# LAMP:

Language Acquisition through Motor Planning

*AAC Strategies for Promoting the Development of Communication
for Individuals with Autism Spectrum Disorder*

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INTRODUCTION TO PROGRAM COMPONENTS

LAMP utilizes five key elements as the foundation for language learning in the child with ASD.

"Readiness to Learn" and "Shared Focus" provide the foundation upon which the skills leading to "Language Connections" are built. When these two skills have been addressed, the child is able to benefit from further training. Next, consistent motor patterns are learned, and these motor patterns result in the device speaking. The message spoken by the device provides the child with auditory feedback, and is then systematically met with natural consequences in the environment. The cumulative result of these components is the establishment of Language Connections.
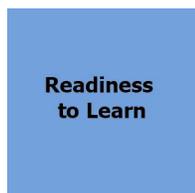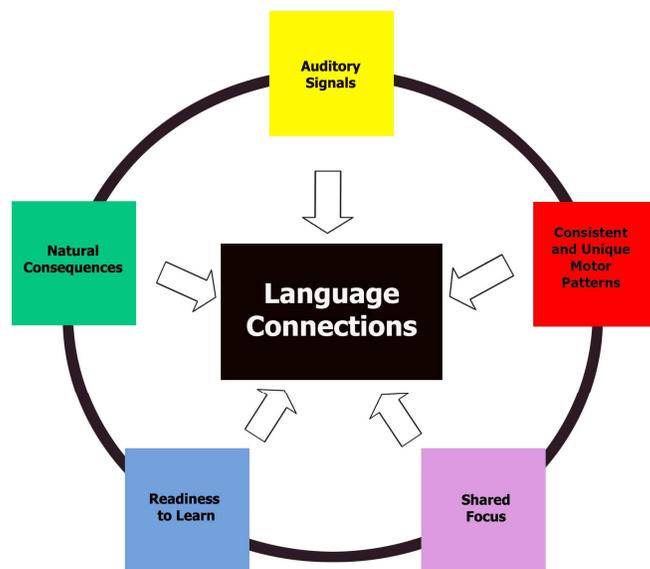
READINESS TO LEARN

Some children with ASD need to be calmed in order to be in a state of readiness to interact. Other children need to have their level of alertness increased to be ready to learn. In either instance, the child must be ready at emotional and sensory levels before learning can occur.

SHARED FOCUS

The child must have a shared focus with the adult(s) working with him/her, with the objects to be used in the activity, and with the AAC device. Designing intervention that is child directed, while therapist guided, better ensures that the child will be interested in and focused during the learning.

CONSISTENT AND UNIQUE MOTOR PATTERNS

Consistent and Unique Motor Patterns

The motor patterns used to "speak" with the AAC device must be consistent and unique. Each consistent pattern of one, two or three hits on the AAC device must always result in production of a unique word. These motor patterns are meant to reflect the consistent and unique motor patterns that result in the production of speech. The vocabulary sets in **LAMP** are organized to maintain consistent and unique motor patterns.

AUDITORY SIGNALS

Auditory Signals

Intersensory input from the vestibular, proprioceptive, and auditory systems is critical for the development of speech and language (1989, Windeck & Laurel). The speech output produced by the AAC device provides critical auditory information to the child. The child hears himself/herself producing the word while experiencing the motor pattern. The adult models speech by repeating the word, but the child is not required to imitate the word. The auditory output stimulates the child's auditory system, providing auditory feedback with the motor response, which may later stimulate the child's natural attempts to imitate the auditory output he/she gets from the AAC device and the auditory feedback from his/her communication partner.

NATURAL CONSEQUENCES

Natural Consequences

Any attempts to communicate should have natural consequences. These consequences are auditory/verbal, visual, and social. After speaking with the AAC device and hearing the auditory output, the child sees a response, which is a natural consequence, from the person with whom he/she is interacting. For example, the child says "more," and the adult blows more bubbles. The child sees the adult respond to "more," hears the adult say "more," and sees/feels the resulting bubbles. Natural consequences, strong in visual reactions, are critical in the language learning process.

LANGUAGE CONNECTIONS

The AAC device is a tool that allows the child to "babble" and learn about language. For example, after saying "more" to get bubbles, the child might think that pressing the key for "more" means "bubbles." A beginning talker might make the same conclusion. However, in another instance what the auditory signal means when the child says "more" and gets more juice, the meaning of "more" is revised by the child.

As the child learns with the AAC device, he/she is learning consistent motor patterns that result in an auditory signal. Depending on the natural consequence triggered by the auditory signal, the child may modify his/her perception of what the auditory signal means.
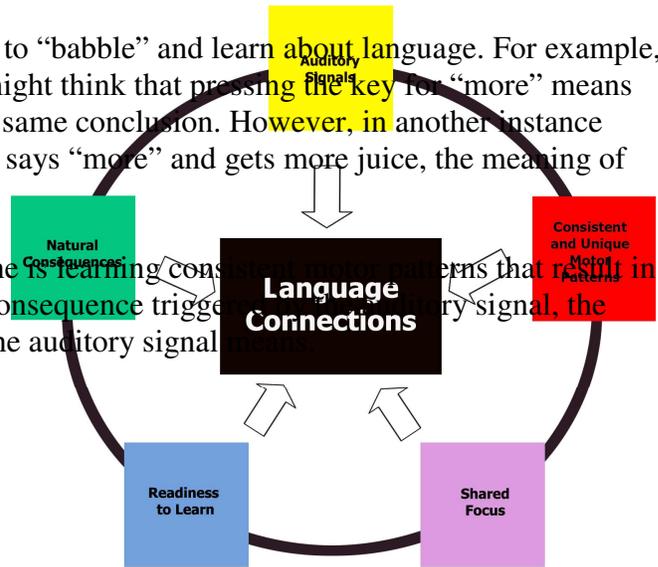
THERAPY TECHNIQUES AND STRATEGIES

Evaluation: A comprehensive evaluation and/or profiling of the child should be completed before starting this intervention. The following information is needed about the child: Motor planning, muscle tone, and coordination; perceptual motor capacities; visual spatial abilities; and sensory modulation, including vestibular, tactile, and proprioceptive. It is the role of an occupational therapist to profile the child's individual differences based on observation, history, and specific evaluations.

