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### AAC aphasiology: partnership for future research

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## FORUM

# AAC Aphasiology: Partnership for Future Research

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This paper explores issues related to augmentative and alternative communication (AAC) interventions for aphasia. Recent literature on functional communication treatment is reviewed with a goal of clarifying how aphasiologists see AAC fitting into aphasia treatment. AAC assessment models are proposed as a method for achieving the objectives of functional communication treatment. Recent AAC and aphasia treatment efficacy studies are critically examined for their use of accepted AAC assessment models. Recommendations address the need to incorporate AAC assessment when addressing questions of effectiveness, efficiency, and generalization in AAC aphasiology research.

**KEY WORDS:** augmentative and alternative communication (AAC), aphasia, assessment, intervention, research

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Treatment for severe aphasia has always been a problematic issue for aphasiologists. Most of the highly structured language and process stimulation approaches used to treat aphasia are ultimately unsuccessful in providing language systems that meet the daily needs of severely impaired individuals (Rosenbek, LaPointe, & Wertz, 1989; Shewan, 1986). Even authors of the earliest comprehensive treatment approaches suggested that severely aphasic individuals should be treated differently than those with moderate to mild impairments (Schuell, Jenkins, & Jimenez-Pabon, 1964; Wepman, 1972). According to Schuell et al. (1964), "the best results we have seen were all those where a new routine, adapted to the abilities, interests, and limitations of the patient, and to the needs and interests of the rest of the family as well, was thoughtfully planned and systematically adhered to" (p. 379).

Over the past 30 years, clinicians and researchers in aphasiology have sought to explain severe aphasia and to develop effective treatment paradigms for the different classes of aphasia. Early treatments often attempted to stimulate the damaged language functions of the brain (Schuell, 1974; Schuell et al. 1964). Later, approaches sought to use intact symbolic and prosodic capacities as compensations for impaired linguistic abilities (Helm-Estabrooks & Albert, 1991; Meyers, 1980; Rao & Horner, 1978; Skelly, Schinsky, Smith, & Fust, 1974; Sparks & Holland, 1976). Simul-

taneously, treatments have addressed the functional communication needs of persons with aphasia, with an emphasis on development of compensatory tools and skills (Aten, 1986; Aten, Caligiuri, & Holland, 1982; Collins, 1986; Davis & Wilcox, 1985; Holland, 1980, 1982; Morgan & Helm-Estabrooks, 1987). Holland (1980) has suggested that functional communication treatment differs from other forms of aphasia treatment. "Functional" is defined as "getting messages across in a variety of ways ranging from fully-formed grammatical sentences to appropriate gestures, rather than being limited to the use of grammatically correct utterances" (p. 50). According to this definition, training in the use of augmentative and alternative communication systems (AAC) may be a component of functional communication treatment.

In order to gain a better understanding of where the field currently stands on issues related to AAC and aphasia, this paper will review three areas of theory and practice: (1) functional communication approaches for severe aphasia, (2) standard assessment practices for AAC interventions, and (3) recent research in the area of AAC treatment outcomes with severely aphasic adults. This body of research will be critically examined to evaluate the methodologies used, the comprehensiveness of AAC assessment practices, and the validity of the conclusions reached by the researchers. Ultimately, the goal of this review will be to draw on theory and practice in the field of AAC to suggest methods

for improving the social validity of research investigating AAC and aphasia interventions.

### FUNCTIONAL APPROACHES TO APHASIA TREATMENT

A number of aphasiologists have explored issues related to functional treatment and have addressed the need to create working communication systems for individuals with severe aphasia. Davis and Wilcox (1985) introduced one of the early treatment approaches designed to improve pragmatic aspects of communication in aphasia. Their approach to treatment, Promoting Aphasics' Communicative Effectiveness (PACE), encouraged the use of all available communication modalities for conveying new information in meaningful exchanges.

In PACE treatment, clients are given free choice of communication channels or modalities, and clinicians provide natural feedback based on communicative adequacy rather than on the accuracy of symbols used to convey the message. Davis and Wilcox included two case studies using PACE treatment for severe aphasia in their discussion of treatment implementation. One of these provided an early example of partner training. This case study illustrated the use of PACE treatment in training the communication partner of an adult with severe Wernicke's aphasia to recognize and accept the aphasic person's use of multiple communication modalities.

Collins (1986) took a similar total communication approach in his discussion of treatment for global aphasia. He recommended that clinicians treating individuals with global aphasia emphasize a variety of indirect and direct approaches, using multiple communication modalities, to improve functional communication. He encouraged clinicians to focus on enhancing residual skills and persuading family members that communication is more important than "linguistic elegance" (p. 99).

