Study Title: Strategies for Teaching Verbs
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Strategies for Teaching Verbs – Study Protocol and Statistical Analysis Plan

BACKGROUND

Purpose
This study is designed to evaluate whether children with language impairment, children with Down syndrome, and children with typical development exhibit different levels of accuracy demonstrating and labeling novel verbs taught under three conditions: semantic cues (perform action), syntactic cues (sentence frame), and combined (syntactic and semantic cues).

Conditions
1. Semantic cues (perform action)
2. Syntactic cues (sentence frame)
3. Combined (syntactic and semantic cues)

Primary Dependent Variable
Percent accuracy identifying taught words from a field of two

Secondary Dependent Variable
Percent accuracy labeling taught words

TEACHING PHASE

Prior to session

Obtain list specifying the order of conditions and the order of words for each condition. Also note that the sets are counterbalanced across conditions across participants (i.e., 1/3 of participants will be taught Set 1 in the semantic condition, 1/3 have Set 1 in the syntactic cues condition, and 1/3 have Set 1 in the combined condition).

During the Session

I. Turn on camera and announce the date and participant ID.
II. Make sure examiner and participant are in appropriate view of camera.
III. Complete two trial items including testing. First do syntactic cues then do semantic cues.

Introduce the task: **"Today I will teach you some new moves that have special names. Some of these moves are silly. After I show you how to do these moves, I'm going to ask you show me how to do them and I will ask you their names. Remember, I'm going to show you these moves, and then I'm going to ask you to find them. Do your best to remember their names. First it is my turn. You sit with a quiet body and watch. Then it will be your turn. Let's try some."**

Note about feedback: The examiner must provide some type of evaluative feedback. The examiner is not required to say "Yes" or "No" specifically.

     Possible positive/correct responses (not an exhaustive list): "Yes," "Correct," "Right," and "You go it!"

     Possible negative/incorrect responses (not an exhaustive list): "No," "Close," "Not quite," "Oops," and "Listen again."

Nood: /nud/; place hands on hips and turn (similar to "washing machine" exercise from elementary school)

Syntactic Cues	
1. Demonstrate and label target word	Examiner says, **"I am nooding,"** while acting out the action.
2. Demonstrate and label target word	Examiner says, **"See. I nood,"** while acting out the action.
3. Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
4. Provide feedback on label	Examiner provides feedback: If correct: **"Yes. I am nooding,"** while acting out the action (or an equivalent form). If incorrect: **"No. I am nooding,"** while acting out the action (or an equivalent form).
5. Demonstrate and label target word	Examiner says, **"I nood,"** while acting out the action.
6. Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
7. Provide feedback on label	Examiner provides feedback:

		If correct: **"Yes. I nood,"** while acting out the action (or an equivalent form). If incorrect: **"No. I nood,"** while acting out the action (or an equivalent form).
8.	Demonstrate and label target word	Examiner says, **"See. I am nooding,"** while acting out the action.

"Let's stand up for this one. Remember, I'm going to show you these moves, and then I'm going to ask to find them. Do your best to remember their names. I will show you how to do the moves. Then it will be your turn."

Bome: /bom/; moving on leg in a circle close the floor with toe pointed

		Semantic Cues
1.	Demonstrate and label target word	Examiner says, **"Boming,"** while acting out the action.
2.	Demonstrate and label target word	Examiner says, **"Boming,"** while acting out the action.
3.	Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
4.	Provide feedback on label	Examiner provides feedback: If correct: **"Yes. Boming,"** while acting out the action (or an equivalent form). If incorrect: **"No. Boming,"** while acting out the action (or an equivalent form).
5.	Elicit demonstration	Examiner says, **"Show me."** If the child asks about what he or she is supposed to do, the examiner may say, "Show me what I did."
6.	Provide feedback on demonstration	Examiner provides feedback: If correct: **"Yes. Boming,"** while acting out the action (or an equivalent form). If incorrect: **"No. Boming,"** while acting out the action (or an equivalent form).
7.	Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
8.	Provide feedback on label	Examiner provides feedback: If correct: **"Yes. Boming,"** while acting out the action (or an equivalent form). If incorrect: **"No. Boming,"** while acting out the action (or an equivalent form).
9.	Elicit demonstration	Examiner says, **"Show me."** If the child asks about what he or she is supposed to do, the examiner may say, "Show me what I did."
10.	Provide feedback on demonstration	Examiner provides feedback: If correct: **"Yes. Boming,"** while acting out the action (or an equivalent form).