It is the role of a speech-language clinician to profile the child's speech, language, and communication abilities. The following information is needed about the child: past and current speech abilities; receptive language; expressive language; pragmatic development; and communication interaction style. A Communication Form/Functions Profile and Play Interests Inventory should also be completed. See Appendix B and C for a copy of these two forms.

Readiness to Learn

READINESS TO LEARN

Preparation to Learn: Prior to treatment with the AAC device, the child might need calming or alerting.

Calming activities include

➢ slow repetitive movements like gentle swinging or rocking;

➢ proprioceptive activities, particularly resistive "heavy work" like carrying, pushing, pulling, lifting, squeezing, climbing, or hanging on;

➢ deep pressure, like brushing, massage, being wrapped, or being squeezed;

➢ oral motor activities, like chewing, blowing, or sucking; and

➢ quiet sounds, voices, or rhythmical music.

Alerting activities include

➢ quick, erratic, and unexpected movements, like swinging, rolling, bicycling, dancing, spinning, or bouncing;

➢ oral motor activities (like eating something sour, crunchy, or bitter); and

➢ loud noises, voices, or music.

Sensory Levels while Learning: Select activities appropriate for the child's level of sensory functioning. The child needs to accept participation in the activity if he/she is expected to use the AAC device to request or sustain the activity. If it is necessary to force the child to interact and use the device, the child may be telling you that the activity is not working. Don't force the child to participate. Either modify or stop the activity altogether.

SHARED FOCUS

Child-Directed: Ideal intervention should be child-directed. When the child chooses the activity, then the child is more motivated and more likely to put forth the effort needed to learn something new. Spontaneous, child-led intervention encourages the child to communicate naturally, while adult or therapist structured and engineered activities tend to promote compliance. Following the child's lead instead of a lesson plan or specific routine produces the kind of communication that generalizes and grows naturally.

> ➢ Follow the child's lead: Watch for what interests the child and use that interest to create a meaningful language learning experience. In the beginning, it does not matter what the child is doing, whether he/she is picking up or dropping objects, running back and forth, or playing with a toy. It is essential to follow the child's lead and make it interactive.

> ➢ Join in with the child: Shared focus develops through interaction. Through your own affect and actions, court the child into letting you engage with him/her. Watch for a signal that suggests that he/she is interested in what you are going to do. Don't interrupt the interactive process as long as the child is continuing to participate.

> ➢ Build on the child's interest: Once you have joined the child, build on that interest and find ways to expand the child's communication. For example, the child might have been interested in swinging. You joined in the swinging by pushing him/her after he/she asked for "more" with the AAC device. Build up the interaction by showing the child how to say "fast" or "slow" and then adjust the tempo of the swinging accordingly.

> ➢ Carefully use barriers: The use of barriers can be an effective way to help the child use communication to solve the problem. Barriers could involve "gentle obstruction" when you block his/her way or put something in the way of whatever it is he/she wants. It could also involve doing something the wrong way so that he/she has to correct it.

> ➢ Let the child make the moves: It is often necessary to let the child make the moves during the interaction so that he/she is not overwhelmed. For example, you may offer a child a simple wind-up toy, which is rejected. However, if you place the toy near by, in his/her lap, or even in his/her pocket, the child might be interested in it. Being indirect is less likely to trigger avoidance and rejection.

Surprising and Novel: Capture the child's attention by doing surprising and novel things. The child may be more compelled to respond because you are not acting in a normal or predictable way. Think about what you tend to do over and over again, and do it differently.

Purposeful and Intentional: Many children with ASD lack the motor planning and/or ability to initiate purposeful behaviors. For these children, treat whatever the child is doing as intentional and purposeful. By giving the child's every move your attention as if it is the most important thing

in the world, your interest and energy conveys to the child that what he/she is doing is meaningful and will get a response.

Use of Movement: Movement helps maintain a shared focus and also allows language to be used more easily. Be prepared to move, providing the child with a full compliment of appropriate sensory input. Use activities that lend themselves to the use of vocabulary that helps the child direct movement, continue movement, and/or stop movement. The vocabulary recommended in this training package promotes movement and active learning.

Consistent and Unique Motor Patterns

CONSISTENT AND UNIQUE MOTOR PATTERNS

Motor plan: LAMP was developed with two "levels" of motor planning. Level 1 requires a single movement before the word is spoken by the device. Level 2 requires two movements before a word is spoken. Both levels were developed with consistent and unique motor patterns for each word produced. Use the program that best matches the child's current abilities. The motor plans for Level 2 simply add a movement to the end of each motor plan from Level 1. Motor plans learned at Level 1 never need to be unlearned if it is determined that Level 2 would have been a more appropriate starting point. Another movement is simply added to the end of the originally learned movement.

Unity® vocabularies were used because they support a consistent motor plan that builds in a systematic fashion.

Pattern not Metaphor: Children learning to communicate with LAMP learn how to say the target words without initially learning the symbol or the association of the symbol to the word. For example, the word "go" shows a frog jumping. Initially, the picture and metaphor behind the association are irrelevant. The child with ASD who is significantly language impaired learns how to say, "go" as a motor pattern or manipulative act, not a linguistic metaphor. The child is not asked to scan the overlay and find the picture that means "go." Rather, he/she is guided in completing the motor pattern. The pattern is learned and becomes automatic. As the child's language develops, he/she may learn the association and meaning behind the picture, but knowing the meaning and association is not necessary to begin talking with the AAC device.

Device Position: During the initial stages of motor learning, the AAC device needs to be in the same location relative to the position of the child. For example, if the AAC device is placed at midline and the child is using his/her right hand to execute the motor pattern to say "go," the child would be moving his/her hand slightly to the right of midline to the location of the frog icon. The next time you work with the child, you do not want to put the device way off to his/her left, which would then require him/her to move his hand across midline. During the early stages of learning, the device needs to stay in approximately the same position relative to the child's position.

Random Selection and Perseveration: Some children are distracted or overly challenged by the many pictures and choices presented on an AAC device. Others may perseverate on a key, with perseveration possibly serving a communication function for the child. Before attempting to curb the perseveration, determine whether or not the perseveration is serving a useful function. Work through whatever may be triggering the perseveration, such as sensory overload. If continuing

perseveration is a roadblock in the learning process, the key on the AAC device can be temporarily hidden.

