenital language-learning disorder, or may be one of the few with specific language impairment (or aphasia) caused by the injury. Therefore we include in this tutorial the following principles of grammar instruction.

Principles of Grammar Instruction: The following ten principles of grammar instruction are paraphrases of principles published by Fey, Long, and Finestack (2003). These principles capture the best evidence-based practices known to language specialists at that time for teaching grammar to children who have language-learning difficulties, regardless of the cause of that difficulty. However, it may be that effectiveness of specific grammar teaching procedures is more dependent on the student’s age, nature of the impairment, and specific grammatical objectives than this general list of procedures suggests.

Principle 1: Make sure that the grammar being taught serves a communication purpose (e.g., in story telling giving a description, and the like).

Principle 2: Do not focus teaching sessions only on grammar.

Principle 3: Choose a class of grammatical forms (e.g., past tense, rather than highly specific words) and ensure that there is environmental support for the meaning of the component of grammar being taught. For example, in teaching past tense, there should be meaningful conversation about events that took place in the past.

Principle 4: Choose developmentally appropriate forms of grammar. This requires consultation with a speech-language pathologist who knows in what developmental order children typically acquire aspects of grammar.

Principle 5: Create many natural opportunities throughout the day for supported practice.

Principle 6: Use varied linguistic contexts for practice of grammar, including conversation, descriptions, and stories (spoken and written).

Principle 7: Make the target aspect of grammar salient and meaningful. For example, in teaching helping verbs, create an argument like the following: “He is running” ... “No he isn’t” ... “Yes he is” ... “No he isn’t” and so on.

Principle 8: Make sure that relevant adults know how to use systematic recast procedures. For example, if the child says, “He goed to school”, the adult follows that utterance by saying, “He went to school”.

Principle 9: All adults should use grammatical language models, not “baby talk” or telegraphed models. Furthermore, relevant adults should know what specifically the child is working on so they can make a point of modeling those aspects of grammar.

Principle 10: Adults should use the traditional “You say what I say” imitation procedure sparingly. That is, avoid over-use of the following teaching procedure, “John, say after me, ‘He kicked the ball’ ... John imitates ... the adult says “Good job! He kicked the ball.” And when this imitation procedure is used, it should be supplemented by more natural language teaching procedures.

EVIDENCE REGARDING INTERVENTION FOR CHILDREN WITH LANGUAGE DISORDERS

This summary of evidence is written for teachers and others who may be required to support their intervention practices with evidence from the research literature or who may simply be curious about the state of the evidence. This summary was written in early 2008. Evidence continues to accumulate.

A search of the literature revealed no studies of the effectiveness of language intervention for students with a diagnosis of TBI, other than those that focus on the behavioral dimensions of language. The summaries of vocabulary and grammar teaching procedures presented earlier (Fey et al., 2003; Roth, 2002) are taken from general reviews of state-of-the-art professional practice, not based on systematic reviews of the experimental literature. Therefore these summaries represent a useful point of departure in choosing teaching procedures, but they cannot be considered evidence reviews.

Specific evidence supporting language intervention for students with TBI can, therefore, only be drawn – with great caution – from studies of other populations of students. Cirrin and Gillam (2008) identified 21 studies of language intervention for school-age children with primary spoken language disorders (versus disorders of reading and writing, and disorders of language secondary to other disabilities) published since 1985. Each study met high standards of experimental rigor. No studies of middle and high school students were found. Six studies focused on vocabulary, three on grammar, five on phonological awareness and metalinguistics, five on general language processing, and two on pragmatics. Effect sizes were moderate to high for the majority of studies. Therefore the authors conclude that there is an unfortunately small but solid body of evidence for language intervention for elementary-age students with primary language disorders.

Jitendra and colleagues (2004) systematically reviewed the evidence supporting specific procedures for teaching reading vocabulary to students with learning disabilities, grades 4 through 12. They found 19 articles that included 27 separate experimental studies. The following vocabulary teaching procedures were supported by experimental evidence: cognitive strategy instruction (e.g., semantic feature analysis), visual imagery, direct instruction, error-free learning (i.e., gradually increasing the time delay between presenting the word and requesting a definition)(only one study), and activity-based methods (only one study). Computer-assisted instruction yielded mixed results. The respected evidence review of the National Reading Panel (2000) summarized the results of a large number of successful experimental studies that support the use of explicit instruction in teaching both reading vocabulary and comprehension, with a focus on strategy intervention in the case of comprehension.

Other reviews of language intervention for specific populations of students with disability include Goldstein (2002, autism), and Sigafos and Drasgow (2003, developmental disabilities). The Goldstein review is relevant in that it identified many successful experimental studies in which the social dimensions of

language were targeted or positive communication alternatives to negative behavior were taught. Although there are differences in central tendencies between autism and TBI, those two dimensions of communication intervention are also important for many students with TBI. The systematic evidence review of Ylvisaker and colleagues (2007) summarized several studies in which social language and positive communication alternatives were successfully taught to children and adults with TBI.

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Ylvisaker, M., Turkstra, L., Coehlo, C., Yorkston, K., Kennedy, M., Sohlberg, M., & Avery, J. (2007). Behavioral interventions for individuals with behavior disorders after TBI: A systematic review of the evidence. *Brain Injury*, 21(8), 769-805. Written by Mark Ylvisaker, PhD