If incorrect: **"No. Boming,"** while acting out the action (or an equivalent form).

IV. Testing Practice Words with Feedback
  a. Using the powerpoint with the side-by-side options
  b. Say, **"I'm going to ask you to point to the actions I just taught you. Be sure to look at both pictures. Sometimes the pictures switch sides, so look carefully. If you are not sure of the answer, take your best guess. Let's practice some."**
  c. **"Point to jumping."** (Examiner may say, "Which one?" is the child does not respond after a few seconds.)
       i. If correct → **"You're right! That's jumping."**
       ii. If incorrect → **"This is jumping."**
  d. **"Let try another one. Point to eating."**
       i. If correct → "You're right! That's eating."
       ii. If incorrect → **"This is eating,"** while pointing to the correct video on the screen.
  e. **"Point to nading."** (Examiner may say, "Which one?" is the child does not respond after a few seconds.)
       i. If correct → **"You're right! That's nading."**
       ii. If incorrect → **"This is nading,"** while pointing to the correct video on the screen.
  f. **"Point boming."** (Examiner may say, "Which one?" is the child does not respond after a few seconds.)
       i. If correct → **"You're right! That's boming."**
       ii. If incorrect → **"This is boming,"** while pointing to the correct video on the screen.

V. Complete the following steps for each target word in all three conditions. Be sure to follow the order of conditions for that particular participant. NOTE THAT TESTING IS COMPLETING IMMEDIATELY AFTER TEACHING FOR **EACH** CONDITION (e.g., Teach 2 Combined → Test 2 Combined → Teach 2 Combined → Test 2 Combined → Teach 2 Semantic → Test 2 Semantic → Teach 2 Semantic → Test 2 Semantic → Teach 2 Syntactic → Test 2 Syntactic → Teach 2 Syntactic → Test 2 Syntactic).
  a. For feedback, if the participant does not provide a response or the examiner cannot determine whether it is accurate in the moment, it is acceptable to only perform and label the action as long as it is clear the examiner is labeling the ongoing action.
  b. Provide participants with a brief (approximately 10-min) break between conditions.
  c. If a participant shows signs of low motivation, limited motivation, and/or inattention as evidenced by reduced responsiveness and/or turning away from the examiner, for example, the examiner may implement use of additional social praise, external reinforcers (e.g., stickers, stamps), and/or reminders of how much work is left before a break.

Semantic Cues: Introduce the task:
  "Let's learn some more. Remember, I'm going to show you these moves, and then I'm going to ask you to point to them. Do your best to remember their names. Let's stand up. I will show you how to do the moves. Then it will be your turn. Let's try some."

Semantic Cues	
1. Demonstrate and label target word	Examiner says, "_____ing," while acting out the action.
2. Demonstrate and label target word	Examiner says, "_____ing," while acting out the action.
3. Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
4. Provide feedback on label	Examiner provides feedback: If correct: **"Yes. _____ing,"** while acting out the action (or an equivalent form). If incorrect: **"No. _____ing,"** while action out the action (or an equivalent form).
5. Elicit demonstration	Examiner says, **"Show me."** If the child asks about what he or she is supposed to do, the examiner may say, "Show me what I did."
6. Provide feedback on demonstration	Examiner provides feedback: If correct: **"Yes. _____ing,"** while action out the action (or an equivalent form). If incorrect: **"No. _____ing,"** while acting out the action (or an equivalent form).
7. Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
8. Provide feedback on label	Examiner provides feedback: If correct: **"Yes. _____ing,"** while acting out the action (or an equivalent form). If incorrect: **"No. _____ing,"** while acting out the action (or an equivalent form).
9. Elicit demonstration	Examiner says, **"Show me."** If the child asks about what he or she is supposed to do, the examiner may say, "Show me what I did."
10. Provide feedback on demonstration	Examiner provides feedback: If correct: **"Yes. _____ing,"** while acting out the action (or an equivalent form). If incorrect: **"No. _____ing,"** while acting out the action (or an equivalent form).

To transition to the next item, say, **"Let's do another one."**

Syntactic Cues: Introduce the task:
> **"Let's learn some more. Remember, I'm going to show you these moves, and then I'm going to ask you to point to them. Do your best to remember their names. First it is my turn. You sit with a quiet body and watch. Then it will be your turn. Let's try some."**

Syntactic Cues	
1. Demonstrate and label target word	Examiner says, **"I am _____ing,"** while acting out the action.