Many children may be more successful if the number of keys available to them is limited. In some cases, hiding most of the keys may be necessary, but other children may be able to handle having a full display. Language that is not needed during the activity can be hidden on dynamic devices such as the Vantage. Hiding unused keys reduces random selections, promotes learning of the motor pattern, and provides opportunity for greater success. Since activities need to be child-directed, hide keys as needed in the activity, modifying and adjusting the vocabulary available based on the needs of the child and the activity.

It is appropriate to show some words to evaluate the child's emerging motor automaticity. It is also valuable to show some keys to allow the child opportunity to learn something new from hitting an incorrect key. An error in key selection is a powerful lesson when the communication partner reacts with natural consequences or even surprising and exaggerated reactions.

Prompts: The child using LAMP will be provided with physical and visual prompts when necessary to promote success.

Physical prompts start with hand-over-hand assistance, with the adult's hand placed over the child's hand. The child might need assistance with finger isolation, but he/she needs to feel his/her own finger touch and press on the appropriate key. As soon as possible, decrease the physical assistance, moving back to an arm prompt or shoulder prompt.

As the child requires fewer physical prompts, try using only a casual visual prompt, such as pointing to the device or a key. For some children using light prompts, such as flashing a light on the key can be distracting.

Some children will require a team of people working together in order to provide the physical and/or visual prompts needed, followed by the natural consequences. One person may need to provide physical assistance to the children while being as quiet as possible, while another person does the activity with the child, providing the appropriate visual prompts and natural consequences. One person might also need to hold the device for the child. An ideal team might consist of an occupational therapist, who is aware of the sensory needs of the child, along with a speech clinician or teacher who is trained in use of the AAC device and appropriate language intervention strategies.

Children with ASD tend to become quite prompt dependent. Consequently, be aware of the prompts you are using and use only as necessary to ensure success.

Developing Automaticity: It is critical that the child's use of the AAC device become as automatic as natural speech. The child's selection of words must be rapid and without conscious thought to ensure that real language processing is taking place. This type of rapid, automatic use of words develops through repetition of consistent motor patterns and repeated manipulation. Automaticity is developing when movement to the key is fast with little to no visual scanning and with limited physical assistance. Some children, because of their motor planning problems, continue to need some type of physical assistance, such as a tap on the shoulder, in order to initiate movement of any kind.

Imagine the child's first intervention session with the device. It is a session of approximately 20 minutes. The goal for this session is to see some emerging automaticity and purposeful use of three new words, "go," "come," and "more."

In the session, the words "go" and "come" are used so the child can direct an adult. Keys are hidden, allowing the child to select only those two words. The child says "go" to make the adult go away and "come" to make the adult come back. The child is interested in this for ten minutes. Then another activity is introduced, where the child asks for "more" bubbles, "more" back rubbing, and "more" jumping on a trampoline. Now three keys are available to the child. This activity continues for another ten minutes. Now the hidden keys are shown and the adult tries to re-initiate the "go and come" game. If the child can quickly go to the words "go" and "come," then automaticity is beginning to develop. If not, more work using hidden keys may be needed.

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Auditory Signals
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AUDITORY SIGNALS

Voice Selection: "Kit" is the most popular voice for children of either gender. However, a different voice can be selected if necessary. The voice used has not been a significant factor with the children who have used this strategy.

Volume: Adjust the volume of the device according to the child's auditory sensitivity. The volume level of the device has not been a significant factor with the children who have used this strategy.

Speech Modeling: During intervention, provide a short, simple language model. Speak precisely and slowly, yet naturally. The child is encouraged to imitate the word he/she just said with the AAC device, but it is not required. The verbal reinforcement provided (e.g., "you said 'go', here I go") also helps to encourage later word approximations by the child.

Verbal Prompts and Reinforcement: During the initial stages of intervention, provide very restricted to NO verbal prompts to reduce the amount of auditory input the child has to process. Do not clutter the interaction with verbal prompts that may not be understood by the child or that encourage unwanted verbal prompt dependency. Avoid saying things like, "press the picture," "point to the frog," or "how do you say 'go'?" It is better to say nothing at all than assault the child with excessive verbiage.

Restricting verbal prompts also helps avoid the tendency for the children to become "key pushers" – those children who keep pushing keys on the device until they find what satisfies you. Instead, provide physical prompts with no more than the word that the device will produce when the key is selected. For example, when directing an adult to pretend to run away by using the word "go," direct the child's finger to the symbol for "go" while you say "go," using appropriate intonation (e.g., go?, GO!). After the child communicates with the device, provide natural verbal reactions and reinforcements. Animated speech and compelling vocal sounds help to draw the child's attention, maintain a shared focus, and communicate other messages, such as excitement, disappointment, surprise, or disgust.

NATURAL CONSEQUENCES

Natural Consequences

Natural Reactions: The activities and words used in the intervention should result in natural consequences, with an emphasis on visual reactions. For example, "go" has a natural visual reaction, while "Wednesday" does not. "More" has a natural visual reaction, while "red" does not.

Positive and Animated: The people with whom the child is interacting should respond to the child in a positive and animated manner. Pretend activities can be useful and promote imaginative play. This helps maintain the shared focus and involvement of the communication partner with the child.

No Mistakes: No matter what the child selects on the AAC device, the rule for the communication partner is RESPOND, RESPOND, RESPOND. If the child provides the anticipated message, consequate it accordingly. When the message is incorrect, be sure to respond appropriately to the word that was spoken. Provide a natural consequence to whatever the child said with the AAC device. If the child meant to say "go," but instead said "eat" and there is no food available, then pretend to eat something, animating yourself by making loud eating noises and a big gulp at the end.

