If you are viewing this course as a recorded course after the live webinar, you can use the scroll bar at the bottom of the player window to pause and navigate the course.

This handout is for reference only. Non-essential images have been removed for your convenience. Any links included in the handout are current at the time of the live webinar, but are subject to change and may not be current at a later date.

No part of the materials available through the continued.com site may be copied, photocopied, reproduced, translated or reduced to any electronic medium or machine-readable form, in whole or in part, without prior written consent of continued.com, LLC. Any other reproduction in any form without such written permission is prohibited. All materials contained on this site are protected by United States copyright law and may not be reproduced, distributed, transmitted, displayed, published or broadcast without the prior written permission of continued.com, LLC. Users must not access or use for any commercial purposes any part of the site or any services or materials available through the site.
Technical issues with the Recording?

- Clear browser cache using these instructions
- Switch to another browser
- Use a hardwired Internet connection
- Restart your computer/device

Still having issues?

- Call 800-242-5183 (M-F, 8 AM-8 PM ET)
- Email customerservice@SpeechPathology.com
Relationships between Language and Executive Functions: Planning and Regulating

Jill K. Fahy, MA, CCC-SLP

Moderated by:
Amy Natho, MS, CCC-SLP, CEU Administrator, SpeechPathology.com

Need assistance or technical support?

- Call 800-242-5183
- Email customerservice@SpeechPathology.com
- Use the Q&A pod
How to earn CEUs

- Must be logged in for full time requirement
- Log in to your account and go to Pending Courses
- Must pass 10-question multiple-choice exam with a score of 80% or higher
  - Within 7 days for live webinar; within 30 days of registration for recorded/text/podcast formats
- Two opportunities to pass the exam

Relationships between Language and Executive Functions: Planning & Regulating

Jill K. Fahy, M.A.+30, CCC-SLP
Associate Professor
Eastern Illinois University
Department of Communication Disorders & Sciences
Learning Outcomes

After this course, participants will be able to:

- Identify features and profiles of executive function deficits in children with language impairment.
- Describe the role of language as a tool for reasoning, planning, and predicting.
- Identify therapeutic methods to elicit complex syntax for planning, problem-solving, and self-regulation.

What ARE the EFs?

- Monitoring, Appraisal, Awareness
- Flexibility
- Initiation & Persistence
- Strategic Planning & Organization
- Fluency of Ideas & Options
- Goal Determination/Recognition
- Inhibition, Suppression, Resistance
- Working Memory, Updating to WM
- Sustained, Selective, Alternating, Divided Attention

Verbal & Nonverbal

Related Yet Separable
How do we use EF Skills…. and Why do they Matter?

Be Deliberate, Relevant, Planful

- Self-regulate, in general
  - As opposed to being prompt-dependent from others
- Self-control responses, emotions, actions
  - Versus impulsively interfering with own goals, needs
- Adapt and shift, as needed
  - As opposed to being rigid, inflexible, ‘stuck’
- Generate strategic plans to novel, complex problems
  - As opposed to needing direction, trial-and-error
- Execute goal-oriented behavior
  - With internal direction and regulation
Be Contextual, Aware, Timely

- Read the room, situation, context, or needs
  - Attend, notice, monitor, adapt
- Monitor efforts for relevance, accuracy
  - Avoid unintentional inaccuracy, incomplete, dangerous
- Anticipate potential outcomes, needs, problems
  - Avoid problems, minimize risk
- Estimate time-required, passage of time
  - Avoid feeling overwhelmed, confused, anxious
- Initiate and persist with efforts, to accomplish
  - Avoid ‘life passing by’…. Continual cues and prompts

Essentially…

- Establish and achieve realistic goals
- Minimize unintentional problems
- Manage conflict, frustration
- Control social behaviors
- Apply knowledge to academic, vocational needs
- Persist despite intrusion
- Respond to unexpected changes

Given neurological wiring, maturation, experience
A Few Other Key Concepts:

