Procedures for training “before” and “after” (11 weeks):

**Stimuli:** Sequential picture stories, containing 5-6 pictures per sequence, from *Fold-a-Book* (Gustafson, M., 2003 [14]) and 2-3 pages of wordless picture books.

**Tasks:** (1) Therapist recorded lead questions containing the target conjunction and modeled the first clause of the target response (e.g., what happened before the kids put on their costumes?). CI played, repeated and completed the lead sentence. Task demands were increased when CI was able to consistently complete lead question sentences using SentenceShaper® (80% criterion). (2) Therapist recorded a sentence describing one of the sequential picture frames on SentenceShaper and then recorded a second sound file asking, “what happened before?” or “what happened after?”. CI’s responses could be recorded “piece-meal” and/or in a single sound file. Task demands were increased when CI was able to consistently create multi-clause sentences using target conjunctions (80% criterion). (3) CI was required to independently create narratives describing novel picture sequences and selected portions of picture books using the target conjunctions in most sentences. No information was recorded on SentenceShaper by the therapist.

**Feedback:** Based on the type of error produced, (e.g., lexical error, order error, missing sentence elements), the therapist provided the following: 1) directed CI to Side Button vocabulary; 2) pointed to target characters/ actions in the picture sequence; 3) asked questions regarding the missing elements (e.g., “who made up their faces?”); 4) moved icons in the Sentence Assembly Area and left empty spaces/slots to indicate missing sentence elements and then replayed the entire recording. Errors in content were pointed out and corrected by CI only if they did not express a plausible temporal relationship between the actions portrayed in the story. Morphological errors were not corrected.

**Home practice activities:** (1) Weeks #1-3: Home practice focused on retelling stories describing wordless picture books. No specific instructions were provided regarding use of the target conjunctions or the structural aspects of his productions. Homework was reviewed at the outset of each session and feedback was provided to reinforce use of strategies such as recording sentences piece-meal, relying on the replay feature, and using a cloze technique to complete sentences. (2) Weeks #3-6: CI was provided with several novel picture sequences. In each sequence, one picture frame was outlined with red marker. An arrow was drawn above the picture (pointing to either the previous or subsequent picture) to indicate the target for the second sentence clause. The therapist recorded a sentence on SentenceShaper describing the outlined picture and then recorded a second sound file asking, “what happened before?”, or “what happened after?”. (3) Weeks #7-11: CI completed retellings of novel picture sequences (4-5 sequences per week). “Before” or “after” were printed above selected pictures within the sequence to elicit both conjunctions equally.
Procedures for training “because” (7 weeks):

**Stimuli:** Sequential picture stories and *Cause and Effect* cards (Speechmark Publishing Ltd., 1997 [15]).

**Task:**  (1) Four sessions trained production of “because” structures to describe picture sets depicting a cause and effect scenario. Initially, task demands were simplified by requiring CI to complete sentences recorded on SentenceShaper by the therapist. For example, the therapist recorded the first sentence clause (e.g., “the boy is worried”) and CI was required to replay and complete the sentence (e.g., “because he broke the vase”). Next, CI was presented with novel picture sets and was instructed to describe the first picture (e.g., “the boy is worried”). He was then required to record “because”. The therapist then asked, a “why-question”, (e.g., “why was the boy worried?”) and pointed to the second picture. CI was required to replay his recordings and complete the sentence, (e.g., “he broke the vase”). (2) Task demands were increased by using sequential picture stories. The therapist pointed to one of the pictures in the sequence and asked a “why-question” about the depicted action, (e.g., “why is the girl crying?”). CI then referred to the entire sequence and recorded his response.

**Feedback:** When CI omitted the target conjunction or subject in the second sentence clause and/or had difficulty producing the target verb(s), the therapist suggested playing the Side Button vocabulary for assistance and/or pointed to characters or actions in the picture sequence and asked questions to cue CI to the missing elements. When CI failed to express a plausible cause for the action described in the first sentence clause, the therapist prompted him to explain why the action had occurred and/or would present a choice of plausible reasons for the event. CI would then attempt to record one of the options provided.

**Home practice activities:** The same materials used in the session were sent home and task demands matched those used that had been used in training (i.e., completing pre-recorded sentences to describe pairs of pictures, or independently describing pairs of cause and effect cards, or describing causal relationships depicted in sequential picture stories with the target picture outlined in red and the word “why” printed above the picture).

Procedures for training “before”, “after” and “because” in narratives (4 weeks):

**Stimuli:** Wordless picture books

**Task:** CI created stories on SentenceShaper describing wordless picture books using all three conjunctions.

**Feedback:** As CI produced his narrative, the therapist asked questions about the story to elicit target conjunctions (e.g., “what happened before/after that?”, “why did that happen?”). Corrective feedback was provided for error responses (same as above).

**Home practice activities:** CI described one novel picture book each week at home (4 books total). CI was required to use the target conjunctions whenever possible in his retellings. Feedback focused on indicating whether or not CI used an appropriate conjunction when it was indicated by the story as well as correct production of the target structures.
References:


Acknowledgements

This research was funded by NIH Grant R01-DC05629 from the National Institute on Deafness and Other Communicative Disorders to the University of Maryland School of Medicine.