LANGUAGE CONNECTIONS

Vocabulary Taught: Initial intervention focuses on words that are relative to the activity selected by the child or the child's likes and dislikes. Select words that communicate action (verbs) or which can be used to continue an action. Consider starting with the following words because they have broad meaning and can be used during many different activities: *more, go, come, stop*. Based on the child's interests, add action words more specific to the activity: *eat, drink, jump, push, swing*. A general rule of thumb is teach words that have an obvious action and referent.
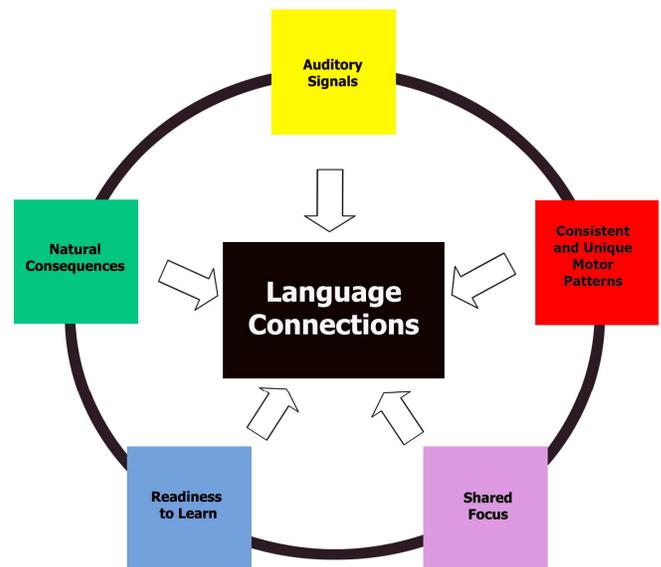
Rapid Generalization: The idea of generalization is that a word can be used in multiple contexts with variations of meaning. Rather than doing the same activity over and over, there needs to be a conscious effort to build flexibility in language meaning and use to prevent the child from thinking that a word can only be used in a specific setting to mean just one thing. For example, "go " has more than one meaning and needs to be used in varied situations. For one child, "go" might be initially used to "go flush the toilet (the thing the child really loves to do), then "go" to make the therapist go away, "go" to be pushed on the swing (another favorite passion of the child), and "go" to use the toilet. In the initial session, "go" needs to be rapidly generalized to mean more than one thing. One of the generalizations should focus on immediate, functional use. For example, use "go" in order to leave with mom after the intervention session is completed.

Earlier, the example was given of the child who was taught to say "go" and "come" in the initial therapy session (see Developing Automaticity). In order to generalize those two words and make them functional in the child's routine, the child is told to go back to class, but the door is blocked. The child is shown how to say, "go" to ask to leave and "come" to have the teacher's aide come with him. The use of "go" and "come" allows the child to have another way to control his own activities as well as the activities of others.

Multiple Facilitators: In the initial therapy sessions, it helps to have at least two people to facilitate interaction. One person helps with the modeling and hand-over-hand use of the AAC device and another person reacts and provides the natural consequences (e.g., "go"). Reverse roles periodically to encourage generalization to additional communication partners. Involve as many as possible of the child's natural communication partners in the intervention sessions.

Non-Therapy Settings: This therapy technique requires some intensive, early intervention before the new language skills can easily be used in other settings. Consistent success in the therapy setting sets the foundation for successful use in other settings. Have the family or classroom personnel join the therapy setting to assist in the generalization to new people and new environments.

FUTURE CHALLENGES

The child with autism who has learned to communicate using LAMP continues to face many communication, sensory, motor, and relationship challenges. The on-going language challenges to be faced include limited generalization, expansion of vocabulary, growth in communicative functions, syntax and grammar development, and plateaus in development of spontaneous language interaction. For most children with ASD, the communication gains in using LAMP have significantly improved their speech and language development.

SPECIFIC INTERVENTION STEPS

DEVICE INTRODUCTION

During the initial stages of intervention, it may be necessary to limit use of the AAC device to a controlled setting. If possible, plan for one to five intensive therapy sessions before introducing the device in other settings, such as a classroom or home. As the child is gaining success in use of the device, introduce more use of the device in less controlled settings. The introduction of the device into these settings will be dependent on a wide range of variables, including the skills and attitudes of the communication partners and the degree of simulation in the environment.

VOCABULARY

The first words introduced in LAMP are core vocabulary and are carefully selected to represent a variety of communicative functions. These words are divided into small sets of words. Additional Extended Vocabulary pivots off of these words. For example, Set 1 includes the word "more." "More" will be taught using all the principles previously outlined to encourage generalization of the vocabulary so that "more" might be used to ask for more pushing on a swing, more food, more drink, or more deep pressure. The words for the objects or actions of which the child wants "more" will be highly personalized. These words will be added to the device as needed to become part of the child's ever growing extended vocabulary.

Many children who have experienced the LAMP approach have become functional speakers and no longer require AAC. However, not all children using LAMP are going to become functional speakers. If not, they will have an AAC vocabulary system that provides a structure to continue expanding their vocabulary as needed.

VOCABULARY SETS

The following vocabulary sets were developed to assist you in getting started. They should be used with caution. Please remember that your implementation should be focused on the child's interest, and if Set 1 vocabulary does not match what the child is doing, it should not be used at the first session. In that situation, read on down the list of vocabulary sets, and select a set that is a better match for the child on that day, or select vocabulary from the information in Appendix D. You should continue to develop additional vocabulary sets that are pertinent to the child, referencing the vocabulary lists in Appendix D.

Set 1	Set 2	Set 3	Set 4	Set 5
More	Eat	Help	Hi	Turn
Stop	Drink	Come	Good-bye	Get
Go	Don't/Not	Want		Need
		That		

For the beginning communicator, the vocabulary included in these sets provides powerful single word utterances. When the child is using some of these words as single word utterances, it is important for you to model expanded utterances. This can be done using speech, but it is also helpful to model the expanded utterances on the device.

You will find that you can model two word utterances by combining words included in the vocabulary sets. Examples include "Need help," "more eat," and "Not stop" or "Don't stop."

VOCABULARY FOR EXPANSION

Vocabulary for Expansion consists of suggested words that work well with the sets of vocabulary to expand to additional two word utterances.

The following word are suggested for expansion:
    Pronouns: I, you, it
    Colors
    Foods
    Toys
    Drinks

INTERVENTION GOALS

The following goals, which were developed for the sets of vocabulary, are provided as an example. You are encouraged to use them as a model for developing goals for your vocabulary set.

All goals written are based on the following conditions and measurement standards:

Condition: The child is engaged with the facilitator(s) in activities appropriate to the child's readiness to learn, are motivating, and are of interest to the child. The communication attempts of the child result in natural consequences.

Measurement Standard: The goal is considered met when the child consistently communicates the appropriate word without visual, verbal, or physical prompts during three intervention sessions.

Measurement Tools: The facilitators will measure the child's progress using observation checklists, videotapes, and data from the Language Activity Monitor (LAM).