- EFs are NOT the same thing as IQ
- EFs develop over the course of ~20-25 years
- Multiple, distinct EFs; yet overlapping, integrated
- Neural maturation is more than ‘just’ the frontal lobe

Progression & Stages of EF Development

Birth – Five: EXTERNAL Monitoring
- Simple Inhibition (Shifting)
- Sustained Attention (WM)
- Minimal Strategic Planning

Childhood (7-12): Shift to INTERNAL Monitoring
- More Controlled Inhibition
- Shifting Emerges Separate from Inhibition & WM
- Selective Attention/WM
- Simple Strategic Planning

Adolescence (13-15): Develop INTERNAL Monitoring
- Relatively Mature Inhibition
- Relatively Mature Shifting
- Alternating Attention
- Working Memory
- Complex Planning

Late Teen/Early Adult: Practice/Refine SELF-MONITORING
- Abstract Language, Social Perception, Verbal Reasoning
- Practice Using EFs in Complicated, Complex, Real-World Demands
Developmental Risks for EDF

- Fetal exposure to toxins, alcohol, drugs
- Birth-related neurologic trauma, complications
- Developmental trauma, stress, abuse
- Genetic syndromes
- Acquired & progressive neurologic disorders
- Comorbid mental health disorders
- Language disorders & Social-communication disorders
- Learning disorders
- Sensory/Processing/Motor disorders

More Specifically…

- EDF is a feature of
- AD/HD
- Autism Spectrum Disorders
- Specific Language Impairment
- Learning Disabilities (Verbal & Nonverbal)
- Dyslexia
- TBI
How are EFs and Language Related…?

*It is somewhat complicated…*
Relationship: EFs & Social Cognition

- EFs are ALSO applied to SOCIAL demands
  - Social attention
  - Self-monitoring
  - Emotional regulation
  - Response planning
  - Situational shifting
- Social cognition is ALSO applied to EFs
  - Notice situational
  - Interpret implied expectations
- Exact relationship is yet to be determined…….

EFs in Listening, Speaking

- Listening Comprehension
  - Attentional control, updating of working memory
  - Inhibition, shifting away from competing information
  - Inhibition, shifting from competing or ambiguous meanings

- Oral Expression
  - Attentional control, monitoring, revision
  - Working memory for syntactic planning, revision
  - Inhibition and strategic planning for syntax
  - Inhibition and shifting for semantic selection
EFs in Language Processing

- **Inhibition**
  - Resolve lexical & syntactic ambiguity (Khanna & Boland, 2010)
  - Support lexical and semantic processing (Khanna & Boland, 2010)
  - Language comprehension tasks (Berninger, Abbott, Cook, Nagy, 2017)

- **Updating WM**
  - Lexical and semantic processing (verbal WM) (Gathercole & Baddeley, 1990; Khanna & Boland, 2010)
  - Auditory and reading comprehension (Daneman & Carpenter, 1980; Roberts, Marinins, Felser, & Clahsen, 2007)
  - Sentence production / syntax processing (Slevc, 2011; Moser et al., 2007)

- **Attentional systems**
  - Processing of language, in multiple ways (Kurland, 2011)
Development of Language & EFs: Ages 4–7 (Gooch et al., 2016)

- Evaluated language and EFs in ~240 children
  - At age spans of 4-5; 5-6; and 6-7
- Language measures:
  - Receptive and expressive vocabulary
  - Sentence structure comprehension
  - Sentence structure repetition/use
- Nonverbal (visual) EF measures:
  - Visuospatial working memory
  - Visual scan/search with distractors
  - Motoric inhibition task
  - Visual inhibition task
  - Questionnaire for inattention, hyperactivity

Findings:
- Stability in language and EFs over the 3 years
- Strong concurrent relationships between the two, esp. at age 4
- Parent and Teacher ratings of attention and behavioral control were predicted by EFs, regardless of language
- Data did NOT support notion that language deficits “cause” EF deficits
- Data did NOT support idea that, at least ages 4–7, language or EFs causally impacted the other
- But perhaps processing speed…? Overlapping

