

## **Supplemental Material S4. Combined Aphasia and Apraxia of Speech Treatment (CAAST) remote protocol.**

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**Introduction:** Present the sentence frame (shown below), "We are going to practice saying short sentences. Most sentences are made up of these parts" (point to frame) and describe each part using the following descriptions. ONLY SAY THIS ONCE AT THE BEGINNING OF THE SESSION.

a "doer" – someone or something that does something

an "action" – what is being done

a "theme" – a person, place or thing that is involved with what is being done

"other" – we have a space for "other" parts of sentences that we can include descriptor words – like "big," "pretty," "hard," "hot"

DOER	ACTION	THEME	OTHER
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**Step 1.** Display a picture (in random order) with a prompt or combination of prompts (e.g., "Tell me about this picture"; "What does this remind you of?"; "Tell me what's happening").

A. Upon an appropriate reply (any utterance regarding to the picture), go to Step 2.

B. Upon an inappropriate or no reply, provide two verbal models and request a response (e.g., "You could say something like *noun phrase* [hairy man] or *verb phrase* [shaves face]"; "You could say something like *noun + verb* [man shaves] or *verb phrase* [shaves beard]").

1) Upon an appropriate reply, go to Step 2.

2) Upon an inappropriate response or no reply, give a single word model and request a repetition (e.g., "Say *noun* [man]." or "Say *verb* [shaves]").

a. Upon an appropriate reply, go to Step 2.

b. Upon an inappropriate or no reply, use integral stimulation with no more than four tries to elicit a noun or verb production (e.g., "Watch me, listen to me, say it with (after) me...man"). Upon an appropriate reply, go to Step 2. Upon an inappropriate or no reply, present the next item.

**Step 2.** Repeat the participant's response and reinforce it (e.g., "Man...good"). Refer to the sentence frame and write the participant's response in the appropriate section of the frame (e.g., "'man' can be the doer or the theme...where shall we put it?"). If the participant provides no direction or gives an inaccurate reply, write the response under an appropriate item. Go to Step 3.

**Step 3.** Ask a question to elicit another component of the frame (e.g., "What is the man doing?")

A. Upon an appropriate reply, go to Step 4.

B. Upon an inappropriate or no reply, provide two verbal models and request a response (e.g., "You could say something like *noun phrase* [foamy face] or *verb phrase* [shaves beard]").

- 1) Upon an appropriate reply, go to Step 4.
- 2) Upon an inappropriate or no reply, give a single word model and request a repetition (e.g., "Say *noun* [beard]" or "Say *verb* [shaves]").
  - a. Upon an appropriate reply, go to Step 4.
  - b. Upon an inappropriate or no reply, use integral stimulation with no more than four tries to elicit a noun or verb production (e.g., "Watch me, listen to me, say it with (after) me...shaves"). Upon an appropriate reply, go to Step 4. Upon an inappropriate or no reply, present the next item.

**Step 4.** Reinforce the participant's production from Step 3, write the response in the sentence frame, and model a phrase/sentence that incorporates the participant's productions from Steps 1 and 3 (e.g., "Right, shaves. Man shaves"). Go to Step 5.

**Step 5.** Model the participant's combined production again and request a repetition.

- A. Upon a correct response (all target words produced with correct articulation), request three repetitions of the utterance using integral stimulation<sup>1</sup> as needed. Go to Step 6.<sup>2</sup> (use in subsequent substeps when a correct production occurs)
- B. Upon an incorrect or no response, underline sounds in error on frame. Say, "Let's think about these sounds and try again." Model sentence and request a response. If correct...3 reps – Step 6.<sup>2</sup>
- C. If incorrect, give feedback and say, "Let's try again...." Use integral stimulation<sup>1</sup> up to 3× for each target sound in each word. Say, "Let's try the entire phrase again," and request 3 reps with integral stimulation<sup>1</sup> as needed. Proceed to Step 6.
- D. If incorrect, give articulatory placement for all sounds in error (up to 3 sounds) while referring to frame; try entire phrase again with integral stimulation for 3 repetitions. If correct.....\*If incorrect, give feedback on target sounds and go to Step 6.

**Step 6.** Remove the picture, wait for approximately 5 seconds, return the picture, and request that the participant again describe the picture.

- A. Correct or alternate correct response—reinforce and go to the next picture.
- B. Partially correct response—assist with integral stimulation.
- C. No response—model and request repetition using integral stimulation.

**After completing all pictures, repeat Step 5 with sentences/phrases written previously.**

**Notes.**

<sup>1</sup>Modified integral stimuli for remote administrations: "Watch me, listen to me, and say it *after* me."

<sup>2</sup>e.g., response is "man sabs": "This sound (point/underline to 'sh') in 'shaves' is a little off. Try putting your teeth together....." and try the word "shaves." Give feedback as appropriate. "Now this sound ('v') is also not quite right. Try....." and try the word "shaves." Give feedback as appropriate. "Now...let's try those sounds again in the whole phrase 'man shaves'" with integral stim.