Goals for Set 1 (More, Stop, Go)
    The child will …
1. Say "more" to request at least five favorite objects or activities (e.g., more swinging, more drink, more food).
2. Say "more" + OBJECT to request favorite objects.
3. Say "more" + ACTION to request favorite activities.
4. Say "stop" to cease at least five different activities being done with him (e.g. stop swinging).
5. Say "stop" to cease an activity being done by the communication partner, which did not involve a specific action being done to the child (e.g., stop the communication partner from pretending to sleep).
6. Say "stop" + ACTION to cease an activity.
7. Say "go" to cause at least five different actions (e.g., start the music, leave the room).

Goals for Set 2 (Eat, Drink, Don't/Not)
    The child will …
1. Say "eat" to request at least five different foods.
2. Say "eat" + OBJECT to specify a request.
3. Say "eat" to cause someone else to eat or pretend eating.
4. Say "eat" + OBJECT to specify a directive.
5. Say "drink" to request a least three different drinks.
6. Say "drink" + OBJECT to specify a request.
7. Say "drink" to cause someone else to drink or pretend to drink.
8. Say "drink" + OBJECT to specify a directive.
9. Say "don't" to indicate protest or negation + "eat," "drink," "go," or "stop."

Goals for Set 3 (Help, Come, Want, That)
The child will …
1. Say "help" to request assistance with five problems or difficult tasks.
2. Say "help" to state a desire to help someone else.
3. Say "help" + ACTION to moderate a help activity (e.g., help go, help more).
4. Say "help" + PERSON to moderate a help activity (e.g., help me).
5. Say PERSON + "help" to moderate a help activity (e.g., you help, I help).
6. Say "come" to cause a communication partner to come towards or with the child.
7. Say "come" + MODIFIER to moderate a come activity (e.g., come here, come in).
8. Say "want " to make a request.
9. Say "want " + "more," "go," "stop," "eat," or "drink."
10. Say "that " to make a request or establish shared focus.
11. Say "eat " + "that," "drink" + "that," or "want" + "that."

Goals for Set 4 (Hi, Good-bye)
The child will …
1. Say "hello" to greet a familiar person.
2. Say "good-bye" when parting from a familiar person.

Goals for Set 5 (Turn, Get, Need)
The child will …
1. Say "turn" + "on" to direct the action of another person or describe his/her own action.
2. Say "turn" + "off" to direct the action of another person or describe his/her own action.
3. Say "get" to direct a facilitator to get a desired object.
4. Say "get" + "it" to direct a facilitator to get a desired object.
5. Say "get" + "that" to direct a facilitator to get a desired object placed at a distance away.
6. Say "get" + "this" to direct a facilitator to get a desired object placed nearby.
7. Vantage Unity 45 Single Hit: "my turn, "you turn."
8. Say "need" + any appropriate previously learned vocabulary item.

PREPARATION FOR INTERVENTION

When you have completed the evaluation, it is time to prepare for intervention. The first step is to select the Unity vocabulary that is most appropriate for the child. The following chart may be helpful in selecting vocabulary.

DEVICE	UNITY	LOCATIONS	SEQUENCE	DESCRIPTION
Vantage	Unity 45 One Hit	45	None	40 Single Hit core words; additional vocabulary available through additional key selections
Vantage	Unity 45 Full	45	Mostly two hits; some three hits	Approximately 1950 words, sentences, and phrases
Vantage	Unity 84 One Hit	84	None	67 Single Hit core words: additional vocabulary available through additional key selections
Vantage	Unity 84 Sequenced	84	Mostly two hits; some three hits	Approximately 3300 words, sentences, and phrases

When selecting the vocabulary, don't underestimate the child. It is better to start with a vocabulary that provides more than the child is capable of at this time than it is to start with a vocabulary that is a good match for the child's current skills. All three of these vocabularies have been implemented successfully with children with ASD who are just beginning communication intervention.

LAMP can be implemented successfully with other Unity vocabularies, such as Unity 84 One Hit, Unity 84 Sequenced, and Unity 128 Sequenced.

The following steps will help you prepare the device for your first session. If you need assistance to complete these steps, see the Quick Reference Guide for Vantage (Appendix J).

1. Fully charge the device.
2. Go to the User Area in the device that contains the vocabulary you selected for use.
3. Use the Speech Menu on the device to select an appropriate voice for the child.
4. If you are using a Vantage, you may want to turn embellished icons off because this minimizes visual change on the display. Turning embellished icons off is helpful for individuals who are distracted by visual change, have difficulty attaching meaning to relatively abstract icons, or for those having strength in motor memory.

5. If you feel the child requires a visually simplified display to ensure success, consider hiding keys. You may want to hide all keys other than your target vocabulary set, or you may want to hide only a limited number of keys, particularly keys containing tools. If you hide keys, be prepared to show keys that will be needed to provide child-focused intervention.

OPPORTUNITIES FOR COMMUNICATION

Opportunities for communication can be created when the unexpected is introduced within an expected routine. Therefore, you must first establish a routine and model the target vocabulary before expecting the child to produce the new vocabulary.

Opportunities for communication can also occur when the child can see a desired object or activity, but needs your assistance to access it. Frequently, you will need to give a "taste" of the desired object before expecting the child to request the item.

Set 1: More, Stop, Go

1. Engage the child in physical activity in which you provide the "power." For example, push the child in a swing, bounce him/her on a therapy ball, or push him/her in a wagon. Establish the routine of "stop" and either "go" or "more." After the child understands the routine, interrupt the routine and wait for child to request action.
2. Manipulate a small vehicle around the child. Have the child direct the movement through the use of the target words, thus allowing him/her to cause the car to crash, drop off the table, or stop. Once the child has directed the car to stop, do not move it until the child directs you to do so.
3. Pair exaggerated physical activity with "go" or "more." Cease the activity in response to "stop." Do not resume the activity until the child says "go." Feign exhaustion to encourage the child to say "stop."

Set 2: Eat, Drink, Don't/Not

1. Give the child a taste or sip of the desired item. Do not offer more until the child says "eat," "drink," or "more."
2. Pretend to eat/drink the child's snack. Model "don't." If the child says "stop," respond appropriately, then model "don't."