Implications?
- Do Tx for both language and EFs?
- Still need data re: if Tx here can impact performance there
Development of Language & EFs: Ages 8–11 (Kaushanskaya et al. 2017)

- Evaluated 71 children ages 8–11, with typical language
- Language measures
  - PPVT-4; CELF-4; TOLD-I:4, Morphological Comprehension Subtest
  - Lexical-Semantic Composite: PPVT-4 + CELF-4 Word Classes-Receptive subtest
  - Syntactic Composite: CELF-4 Concepts & Following Directions subtest + TOLD-I:4 Morphological Comprehension Subtest
- Nonverbal EF measures
  - WISC-4 Perceptual Reasoning Index (nonverbal IQ)
  - Nonverbal inhibition – Flanker tasks, Go No-Go tasks
  - Updating/WM – n-back, Corsi block task
  - Shifting – Local/Global task; Dimensional Change Card Sort

Development of Language & EFs: Ages 8–11 (Kaushanskaya et al. 2017)

- NONVERBAL Inhibition
  - Predicted performance on Syntactic Composite
  - But not Lexical-Semantic Composite
- Nonverbal WM
  - Only a weak association with RLI on the CELF-4
  - Concepts & Following Directions + Word Classes + Sentence Structure
- Nonverbal Shifting
  - No significant relationships with language measures
- Implications?
  - Children with TL may be using NV inhibition for syntax analysis, and NV WM for receptive language tasks...
EFs and Communication: Adolescents

- Parent/Teacher and Self-Reported Ratings of EFs
  - Greater degree of EF problems (GEC) in daily life for adolescents with SLI, than Self-reported
  - Adolescents still developing accurate self-appraisal
  - Parent ratings -> deficits in EF skills for 57% of adolescents w/ SLI, as opposed to only 10% of adolescents with TL (Hughes, Turkstra & Wulfeck, 2009)
  - Neural networks still developing....
  - Disorders such as AD/HD, ASD, LD, SLI
  - All contribute to, have comorbid features of EDF

Academic Demands Increase...

- Rely upon high level language, EFs:
  - Expectation of advanced language for reasoning
  - Abstraction of ideas, interpretation, deduction
  - Requirements to differentiate, defend, interpret
  - Expectations to adapt, shift, integrate, apply
  - Cope with distraction, noise, change, unexpected
How do EF Skills Look in Children with Language Disorder?

Also a bit complicated…but some conclusions emerging

Children with SLI have difficulty

- **Updating Information in Working Memory**
  (verbal & nonverbal)

- **Inhibiting Responses and Behaviors**
  (slower, more errors; trouble resisting irrelevant meanings?)

- **Shifting Between Mental Tasks**
  (verbal & nonverbal)

- **Processing Speed**
  (for both verbal & nonverbal)
Children with SLI Perform LESS WELL in Certain EFs…

Than children with TL…

- Verbal & nonverbal sustained attention & attentional shifting (Kapa & Plante, 2015, for review)
- Verbal & nonverbal working memory, fluency, planning, and inhibition (Henry, Messer, Nash, 2011)
- Inhibitory control (Bishop & Norbury, 2005; Im-Bolter et al, 2006; Diamond, 2013; Miyake et al., 2000)
- Inhibition and cognitive flexibility (Pauls & Archibald, 2016)

Children with SLI Display Observable EF-use Deficits

- Adolescents with SLI rated by their parents as having statistically more EF deficits than typical
  - Yet the teens, themselves, presented with reduced awareness, rating their EFs as typical (Hughes, 2011)
- Preschoolers with SLI rated by their parents and teachers as having significantly worse
  - WM, planning, and organization, than peers with typical language (Trainor, 2012)
Children with “Low Level Language” also Display EF Differences

- Low-level language…?
  - Typical PPVT, but Below average in >1 CELF-4 Index
  - And Low-average CELF-4 Core Index
  - Statistically below mean for children with typical language
- Preschoolers referred for communication concerns
  - Parent & Teacher Ratings \( \rightarrow \) significantly worse Plan/Org, Inhibit, Emotional Control, than TL (Trainor, 2012)
- School-aged children ages 8–14 with suspected SLI
  - Parent & Teacher Ratings: EF profiles similar to SLI (Henry et al., 2011)

How We Use Language when Internalized

*The role of inner speech*....
Planful Inner Speech (Vygotsky)

PROBLEM DESCRIPTION:
(Ages 3-4)
Emotional comments on nature of problem.
REQUEST HELP
"it's too high"
"get my copter!!"

