Enhanced Natural Gestures: An Alternative to Natural Gestures and

Sign Language for Individuals With Severe Disabilities

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INTRODUCTION

The primary purpose of this article is to provide an overview of Enhanced Natural Gestures (Calculator, 2002; Calculator, 2016; Calculator & Diaz-Caneja Sela, 2015) along with rationale for their use with individuals with severe disabilities. These are individuals who typically present with severe to profound intellectual delays that are accompanied by substantial challenges across a variety of other areas. These may include disorders of movement, sensory function (particularly vision and hearing), overall health, behavior, and communication.

Enhanced Natural Gestures (ENGs) are intended to be used in conjunction with other gestural methods, as well as vocal and graphic forms of communication. As such, they comprise one component of a multimodal communication system. They are considered one of many forms of augmentative and alternative communication (AAC).

AAC becomes necessary when individuals with disabilities are unable to use speech as their primary means of communication.

Overview of Augmentative and Alternative Communication

AAC, including the use of ENGs, is usually intended to augment, or, supplement individuals' existing multimodal methods of communication. However, in some cases it is introduced to replace other undesirable methods. This is most often the case with respect to individuals' reliance on challenging behaviors such as hitting, spitting, and pulling hair in the absence of other more conventional and socially acceptable ways of communicating.

ENGs and other AAC methods may also serve as alternatives to existing methods of communication that are highly idiosyncratic, or, specific to a particular individual and thus difficult to be interpreted and responded to correctly by other than a select few (e.g. parents). This can include not only the use of natural gestures, described later, but sign language too.

ENGs can be an alternative to sign language in cases in which individuals' signs are substantially modified to accommodate intellectual, motor, and other limitations. As such, signs may be recognizable to a limited audience. This may include communication partners who are well versed in sign language but unfamiliar with the modified and thus unique versions of signs produced by particular individuals.

The ensuing discussion of Enhanced Natural Gestures begins by examining their origin and how they are special relative to other forms of gestural communication, including natural gestures and sign language. This is followed by a brief review of research supporting the efficacy of ENGs as a communication method for individuals

with severe disabilities. Next, teaching methods comprising the ENG protocols are described. These include discussions of two methods associated with incidental teaching: mand-model with time delay and molding-shaping. In both cases, all instruction is carried out in conjunction with normally occurring events through the use of incidental teaching. Next, the seven steps of the ENG program are reviewed briefly. Finally, implications of this evidence-based method are discussed as they pertain to maximizing the effectiveness with which individuals with severe disabilities communicate with others.

Origin of Enhanced Natural Gestures

This method of communication was initially developed for individuals with Angelman Syndrome (AS), a neurodevelopmental genetic disorder caused by deficient expression of the maternally derived UBE3A gene on the 15th chromosome. Angelman Syndrome occurs at an incidence of approximately 1 in 12,000 live births. It is associated with a broad range of disabilities that include severe to profound intellectual delays, seizures, motoric challenges, absence of speech, severe delays in both expressive and receptive language, etc. Anecdotal evidence (e.g. written and electronic correspondence as well as verbal reports from parents and practitioners) suggests ENGs are now being used in the USA and abroad with individuals whose severe disabilities can be attributed to a variety of other etiologies as well.

Multimodal Communication

The communicative challenges of individuals with severe disabilities are usually observed across all modes of communication. Their *vocal* behavior is characterized by severe limitations or absence of speech. *Gesturally*, we typically see limited abilities to learn sign language due to intellectual and motor disorders that influence their acquisition

and accuracy of signs. Finally, limitations in the area of *graphic* communication narrow options with respect to the complexity and variety of both electronic (e.g. speech generating devices [SGDs]) and nonelectronic (e.g. communication boards and communication books) methods of communication that might be considered.

Individuals with severe disabilities often favor methods of communication such as non-speech vocalizations, physical manipulations of people and objects, and natural gestures (Calculator, 2014). The latter are not taught but instead reflect self-devised behaviors such as pointing and reaching toward desired objects and events, and pushing way, avoiding, or withdrawing from unwanted objects and events.

Unfortunately the communicative behaviors of individuals with severe disabilities are usually severely restricted in number as well as likelihood of being understood by their conversational partners. Enhanced natural gestures were created with this is mind.