2.	Demonstrate and label target word	Examiner says, **"See. I _____,"** while acting out the action.
3.	Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
4.	Provide feedback on label	Examiner provides feedback: If correct: **"Yes. I am _____ing,"** while acting out the action (or an equivalent form). If incorrect: **"No. I am _____ing,"** while acting out the action (or an equivalent form).
5.	Demonstrate and label target word	Examiner says, **"I _____,"** while acting out the action.
6.	Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
7.	Provide feedback on label	Examiner provides feedback: If correct: **"Yes. I _____,"** while acting out the action (or an equivalent form). If incorrect: **"No. I _____,"** while acting out the action (or an equivalent form).
8.	Demonstrate and label target word	Examiner says, **"See. I am _____ing,"** while acting out the action.

Combined Cues: Introduce the task:

> **"Let's learn some more. Remember, I'm going to show you these moves, and then I'm going to ask you to point to them. Do your best to remember their names. Let's stand up. I will show you how to do the moves. Then it will be your turn. Let's try some."**

	Combined Cues	
1.	Demonstrate and label target word	Examiner says, **"I am _____ing,"** while acting out the action.
2.	Demonstrate and label target word	Examiner says, **"See. I _____,"** while acting out the action.
3.	Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
4.	Provide feedback on label	Examiner provides feedback: If correct: **"Yes. I am _____ing,"** while acting out the action (or an equivalent form). If incorrect: **"No. I am _____ing,"** while acting out the action (or an equivalent form).
5.	Elicit demonstration	Examiner says, **"Show me."** If the child asks about what he or she is supposed to do, the examiner may say, "Show me what I did."
6.	Provide feedback on demonstration	Examiner provides feedback: If correct: **"Yes. I _____,"** while acting out the action (or an equivalent form).

		If incorrect: "**No. I _____,**" while acting out the action (or an equivalent form).
7.	Elicit label from participant	Examiner says, **"Tell me that."** If the child asks about what he or she is supposed to do, the examiner may say, "Tell me what I did."
8.	Provide feedback on label	Examiner provides feedback: If correct: "**Yes. I _____,**" while acting out the action (or an equivalent form). If incorrect: "**No. I _____,**" while acting out the action (or an equivalent form).
9.	Elicit demonstration	Examiner says, **"Show me."** If the child asks about what he or she is supposed to do, the examiner may say, "Show me what I did."
10.	Provide feedback on demonstration	Examiner provides feedback: If correct: **"Yes. I am _____ing,"** while acting out the action (or an equivalent form). If incorrect: **"No. I am _____ing,"** while acting out the action (or an equivalent form).

TESTING PHASE

Receptive probes are administered after every two words are taught within a condition. Expressive probes are at the end of the condition. Testing after each condition is designed to minimize the order effects due to increased memory load as time progresses. Testing after two items is designed to decrease the memory load for the task and reduce interference of other words. Participants will have a brief break (e.g., receive a sticker and play with a toy appropriate for their developmental level) between teaching and testing.

Prior to Session

Obtain list of randomly ordered words for each set. Words are tested in a random order independent of the order they were taught.

Receptive Trials

a. Examiner and participant stand up for the duration of the assessment.
b. Say, **"I'm going to ask you to point to the actions I just taught you. Remember to look at both pictures. If you are not sure of the answer, take your best guess. Let's practice some."**
c. **"Point to jumping."** (Examiner may say, "Which one?" is the child does not respond after a few seconds.)
    i. If correct → **"You're right! That's jumping."**
    ii. If incorrect → **"This is jumping,"** while pointing to the correct video.
d. **"Let try another one. Point to eating."**
    i. If correct → **"You're right! That's eating."**
    ii. If incorrect → **"This is eating,"** while pointing to the correct video.
e. Test each word based on the list of randomly ordered words prepared before the session.
f. Say, **"Point to (target word)-ing"** Be sure to use the "-ing" marker. For example, "Point to meebing."
g. Wait for 5 seconds or until the participant provides a response.
    i. If the participant does not respond in approximately 5 seconds, repeat the prompt (e.g., "Point to meebing.") or say, "Which one?"

      ii. If the participant still does not respond, proceed to the next word and record NR for "no response."

      iii. The prompt may also be repeated if the participant requests a repetition or the participant appears to not have heard the prompt (e.g., participant sneezed when examiner said the word).

h. When the participant responds, acknowledge the response without providing any feedback regarding the accuracy of the response (e.g., "Okay.").

i. Score item as correct (1) or incorrect (0).