REFLECTIVE LANGUAGE:
(Ages 4-5)
TRIAL & ERROR commentary
Describe efforts during problem.
But not planful, or prescriptive
"getting it"

VERBAL PLANNING:
(Ages 5-7)
Language describes PLAN
Foundation for:
Self-talk, Self-help, Self-control
"get the broom handle & move the plant out of the way"

SILENT Inner Speech (Vygotsky)

AUDIBLE
Problem Description phase
States nature of problem out loud.

SUBVOCAL → INAUDIBLE
Reflective language
Commenting on actions during problem

INAUDIBLE
“Inner” speech
Verbal planning language
Supports planful, self-directed problem solving
How do you think it works?
Cheke, Loisel, Clayton, (2012)

<table>
<thead>
<tr>
<th>Type of Explanation</th>
<th>Child's Verbal Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Explanation</td>
<td>&quot;Green and Purple&quot; (age 4)</td>
</tr>
<tr>
<td></td>
<td>&quot;Dunno&quot; (age 4)</td>
</tr>
<tr>
<td>Description Explanation</td>
<td>&quot;Green makes water go down. Purple makes water go up.&quot; (6)</td>
</tr>
<tr>
<td></td>
<td>&quot;One tube makes it go higher, the other doesn't, dunno why.&quot; (7)</td>
</tr>
<tr>
<td></td>
<td>&quot;This one makes the middle rise, this one doesn't do anything.&quot; (7)</td>
</tr>
<tr>
<td>Inference Explanation</td>
<td>&quot;The purple one has a connecting pipe – pushes it down, makes it rise. The green one has no connecting pipe.&quot; (8)</td>
</tr>
<tr>
<td></td>
<td>&quot;Purple works, not Green one. There's water underneath – stops the pebbles, makes water rise in the middle tube.&quot; (8)</td>
</tr>
</tbody>
</table>

Self-Talk Supports Shifting, Inhibition

- Articulatory suppression during task-completion interferes with strategic planning, shifting in children with TL and also those with SLI (Lidstone, Meins, Fernyhough, 2012)

- Labeling the relevant dimension/classifier, in a sorting task, supports the ability to inhibit, override, and then shift efforts to adhere to new task-rules, in 3 year old children (Kirkham, Cruess, Diamond, 2003)

  - What's this one? Where does it go?
  - Inserting language to self-direct, inhibit, override, shift…
Self-Talk for Inhibition & Regulation

- Using self-talk to manipulate & mediate
  - 15 2nd grade children ages 7 – 9, referred for hyper/impulsivity
- Model then fade self-talk while performing variety of tasks which increased in difficulty, for error ID, shift, error-correct
  - Adult performs tasks while overtly self-talking
  - Child overtly self-talks
  - Child performs tasks with sub-vocalizing, then covert
- Findings:
  - Increased initial decision/planning time (reduced impulsivity) & reduced errors on scanning, planning tasks
  - Reduced errors on complex mazes (but so did attention group)
- Use inner speech to orient to task, monitor efforts, talk through efforts, shift efforts, self-reward (Meichenbaum & Goodman, 1971)

Self-Talk for Planning & Predicting

- Talk while you think & as you reason.
  - Use planning/predicting statements before you act.
  - It’s going to fall.
  - It’s too far away. I think I will run out.
- Ask and answer your own Socratic questions
  - HOW are you doing this? WHAT are you doing, specifically
  - WHY are you doing this?
  - WHAT WILL HAPPEN when you do this?
  - What is NEXT? WHY?
  - Let’s see what happens. So it MIGHT do that—let’s see!
  - I think it will STOP. What do YOU think? Let’s see!
Teaching Self-Talk