Set 3: Help, Come, Want, That

1. Put desired item in a jar with a tight lid. Wait. When the child requests "help," unscrew the lid and give the object to the child.
2. Engage the child in coloring activity, giving him one marker at a time. To change colors, when the child asks for "more," model "want more." Then give the child the marker with marker tightly capped. Take the cap off when child requests "help."
3. When the child requests, "want more" during an activity, give an item that is not needed or wanted for the activity. Model "don't want." Don't overdo misunderstanding, i.e., giving

the child the wrong item. At this stage, the child needs to be consistently reinforced for communication attempts.
4. Give the child a desired item in a clear jar with a tight lid and walk away. The child will need to request you to "come" and "help." This may be expanded to "want help."

Set 4: Hi, Good-bye

1. Use a puppet, stuffed toy, or doll to demonstrate "hi" and "good-bye." If appropriate, have the child manipulate the toy and activate a greeting while you do the same.
2. Have the child request another adult or peer to "come," and then respond to their greeting with "hi."

Set 5: Turn, Get, Need

1. Give the child a desired item in a clear jar. When the child requests "help," model "need help."
2. Associate "turn" with turning the jar lid to open. Give the child a desired object in a clear jar. If the child requests "help" or "need help," ask for more direction in order to elicit "turn."
3. Establish "turns" in an activity. The child can say, "more turn," "want turn," or "need turn."
4. Engage the child in a game that requires turn-taking in which he must get something, such as taking turns putting objects in a pail. In addition to using "turn," target phrases such as "get it," "get that," or "you get."

SUPPORT MATERIALS

COMMUNICATION FORMS/FUNCTIONS PROFILE

Client Name _____   **Report Source** (check one) ☐ Observation ☐ Informant   **Date** _____

	Feelings						Requesting											Protest/Reject					Respondent			Social			Total Functions
	likes	dislikes	feels good	pain	hunger	discomfort	help	eat/drink	object	action	bathroom	affection	choose obj.	choose action	chooses w/o seeing	clarify	information	activity	object/food	not allowed	taken object	change	directions	wh ?s	yes/no ?	greeting	response to	polite words	
augmented or speech complex																													
augmented or speech 2-3 words																													
augmented or speech one word																													
echolalia																													
gesture/pointing																													
manipulation of others																													
vocalizations																													
cries																													
gaze shift																													
fixed gaze																													
moves away																													
moves closer																													
facial expression																													
nod																													
body contact																													
action																													
self-injurious																													
aggression																													
tantrum																													
other																													
Total Forms																													

Adaptation by M. Emerson, 2006, based on Janzen, J. (1996). Understanding the Nature of Autism: A Practical Guide. San Antonio: Therapy Skill Builders.

INTEREST INVENTORY

In order to initiate a child-centered intervention, the clinician should make available items or activities, which will interest the child. Individuals with ASD often have very limited interests. Additionally, they may use common objects in unusual or ritualistic ways. Consequently, it is often helpful to obtain information about the child's preferences prior to intervention. This information can also be used to expand the child's interests and play skills.

	Very motivating	Some Interest	No Interest	Aversive	Don't know
Manipulatives					
Stacking Blocks					
Beads					
Puzzles					
Marbles					
Light Bright					
Wikki Sticks					
Strings, yarn, etc					
Active Play					
Ball					
Beanbags					
Jump rope					
Hoppity Hop					
Swing					
Slide					
Sit and Spin					
Jumping					
Spinning					
Putting Together/Taking Apart					
Building Blocks					
Legos					
Bristle Blocks					
Pop-beads					
Exploring the Senses					
Sand play					
Water play					
Vibrating toys					
Toys that light up					
Spinning toys/objects					
Bells					
Flash light					
Plush toys					
Rattle/shaking toy					
Technology					
Videos					
Listening to music					
Playing music w/instrument (drum, whistle, etc)					
Computer games					
Literacy					
Books					
Magazines					
Letter forms					
Letter games					

LAMP VOCABULARY DATA FORM

Vocabulary Set	Word	Taught Using	Date		
			Started	**Used Consistently in Training**	**Generalized to Other Settings**
1	More				
	Stop				
	Go				
2	Eat				
	Drink				
	Don't/Not				
3	Help				
	Come				
	Want				
	That				
4	Hi				
	Good-bye				
5	Turn				
	Get				
	Need				

Vocabulary Set	Word	Taught Using	Date		
			Started	Used Consistently in Training	Generalized to Other Settings
Pronoun	I				
	You				
	It				
Color					
Food					
Toys					
Drink					
Other					

APPENDIX B: 102 MOST FREQUENTLY USED WORDS

Interjections (social words)

yes	no
thank you	please
okay	

Pronouns

I	me
you	
he	she
it	we
they	

Question Words

what	when
where	who
why	how

Verbs (helping words)

be	is
am	are
can	could
do	did
have	had
was	were
will	would

Verbs (action words)

ask	-ing
buy	
call	need
clean	put
come	remember
eat	say
feel	start
find	take
get	tell
give	think
go	try
help	turn
know	use
like	want
look	wish
make	work

Adjectives (descriptive words)

all	more
big	little
hot	cold
same	different
pretty	
new	old
right	wrong

Prepositions (placing words)

about	at
for	of
up	down
on	off
to	from
in	out
with	

Demonstratives (pointer words)

this	that

Conjunctions (connecting words)

and	because
but	if

Adverbs (when, where, how)

not	now
here	there
much	very

Taken from the Unity: Language for Life Training Manual (Pam Elder, 1992 phone conversation)

appendix c: toddler vocabulary arranged by frequency

WORDS	PERCENTAGE
I	9.5
no	8.5
yes/nea	7.6
my	5.8
the	5.2
want	5.0
is	4.9
it	4.9
that	4.9
a	4.6
go	4.4
mine	3.8
you	3.2
what	3.1
on	2.8
in	2.7
here	2.7
more	2.6
out	2.4
off	2.3
some	2.3
help	2.1
all done/finished	1.0
	96.3%

Banajee, DiCarlo & Stricklin, Core Vocabulary Determination for Toddlers, AAC, June 2003, Volume 19, No. 2

APPENDIX D: EXCERPTS FROM "LANGUAGE FUNCTION AND EARLY GENERATIVE LANGUAGE"