      i. If the participant makes a self-correction *after* the examiner says the next trial, the examiner says, "That's okay. Point to what I just said." In addition to that statement, one repetition is permitted. If a participant makes a self-correction prior to the examiner presenting the next item, the 5-second guideline does not apply.

      ii. If the participant says, "I don't know," or an equivalent statement, the trial is scored as incorrect.

      iii. If the participant does not respond, the trial is scored as incorrect.

      iv. If the examiner repeats the prompt more than once and the participant does not respond until after the third presentation (second repetition), the trial is scored as incorrect because the examiner is not allowed to repeat prompts more than once.

a. Repeat for the two words that have been taught in the set.

b. Repeat for the next two words of the set after teaching those words. Introduce the second and subsequent testing sessions by saying, **"I'm going to ask you to point to the actions I JUST taught you. I will only ask about the new ones. If you are not sure of the answer, take your best guess. Let's practice some."**

c. Administer the two practice items.

d. "Point to jumping."

e. "Point to eating."

f. After teaching the next set of words (i.e., in a different condition), probe them with the steps above.

g. Repeat for the final set of words.

II. For expressive trials

    a. Say, **"This time I am going to show you the actions one at a time and ask you what they are doing. If you are not sure of the answer, take your best guess. Let's practice some."**

    b. Show practice video of person jumping. **"What is she doing?"**

    c. Provide feedback on the participant's accuracy.

      i. If correct → **"You're right! She is jumping."**

      ii. If incorrect → **"She is jumping."**

    d. Say, **"Now try this one."**

    e. Show video of person walking.

    f. Provide feedback on the participant's accuracy.

      i. If correct → **"You're right! She is eating."**

      ii. If incorrect → **"She is eating."**

    g. Then test each word based on the list of randomly ordered words prepared before the session. This list includes the four taught words for the current condition randomly mixed.

    h. Play first video. **"What is she doing?"**

    i. Wait for 5 seconds or until the participant provides a response.

       i. If the participant does not respond in approximately 5 seconds, repeat the prompt (e.g., "What is she doing.") and replay the video.

       ii. If the participant still does not respond, proceed to the next word and record NR for "no response."

       iii. The prompt may also be repeated if the participant requests a repetition or the participant appears to not have heard the prompt or seen the video (e.g., participant sneezed when examiner said the word).

j. When the participant responds, acknowledge the response without providing any feedback regarding the accuracy of the response.

k. Record that the participant says in IPA (International Phonetic Alphabet), including any articulation errors.

l. Score item as correct (1) or incorrect (0).

       i. For expressive items, the examiner scores each trial as correct if the participant says the name of the object or an intelligible approximation that includes acceptable speech production errors within approximately 5 seconds of the examiner's prompt. Appendices B.1 and B.2 should be used a references to determine whether speech errors are acceptable. Only the word root is scored for accuracy. Word endings (e.g., "-ing," "-ed" and "-s") are not scored.

       ii. If the participant makes a self-correction *after* the examiner says the next trial, the examiner says, "That's okay. Show me what I just said." In addition to that statement, one repetition is permitted. If a participant makes a self-correction prior to the examiner presenting the next item, the 5-second guideline does not apply.

       iii. If the participant says, "I don't know," or an equivalent statement, the trial is scored as incorrect.

       iv. If the participant does not respond, the trial is scored as incorrect.

       v. If the examiner repeats the prompt more than once and the participant does not respond until after the third presentation (second repetition), the trial is scored as incorrect because the examiner is not allowed to repeat prompts more than once.

m. Repeat for all four words in the set.

n. After teaching the next set of words, probe then with the steps above.

o. Repeat for the final set of words.

III. Stop the recording device.

STATISTICAL ANALYSIS PLAN

Primary research questions:

1. Do children identify novel verbs taught under three conditions with greater than chance accuracy (i.e., >50%): semantic cues (perform action), syntactic cues (sentence frame), or combined semantic and syntactic cues (perform action and sentence frame)?
   a. One-sample Wilcoxon signed rank test with comparison value of 6
2. Do children exhibit different levels of accuracy identifying novel verbs taught under the three conditions?
   a. Wilcoxon signed ranks test comparing each condition to one another using the primary outcome variable of receptive accuracy.

Secondary research questions:

3. Do children accurately label novel verbs taught under the three conditions?

       a. One-sample Wilcoxon signed rank test with comparison value of 0
4. Do children exhibit different levels of accuracy labeling novel verbs taught under the three conditions?
       a. Wilcoxon signed ranks test comparing each condition to one another using the secondary outcome variable of expressive accuracy.