- Rules
  - Pick a specific EF skill deficit to target
  - Devise something short, simple
  - Model self-talk overtly, in context
  - Rehearse, repeat, retain
  - Enlist child’s use of self-talk
  - Make it visual, not just verbal
  - Infuse written versions into the context, environment
  - Gradually fade, but insert that opportunity for the mantra

---

Self-Talk Mantras

- Wait – What I am Working On?
- Wait – What’s my Plan?
- What’s My Goal?
- This isn’t working. I need to SHIFT
- Stop
- Think
- Plan
- Do
- Goal
- Plan
- Predict
- Do
- Focus
- Notice
- Find it
- Fix it
- Find
- Get
- Sort
- Use
- Say it
- Write it
- See it
- Do it
- Check it
- Fix it
- Plans Have STEPS
- What are my STEPS?
- I need help getting started
Pair Language With EF Skills?
And yet children with SLI are already at a disadvantage for using their language systems....

Reasoning:
Causation and Relationships

*Complex syntax and abstraction of meaning are required to use reasoning for PLANNING and PREDICTING*
Reasoning \(\rightarrow\) Prediction, Planning

- Classify via feature analysis, distinction
- Compare features to differentiate, contrast
- Identify differences in nature of items
- Identify differences in how items respond to action
- Determine relationships between items, actions, outcomes, impact
- In order to
  - Predict behavior of actions, efforts upon items, objects
  - Anticipate problems, implications of efforts
  - Prioritize order of actions

“Open the can of sauce with the pair of scissors”
Syntax to Predict & Plan: Conditional, Modal, Temporal

- If → Then
- Even if
- While
- Although
- Because of
- In order to
- So that
- Therefore
- Might v. Will
- Could v. Should
- After v. Before
- Unless
- Always
- Sometimes
- When
- Usually
- Never
- Occasionally
- Otherwise
- However
- And, But, Or
- Neither…nor

Representation of relationships & Prediction of behaviors

Do Not Forget About VERBS….

- Why?
  - Observed actions trigger verb-language networks
  - Read, thought, spoken verbs trigger motor networks
  - Specificity of action requires specificity of verbs
    - Verb → Action → Purpose → Control
  - Planful, predicted, deliberate behavior requires verbs
  - Avoiding anxiety, cognitive overload, plan-steps w/verbs
  - Make effort tangible using verb-phrases
  - Reduce guessing, increase predicting, ‘knowing’
  - Broca’s area and prefrontal cortex structures involved in action imitation, mirror neuron networks, mental representation of action/syntax/movement planning
Reasoning → Abstraction, Deduction

- Compare semantically-abstract features to differentiate, contrast, distinguish abstract ideas
- Rely upon deep semantic meanings, alternative meanings, to differentiate between abstract ideas
- Integrate disparate details into an overall gist by determining less-obvious patterns, similarities
- Use context to determine ambiguous, implied meanings, expectations, implications

In order to
- Deduce insight, implications without being told
- Infer implied information, form new concepts

“But it didn’t SAY that I was supposed to....”
Semantics to Differentiate & Deduce, Represent, Predict

- Superordinate categories
  - Class/Essential features
- Differentiate features
  - Compare features
  - Determine priority features
  - Exclude irrelevant features
- Explain relationships
- Explain exceptions
  - Always, sometimes
- Deduce patterns
- Deduce implied knowledge
- Form concepts
- Give exemplars of concepts
- Anticipate behavior of items, given concepts, features, patterns
  - *CAN we open a can of sauce, with scissors?*

Semantic Therapy

- Specify WHAT
- Clarify WHICH
  - Conditionally represent concepts, situations, items, objects
  - Semantically describe essential, differentiating features
  - Elaborate using adjective modifiers
  - Provide prepositional phrases to clarify
  - Employ relative clauses to differentiate
- Clarify HOW
  - Predict behavior of actions upon items, given features
  - Procedural how-to statements
  - Elaborate using adverb modifiers
Thinking & Planning Language