Characteristics of Enhanced Natural Gestures (ENGs)

Unlike natural gestures, which can be highly idiosyncratic and thus difficult for others to interpret, ENGs are by definition readily understood. Prior to being selected, the practitioner, which can include parents, siblings, teachers, and peers, presents a potential ENG to three naïve listeners, such as classmates or co-workers, along with the context in which it might arise. No fewer than two of these prospective partners must be able to identify the meaning of the ENG in order for it to be selected and then taught.

Thus, ENGs rarely need to be taught to familiar or unfamiliar conversational partners since they are highly transparent (i.e. guessable). This contrasts with sign language. Although some signs are transparent and easily interpreted, a large percentage are unlikely to be understood by anyone other than those with sign language training. In

addition, due to individuals' motor limitations, their signs are often inaccurate and or highly modified. As such even unfamiliar conversational partners with backgrounds in sign language may be unable to interpret their meaning unless translated by others.

Unlike sign language, ENGs build upon natural gestures individuals are already displaying; thus they are easily taught and acquired. For example, an individual might be observed using both hands to lift and then bring a cup to his mouth to drink. This same gesture (i.e. cupping both hands and bringing them to his mouth) could be taught as a means by which that individual might request a drink in its absence. Conversely, another individual might drink by grasping a cup with one hand before bringing it to her mouth. Her ENG would thus reflect this different behavior. As another example, an individual might be observed naturally pulling on the chains of a playground swing to propel herself. We might later observe this individual using an ENG (i.e. producing the same grasping and pulling motion) to request to be taken to a swing on the playground as a preferred activity. Finally, based upon the hand motions of an individual when swimming, we might extract this same gesture and teach it as an ENG for asking her parents to go outside and take a swim in the family pool.

Efficacy of Enhanced Natural Gestures

As indicated earlier, research has supported the efficacy of ENGs. Parents have reported them to be an effective, acceptable and feasible method of communication for their children. This has been confirmed in two home-based studies in which parents were taught to use ENGs and then asked to monitor their children's uses of ENGs over time (Calculator, 2002; 2018) and a third study in which educators were taught and then used ENGs with their students in school (Calculator & Diaz-Caneja Sela, 2015). Readers are

encouraged to review these three studies in order to gain a comprehensive understanding of this method.

Teaching Methods

The studies cited above offer step-by-step descriptions of the ENG instructional protocols, which include tutorials on the two teaching strategies (i.e. mand-model with time delay and molding-shaping) that can be used alone or in combination. Both of these methods rely on incidental teaching. In other words, instructors take advantage of existing opportunities for communication that arise in the natural environment and/or structure natural environments to create reasons for individuals to use their ENGs.

Teaching strategies. Briefly, the first teaching method, mand-model with time delay, begins with the instructor emitting an expectant gaze to signal to the individual a need to use an ENG. It has already been established that a communicative behavior is expected to arise in this predictable, frequently occurring situation. The ENG is embedded in this event. If the individual fails to produce the ENG, the instructor mands (i.e. says "show me what you want," or "show me your gesture"). If the individual still fails to produce the ENG, the instructor models the desired ENG. If even then the individual does not produce the desired ENG, the instructor physically prompts the individual to do so. This often requires full hand-over-hand assistance.

The second teaching strategy involves molding-shaping. First, the individual's hands are molded around a targeted object and she is encouraged to handle it in a customary way (e.g. grasp and then bounce a ball; grasp and then bring food to her mouth; grasp and then use sticks to beat a drum; etc.). Next, we move to the shaping phase. The object (e.g. ball) is removed from the individual's hands. She is encouraged

to maintain the same hand position, as if still retaining possession of the object (e.g. the ball) and then execute the expected movement. If she fails to do so, the instructor repeats the molding and shaping phases already described. If the individual still fails to produce the targeted ENG, the instructor provides physical hand-over-hand assistance to prompt the individual to produce the ENG in the absence of the corresponding object.

Once again, readers are strongly encouraged to review the author's investigations that were cited earlier for additional information pertaining to the means by which ENGs are taught. This includes what has now evolved into a seven-step program, which is summarized below.

Seven Steps for Teaching Enhanced Natural Gestures

In the first step, the instructor observes the individual's existing methods of communication and evaluates their corresponding success. The resulting data are used as a means of determining candidacy for ENG training. For example, if the individual is already communicating successfully with a broad range of conversational partners, she may not be a candidate for ENG instruction.

In step two, we identify the situations or environments in which ENGs will be taught. These vary greatly. Common situations include mealtime, recess (time on the playground), music, art, bath-time, free play, work, and leisure activities. It is often recommended to begin with no more than three situations. These can be increased over time.