Authored by Gail M. Van Tatenhove, PA, MS, CCC-SLP

Single Word Utterance Level

Relational Functions	Context	Form (vocabulary examples)
greet	people noticed	hi, hello, mama, dada
part	people leave	bye bye, goodbye
request Assistance	used to request assistance with an event	help, do
recurrence	used to both request and comment	more, another
naming/labeling	used to name or label objects and people, giving information	doggie, milk, shoe
existence	objects or people pointed out, noticed, or found events – used to gain attention	uh oh, this, that, there, look, see
nonexistence	used to comment on non-existence when existence is expected	no, away, gone
disappearance	comment on the disappearance of person or object in the immediately preceding context	away, all gone, gone
rejection	used to reject on ongoing object or action	no, stop
cessation	comment on an ongoing event that has ceased in the immediately preceding context	stop
comment	used to comment on an attribute in immediate context	like, dirty, big, naughty
vocatives	to call for someone (less frequent than comments or greetings)	mama, dada, baby
directive	used to direct action and/or make requests in the immediate context	go, help, stop
associative	idea is associated with an event, object, or person	big, hot, pretty, up

Semantic Functions	Context	Form (vocabulary examples)
agent	agent of an intended or immediate action	mama, dada, baby, I, me, you
object	object of an action (infrequent occurrence)	mama, dada, baby
action	making of action or event	want, go, turn, catch, up, eat, drink, stop, get, give
possession	associated with or belonging to a person	mine, dada, mama

Two Word Utterance Level

Relational Functions	Context	Form (vocabulary examples)
greet	people noticed	hi + person, hello + person
part	people leave	bye bye + person
request Object or Action	used to request object or action	(want, get, find) + substantive word, want that, get more
request Information	used to request information	why, what's that, where go, what doing
request Assistance	used to request assistance with an event	(help) + another word
recurrence	used to both request and comment on an event	(more, another) + substantive word, do again
naming/labeling	used to name or label objects and people, giving information	doggie, milk, shoe
existence	Objects or people pointed out, noticed, or found Events – used to gain attention	(this, a, the, that, it, there) + substantive word
nonexistence	used to comment on non-existence when existence is expected	(no, away, gone) + substantive word
disappearance	comment on the disappearance of person or object in the immediately preceding context	(no, away, all gone, gone) + substantive word
rejection	ongoing event/object rejected	no + substantive word
cessation	comment on an ongoing event that has ceased in the immediately preceding context	no + substantive word
comment	used to comment on an attribute in immediate context	like that, that mine, you funny
vocatives	to call for someone (less frequent than comments or greetings)	mama, dada, baby
directive	used to direct action and/or make requests in the immediate context	get that, help me, stop it
associative	idea is associated with an event, object, or person	(big, hot, pretty, up) + substantive word

Semantic Functions	Linguistic Structure	Form (vocabulary examples)
agent-action	noun + Verb	daddy hit, me read
action-object	verb + noun	get that, read it, get some, want one
agent-object	noun + noun	mommy book, me that
possession	noun + noun	mommy book
	pronoun + noun	my book, that mine
locative	noun + noun	that thing
	verb + Noun	go chair
	prep + noun	get up
	verb + prep	
attributive	adj + noun	big one, red thing
experiencer-State	pronoun + verb	me read, me love, me want

Top Words Used by Toddlers

1. a	9. it	17. some
2. all done/finished	10. mine	18. that
3. go	11. more	19. *the*
4. help	12. my	20. want
5. here	13. *no*	21. what
6. I	14. off	22. *yes/yeah*
7. in	15. on	23. you
8. is	16. out	

Clinical Application

First 8 Words:

1. all done	5. more
2. help	6. stop
3. want	7. that
4. mine	8. what

First 15 Words:

1. all done	6. I	11. stop
2. away	7. it	12. that
3. go	8. like	13. want
4. help	9. mine	14. what
5. here	10. more	15. you

First 30 Words:

1. again	11. I	21. out
2. all done	12. in	22. put
3. away	13. it	23. some
4. big	14. like	24. stop
5. do	15. little	25. that
6. down	16. mine	26. there
7. get	17. more	27. up
8. go	18. my	28. want
9. help	19. off	29. what
10. here	20. on	30. you

Excerpts from "Language Function and Early Generative Language" (continued)

First 50 Words

1. again	14. get	27. mine	40. stop
2. all	15. go	28. more	41. tell
3. all done	16. good	29. my	42. that
4. away	17. happy	30. not	43. there
5. bad	18. help	31. now	44. turn
6. big	19. here	32. off	45. up
7. come	20. I	33. on	46. want
8. do	21. in	34. out	47. what
9. don't	22. it	35. play	48. where
10. down	23. like	36. put	49. who
11. drink	24. little	37. read	50. why
12. eat	25. make	38. sad	51. you
13. feel	26. me	39. some	

Adding to the Top 50

1. +ed	26. have	51. one	76. they
2. +ing	27. he	52. other	77. think
3. +s	28. hear	53. over	78. thirsty
4. after	29. hi	54. place	79. those
5. almost	30. hot	55. please	80. time
6. another	31. how	56. pretty	81. tired
7. any	32. hungry	57. problem	82. together
8. ask	33. idea	58. ready	83. try
9. be	34. is	59. ride	84. under
10. before	35. job	60. same	85. very
11. body	36. know	61. say	86. walk
12. can	37. later	62. she	87. way
13. cold	38. leave	63. sick	88. we
14. color	39. let	64. silly	89. when
15. did	40. listen	65. sing	90. win
16. different	41. live	66. sit	91. with
17. dress	42. lose	67. sleep	92. work
18. fall	43. love	68. slow	93. write
19. fast	44. maybe	69. sorry	94. wrong
20. favorite	45. much	70. start	95. your
21. for	46. myself	71. surprise	96.
22. fun	47. name	72. swim	97.
23. give	48. need	73. take	98.
24. goodbye	49. nice	74. thank you	99.
25. guess	50. of	75. these	100.

Adding Words to Get to 300+ Core Words

1. Add all the pronouns.
2. Add more adjectives and adverbs
3. Expand verbs, with tense variation

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APPENDIX E: MINSPEAK AND UNITY

by John Halloran, MS, CCC-SLP (Edited by Annalee Anderson, MA, CCC-SLP)

I. Historical Background

Minspeak was introduced in the early 1980's by Bruce Baker. Minspeak uses pictures called icons, and takes advantage of our normal tendency to associate more than one meaning with an item. For example, a picture of an apple might represent not only "apple," but also any other concept we can associate with apple, such as "fruit," "red," "juicy," "crisp," and "bite."