*Deploy syntax, semantics, reasoning…*

Thinking Language v. Guessing Language

- Reason
- Predict
- PLAN

Know…not guess
Strategize…not trial & error
Anticipate…not see what happens
Reduce risk & frustration
Work deliberately, efficiently
Develop Planful Language
(Mercer, Dawes, Wegerif, Sams, 2004)

- Conceptual Understanding (need vocab to describe, compare, contrast, classify)
- Predict/Hypothesize (language directed towards predicting; requires cause & effect, conditionals)
- Controlled Investigation of Hypothesis (need fluency to generate ideas, reasoning to organize, sequence, compare, select 'best')
- Discuss Outcomes/Conclusions (need language to characterize, explain, Why, therefore)

Repeat

Develop Exploratory Talk

- While executing tasks requiring solutions….
- Engage in joint discovery, collaboration, reasoning
  - Posing questions that require explanation, rationale, hypotheses, prediction, conditions (Mercer & Wegerif, 1999)
- Require specificity, clarify HOW
  - It’s that. Pour it in.
  - Pour all of the blue water into the tallest cup.
- Require defense, reasons WHY
  - Because it just will – I think it will.
  - Because if we pour it ALL in, then it HAS to be in the tallest cup. Also, we need the BLUE water because otherwise, it won’t show up in the tube.
Develop Metacognitive Self-Monitoring Language

- What am I doing?
  - Self-attention, Monitoring
- What is happening?
  - Attention to others, situations
- What do I need to be doing?
  - WM & Attention to goal
  - Reasoning & Planning
  - Inhibition & Shifting
- What is going to happen?
  - Reasoning & Prediction
  - Plan, Shift, Regulate

Problem Solving Therapy

*Use Hands-on, Novel Problem Solving Tasks*
Types of Problem Solving Tasks

- Hands-on Problem Solving (contextualized)
  - Require use of EFs
  - Solve hands-on tasks
  - Elicit intrinsic motivation
  - Natural consequences*
  - Can ‘see’ thinking & EFs
  - Requires novel planning
  - Requires shifting
  - Requires initiation, inhibition
  - Can ‘see’ predictions, results, implications, errors

- Verbal Problem Solving (decontextualized)
  - Verbal ‘what-ifs’ do not elicit EFs
  - Requires use of language skills
  - Demonstrate ‘knowledge’
  - Elicit theoretical replies
  - Elicit rote, learned ‘answers’
  - No actual consequences….
  - No tangible outcomes
  - No implications or real-time
  - Cannot ‘see’ predictions, results, implications, errors….

EF Planning & Problem Solving

- Provide tasks to elicit and scaffold thinking, reasoning, language, and EF skills (Fahy & Richard, 2017)
- Tx ‘materials’ are hands-on, novel, challenging tasks
  - Novel, yet rooted in life experience or familiarity
  - Challenging, yet achievable w/scaffolding (ZPD)
  - Should elicit intrinsic motivation, have face-value
  - Must require certain targeted EF and/or Language skills
- Tasks are not provided ‘to be completed’…but to elicit skills
  - Not there to ‘get a right answer’….
  - Not about ‘teaching’ how to do something….
  - How-to’s are not given….
Planning & Problem Solving: Goals and Tasks

- Work on 1-2 EF/Language goals at a time
  - Generate plan-steps/ideas/options?
  - Anticipate outcomes via prediction, causation, conditionality?
  - Prioritize plan-steps to avoid problems, allow for timely completion?
  - Independently initiate plan-steps?
  - Monitor/notice unintentional errors, incompletion, inaccuracy?
  - Shift/inhibit efforts to revise, re-plan, re-initiate?
  - Independently correct unintentional errors, oversight, inaccuracy?