Step three requires the instructor to observe and rate the success with which the individual is already communicating in each of the situations identified earlier. Where reasons and opportunities for communication exist but communicative attempts are either

absent or unsuccessful, there may be a basis for teaching ENGs as augmentative and/or alternative methods of communication.

Next, in step four, the actual ENGs are determined. As noted earlier, ENGs often involve replacements of existing natural gestures that may or may not be idiosyncratic in nature. These may include undesirable challenging behaviors such as hitting. The transparency of potential ENGs is confirmed by previewing them with naïve conversational partners and confirming their guessability in context. No fewer than two out of three partners must be able to interpret each ENG successfully in order for it to be subsequently taught.

 Step five involves the instructor and his/her team reaching consensus on a set of goals and expected outcomes of ENG instruction through the use of goal attainment scaling, or, GAS (Calculator, 2016; Kiresuk & Sherman, 1968; McDougall & King, 2007; Schlosser, 2004). One example of a goal identified by a team was that a student, John, would "use his ENGs in conjunction with other AAC methods to initiate no fewer than 10 interaction with his peers each day." Other goals have targeted the use of ENGs to request desired objects, request continuation of pleasurable activities, reject unwanted objects, request preferred objects, and request objects necessary to participate in a corresponding activity. For each goal, the instructor (or team) identifies a set of five possible outcomes: +2 (best expected). +1 (more than expected), 0 (expected), -1 (less than expected), or -2 (worst expected).

In step six, ENG instruction is implemented and data on the individual's performance in each situation are collected. As noted earlier, ENG instruction is fully integrated into each situation. For example, during shared storybook reading, a classmate

(previously mentored by the classroom teacher on implementation of the ENG protocol) of Megan's who typically reads to her approached Megan and gazed expectantly. Based on previous experiences, Megan expected her classmate to have arrived with a book and commenced reading to her, but this was not the case on this occasion. Megan produced the ENG to request a book from her classmate. Megan's ENG was producing the hand shape associated with holding a book in her two hands. Megan's successful use of the ENG prompted her classmate to retrieve a book. In this case, the goal was for Megan to request an object needed to participate in an activity.

Another example of an event arising in step six involved Noah. One of his goals was to have him request a preferred activity. Upon entering the music room, Noah expected to be escorted to the piano. However in this phase of instruction his teacher paused with Noah at the threshold of the room. Molding-shaping had been used to teach Noah to assume the hand shape and execute the movement associated with playing the piano. When confronted with the situation in which this preferred activity was not immediately available, Noah produced the ENG for piano to communicate his want/need.

The final, seventh, stage of the program involves the instructor and/or team evaluating the efficacy of the ENG program and achievements of the individual. This is accomplished first by their completing the Enhanced Natural Gestures Acceptability Rating Form (see previous sources for a description of this tool). The instructor uses a series of Likert rating scales, along with responses to open-ended questions, to accomplish this. In addition, the goal attainment scaling procedure is completed in order to evaluate individuals' actual outcomes relative to expected outcomes. These can then be evaluated statistically.

Summary

The ENG approach has undergone several revisions since its introduction in 2002. These have been based on empirical data as well as anecdotal reports from practitioners, including parents and teachers. This feedback has alluded to features such as clarity, acceptability, reasonableness and time required to learn and then implement the ENG instructional protocols.

As noted above, three investigations have validated the efficacy of Enhanced Natural Gestures as a method by which individuals can be taught to communicate more effectively. In two of these investigations, one involving parents, the other teachers (and other school personnel), efficacy was evaluated only through completion of the Enhanced Natural Gestures Acceptability Rating Form. The third investigation, involving parents, again relied on the ENGARF but this time in conjunction with Goal Attainment Scaling. The current iteration of the ENG instructional protocol embeds Goal Attainment Scaling into the program.

ENGs are learned and then used most effectively through an integrated approach in which instruction is embedded into everyday activities. Based on the research cited earlier, ENGs may be considered a viable alternative to natural gestures and other idiosyncratic methods of communication, which may include sign language. This may be especially true when ENGs comprise one component of a multimodal AAC system. ENGs should never be introduced as a means of replacing methods of communication that are already effective with a broad range of familiar as well as unfamiliar conversational partners. Further research is necessary to evaluate the degree to which ENGs can be effective with the broad population of individuals with severe disabilities.

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