By using multimeaning icons, Minspeak uses a limited number of icons to represent potentially a very extensive vocabulary. With a small number of icons, the requirements for access are reduced and minimal keystrokes are required to retrieve vocabulary.

Although Minspeak was originally used to represent sentences, it was soon evident that individuals, even those with significant cognitive challenges, were more interactive communicators when given a set of single words rather than whole messages.

Several Minspeak Applications Programs, or "MAPs," emerged. Each of the MAPs was developed for a designated set of individuals, and there was not planned coordination for transition for one MAP to another. When it was time to change to another MAP, extensive relearning was required.

II. Unity

Unity was developed to minimize the difficulty in transitioning from one vocabulary to another. It is designed to grow as the individual's ability develops.

Unity is based on a consistent set of icons, with a consistent arrangement, and consistent icon sequences for representing language. This promotes automatic use, as well as minimizes relearning when transitions in vocabulary are made.

The consistency in Unity also reduces the demands on facilitators, teacher, parents, and therapists. Using Unity, they can build lessons around a common vocabulary, set of icons, and icons sequences. This eliminates the need to create, teach, and learn multiple symbol representations. A therapy idea that is developed for one Unity user can be used successfully with another Unity user, even if the second individual is on a different point within the Unity vocabulary.

III. Cognitive and Age Ranges

Unity can start out at a very basic point, such as having one icon represent one message. It can build systematically from this point to potentially offering thousands of words. Because of this flexibility, Unity is appropriate for persons of almost any cognitive level or stage of language development.

IV. What Words to Use

An augmented communicator whose communication device provides whole messages is able to communicate only what the person who manages their communication device provides for them. However, someone using a word-based vocabulary has the option of generating his own messages. Sentences and phrases allow for speed in the communication process and should be a part of any AAC vocabulary set, but single words should not be excluded. Unity is a word-based vocabulary with sentences and phrases included.

There are about 200,000 different words in English. About 20,000 of them are considered "common." By the time speaking children are two years old, they use about 2000 different words in a single day.

The task of teaching such a large vocabulary seems virtually impossible. This leads us to study "core" vocabulary, or the words that occur most frequently. In a 1987 study, Vanderheiden and Kelso discovered that the 50 most frequently occurring words account for 40 to 50% of the total words communicated, while the 100 most frequently occurring words account for 60% of the total sample.

In Marvin, Beukeman, and Bilyeu's 1991 study of preschool children, the 50 most frequently occurring words represent approximately 60% of the total sample, while the 100 most frequently occurring words account for 73% of the total sample.

In a 1992 study by Adams, Romski, Deffebach, and Sevcik, 12 youths with moderate to severe mental retardation were studied. The youths had been using an augmentative communication system that provided only primary nouns. The subjects were given social regulative symbols such as "please" and "I'm finished." The social regulative words "were used as soon as

they were introduced, and their availability expanded the focus of conversation both at home and at school." According to the authors, "the rapidity with which the subjects in this study adopted social regulative lexigrams suggests that terms that lack ready picturability are not necessarily more difficult for people to use. Our findings suggest the symbol vocabularies, which youth with severe mental retardation can learn, may have been underestimated by limiting their composition to concrete nouns."

"Certain words such as "no" or "more" have broader application to objects and events than other words, such as "cookie" or "car," and thus may be heard more often and will serve the child more frequently in his or her effort to communicate," according to Bloom and Lahey, 1979.

Core vocabulary is composed of the most frequently occurring words. Studies have shown that core vocabulary is remarkably consistent across speaker, age, topic, and cognitive ability.

Fringe vocabulary refers to the less frequently occurring words that are specific to a speaker or a situation. In this familiar nursery rhyme, the fringe vocabulary is bold, and the remaining words are core vocabulary.

> **Humpty Dumpty** sat on a wall.
> **Humpty Dumpty** had a great fall.
> All the **king's** horses and all the **king's** men
> Couldn't put **Humpty** together again.

V. Words Have Multiple Meanings

Children and adults who have word-based systems often create their own combinations with new meanings. When a toddler says "me go," he may mean, "I want to go outside," "I need to go to the bathroom," or "May I go with you?"

Here is an example of a word with multiple meanings:

Back off Big Daddy	**Back** up the disk
Touch your **back**	**Back** up the car
You're **back** again	Who will **back** me if it doesn't work
He is the most **back** woods person I know.	

Although the meaning of a word may vary, the articulation of that word remains the same. Unity would handle this word in a similar manner. The word "back" is stored under one consistent symbol sequence, and can be used for any of the varying meanings, which parallels how "back" is used in spoken English.

VI. Motor Planning and Language

Where is the "q" on the keyboard, and what letter is next to it? For those of you who type, the motor movement may have been automatic, requiring less thought; you may have only been able to retrieve it only you positioned your hands for typing. Any learned movement pattern does not just happen, but is practiced repeatedly. (Bly, 1963; Campbell, 1988; Guild, 1990).

Performing a motor movement repeatedly in a consistent pattern improves performance. Athletes refer to this as muscle memory. In AAC, we refer to it as automaticity. Unity incorporates consistent movement patterns, permitting the user to develop automaticity. Because Unity maintains consistent placement of icons from one overlay to another, the motor patterns do not have to be relearned when transitioning. Some individuals who use Minspeak do not need to see the icons to use their devices because they have developed automaticity. This type of motor movement also allows individuals with visual and motor challenges to be very successful communicators.

VII. Literacy

Karen Erickson, Ph.D., has worked extensively in literacy and AAC. She wrote that literacy learning and Minspeak do not have to be viewed as separate learning processes. She stated that "a potentially synergistic relationship exists between literacy and Minspeak whereby increased competence in one can lead to increased competence in the other." She went on to say, "Minspeak can actually enhance literacy learning and vice versa because Minspeak and literacy share some important features: a) both Minspeak and literacy are generative; b) they both are rule based processes of communication; and c) they are both learned through active engagement in meaningful activities and environments."

For additional information about Minspeak and Unity:
1. Visit www.prentrom.com/msu/gs.html and enroll in the free e-training course "Introduction to Unity."
2. Visit www.prentrom.com/download.html and download the Pathfinder or Vantage demo. Follow the tour guide on the demo.
3. Visit the Semantic Compaction website. http://www.minspeak

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