- Select Task Outcomes, Constraints, & Materials
  - *See Task Ideas at end of Presentation
  - (Fahy & Richard, 2017)

Planning & Problem Solving: Outcomes, Constraints, Materials

- Flinker Task
- Outcome Requirement:
  - Make the cork FLINK at the ‘flinkage’ line
- Constraints:
  - Must ‘flink’ for at least 5 seconds
  - Must use ONLY the materials available
- Materials:
  - Required
  - Possibles
  - Irrelevants
Planning & Problem Solving: Manipulate, Sabotage, Allow Consequences**

- Strategically manipulate or withhold certain materials
  - To promote flexible thinking
  - To require planful intention before impulsively initiating
  - To require self-monitoring, noticing, requesting
- Allow natural consequences, failure, before scaffolding
  - Within reason, safety, tolerance
  - Elicit monitoring, error recognition, opportunity to adapt, revise
  - Elicit insight, awareness for need of strategies or practice
- Withholding 'help' can be stressful
  - If you tell, show, give, do → no opportunity to observe own EF use
  - If you tell, show, give, do → no opportunity to elicit own language use
  - (Fahy & Richard, 2017)

Planning & Problem Solving: Scaffold EF and Language Skills

- Use Guided Discovery learning principles
  - ‘Discover’ with the student…. Elicit ah-hah moments
  - Pose a colleague, learning, anticipating, prompting questions
  - Comment on use of EF and/or language skills, as they are used
  - Model self-talk and thinking out loud
- Ask Socratic questions to promote use of EF/Language skills
  - What plan are you working on right now?
  - How do you think you’re doing?
  - Tell me what you’re thinking about trying next?
  - How do you know THAT will work?
  - What might have gone wrong?
  - (Fahy & Richard, 2017)
So What About Language Tx?

Language

Executive Functions

Social Tx?

Executive Function Tx?

Language Tx?

Behavioral Control
Academic Success

Combination of approaches?
Goal Bank

Language-Reasoning-Planning Group

- Use word tools to think, plan, control, solve
- Generate potential ideas, options, as verb statements
- Use precise language to articulate plan-steps
- Use complex syntax/semantics to express conditions
- Use complex syntax/semantics to predict outcomes
- Inhibit impulses long enough to plan before doing
- Attend and monitor language/efforts/outcomes
- Collaborate with each other to form ideas and solve problems
Planning & Predicting Goals

- Generate plan-steps above baseline of…
  - Verbal fluency, divergent thinking
- Generate sufficient plan-steps to accomplish…
  - Relevance, necessity, reasoning
- Break large tasks into component parts/plan-steps
- Prioritize plan-steps with XX% accuracy
  - Reasoning, if-then, predicting outcomes
- Predict outcomes of plan-steps…
  - Syntax, modals, conditionals, subordination
- Defend predictions for outcomes of plans using …
  - Syntax, conditionals, causation, subordination

Monitoring Goals

- Sustain/selectively attend to efforts sufficient to identify XX% of unintentional errors
- Identify XX% of unintended errors due to incomplete, inaccurate, irrelevant, overlooked….
- Predicted task-accuracy will match Actual task-accuracy…
- Use self-talk statements to focus attention/task monitoring…
- Use self-talk statements/dialogue to shift efforts…
- Use self-talk statements to support timely/specific initiation…
- Use self-talk statements to inhibit efforts until strategic plans…
- Use compensatory strategies XX% of time given XX support…
**Complex Syntax Goals**

- Generate syntactically complex procedural statements clarifying HOW and WHY...
- Using conditional clauses..., clarify circumstances/requirements for....
- Using subordinate clauses..., clarify how
- Given 2 written sentences, combine ideas into compound sentence using coordination which retains given relationships
- Given 2 written sentences, combine ideas into complex sentence using subordination that retains given relationships
- Edit/clarify planning-statements to minimize listener-confusion...
- Edit/clarify syntax in procedural statements to minimize listener-confusion...

**Complex Semantics Goals**

- Provide essential, descriptive features of items sufficient to distinguish between like-items
- State common themes among facts for purpose of recognizing patterns, deducing relationships between ideas
- Integrate semantically-related details into coherent concepts...
- Generate semantically specific procedural statements clarifying WHAT and WHICH
- Clarify WHICH by using elaborated noun phrases, appositives, prepositional phrases, adjective clauses...
- Formulate procedural/explanatory utterances with dependent clauses clarifying WHICH (given similar, related items)
- Develop verbal reasoning through use of categorization, differentiation, comparison, and explanation of relationships
Complex Hands-on Tasks Requiring Language & EFs

- Balloon Car-water bottle, straw, tape
  - https://www.instructables.com/id/Balloon-Powered-Car/
- Marble run with only TP tubes, paper towel tubes
- Popsicle stick bridge-test structural integrity of weight bearing
- Tornado in a jar/tornado tube-2-liter bottles, duct tape
- Making an electric motor, 9-volt battery/copper wire
- Compiled by Rud Watson, M.S., CCC-SLP

---

Complex Hands-on Tasks Requiring Language & EFs

- Potato battery-wires, something that operates on DC-
- Making a bouncy ball with a recipe-recipe here:
  - https://www.pinterest.com/pin/431571576790440060/
- Paper rocket launcher-PVC pipe (L shaped, tape, 2-liter bottle)
  - https://www.instructables.com/id/Easy-to-build%252c-easy-to-use%252c-water-bottle-launcher/
- Balloon hovercraft-balloon and a CD/DVD
- Compiled by Rud Watson, M.S., CCC-SLP
Complex Hands-on Tasks Requiring Language & EFs

- Balloon zip line, rocket: transport - must deliver item-
  - https://discoverexplorelearn.com/balloon-rockets/
- Make a compass-cork, needle, water
- Paper airplane design - trial & error to achieve furthest distance
  - https://www.foldnfly.com/#/1-1-1-1-1-1-1-1-2
- Toothpick tower (playdough & toothpicks) can it withstand an earthquake, earthquake table
- Popsicle catapult - popsicle sticks, tape, spoon, rubber bands
  - https://childsci.org/popsicle-stick-catapult/
- Compiled by Rud Watson, M.S., CCC-SLP

Complex Hands-on Tasks Requiring Language & EFs

- Newton’s Cradle-popsicle sticks, tape, string, marbles
  - https://www.instructables.com/id/An-Easy-Newtons-Cradle/
- Water Mover - move water w/items w/out spilling or pouring
  - various items, planning and organization task
- Summer S’more Oven - pizza box, aluminum foil, plastic wrap
- Space Lander Mission
  - https://www.pinterest.com/pin/555561304031975329/
- Keep a paper towel dry under water
  - https://www.pinterest.com/pin/252553491590732094/
- Pringles Ring
  - https://www.pinterest.com/pin/103442122678623169/
- Compiled by Rud Watson, M.S., CCC-SLP
Complex Hands-on Tasks Requiring Language & EFs

- Make a periscope - CD, TP tubes, tape
  - Complex: https://sciencetomaker.org/the-periscope/how-to-make-a-periscope-with-cd-or-dvd/
  - Less complex: https://buggyandbuddy.com/homemade-spectroscope/
- Non-traditional Flying Machine
  - https://www.adabofgluewilldo.com/airplane-for-kids/
- Egg transport vehicle - water bottle car that can withstand crash
  - https://buggyandbuddy.com/stem-kids-egg-drop-project/
  - Egg protection device - goes within vehicle to protect the egg
  - https://buggyandbuddy.com/stem-kids-egg-drop-project/
- Tiny battery dancers - AA battery/copper wire
  - https://www.youtube.com/watch?v=XiILC0uVCQ0
- Putting a balloon in a jar without touching or pushing it *requires FIRE
  - https://www.education.com/science-fair/article/balloon-bottle-air-pressure/
- Popsicle Harmonica - rubber bands, p-sticks, straw, scissors-
  - https://frugalfun4boys.com/sound-science-kids-make-craft-stick-harmonica/

Compiled by Rud Watson, M.S., CCC-SLP
References


References (continued)

References


References


References