Emphasis on functional communication methods and reliance on context to improve language behavior was further explored by Aten (1986, 1994). Unlike others who suggested that "functional" approaches should be implemented after the conclusion of traditional language treatment (e.g., Wertz, 1984), Aten (1986) proposed that functional communication treatment (FCT) be employed concurrently with language stimulation and continue when language stimulation is no longer effective.

Aten's FCT emphasizes incorporation of daily contacts and activities into treatment for information exchange. He favors treatment that takes place in a variety of natural settings when possible, and that involves interaction between individuals and within groups. He suggests that treatment should be based on the results of a variety of assessment measures including formal language tests, functional communication measures, discourse analysis, and observa-

tion of performance in natural settings. Beyond these basics of FCT, Aten (1994) considers communication needs of the aphasic adult, as well as the severity of deficit, when planning treatment.

The importance of a functional or "ecological" approach to aphasia treatment was illustrated by Simmons (1989), who described the use of a simulated environment to provide a transitional setting for fostering carry-over of clinically learned communication skills to more naturalistic settings. In a similar vein, Lyon (1989) described a treatment approach using volunteers who became communication partners for aphasic adults within and outside the clinic. His anecdotal evidence pointed to increased communicative confidence and improved communicative performance for the aphasic clients being treated in this manner.

More recently, Lyon (1992) has asserted that there is little evidence linking restored communication ability in structured or protected settings to improved use of communication and participation in daily life. He suggests that aphasic adults' inability to communicate in natural settings may be as related to handicap (the psychosocial dysfunction of aphasia) as it is to disability (impaired use of communication modes). Lyon proposes treating both the disability and the handicap of aphasia. When aphasic adults actively become agents of change in their own lives, Lyon believes that the psychosocial burden is reduced for them and their families.

His approach to treatment involves use of community volunteers as liaisons for participation and re-entry into an active life in the community. Volunteers and aphasic clients participate in two phases of treatment. During the first phase, a volunteer partner assumes the role that the clinician would typically take in PACE-like activities. In phase two, the aphasic person begins to plan and execute activities in the community with his or her volunteer companion.

Another treatment approach, which focuses on aphasic clients becoming agents of their own change, is recreation-focused group treatment (Fox, 1990). Severely aphasic nonspeaking adults are encouraged to create their own communication opportunities through the selection of activities in a group milieu. Communication needs are assessed for each activity, and group members are prepared for communicative independence in the natural environment. Pre- and postmeasures over a 6-month period of group treatment showed no change in language ability as reflected in the Porch Index of Communicative Ability (PICA) (Porch, 1967), but functional communication improved as measured by the Communicative Effectiveness Index (CETI) (Lomas, Pickard, Bester, Elbard, Finlayson, & Zoghaib, 1989) and by a pragmatic assessment of group interaction (Fitzpatrick, Nicholas, & DiNapoli, 1988).

Currently, the work of Kagan and Gailey (1993) is drawing much attention among those interested in promoting improved functional communication for

aphasic adults. Their work with the Aphasia Centre-North York focuses primarily on providing opportunities for aphasic adults to participate in conversations with other aphasic adults and with trained volunteers in group settings. The volunteer-run groups at the centre provide a number of different models for learning and using communicative skills in a conversational setting. A core of 100 to 125 aphasic adults participate in structured groups run by volunteers. The goal of these groups is to practice techniques that facilitate conversation. Volunteers come to these sessions with planned activities in mind. Professional staff of the centre provide a packet of materials and props that will facilitate communication for each group (information about members, photos of staff, maps, clocks, etc.). Less formal opportunities are offered at the centre for the participants to practice their conversational skills, including coffee-time chats and volunteer-run recreational activities, lectures, and outings.

The volunteer-run treatment at the North York Centre remains fairly traditional, with volunteers selecting topics and leading activities. Unlike treatments developed by Lyon and Fox, the North York approach does not address client selection of topics and activities. Communicative autonomy appears to be offered only during participation in less formal groups. Additionally, Kagan and Gailey do not address the need for participants to assume responsibility for having necessary communication materials available, and spouses or friends are not currently being trained to act as conversational partners in the community. In the North York program, spouses are encouraged to observe the various group activities and may implement tools and strategies that they find useful outside of the centre.

Clearly, many aphasiologists are beginning to address the need for a "nontraditional" approach to the treatment of severe aphasia, and much work has been done describing the types of treatments that are likely to be of greatest benefit to severely impaired individuals. Treatment has moved beyond the deficit reduction approaches of early traditional therapies to newer treatments that address the communication needs and lifestyles of aphasic individuals. Such treatments require comprehensive assessment of individual, family, and environmental factors that impact communicative effectiveness (Aten, 1994; Lubinski, 1994; Parr, 1996). Aten (1994) states that "the essence of functional appraisal is to let the patient guide you. The hierarchy of losses and needs and residual strengths that are revealed become the database for intervention" (p. 296). Unfortunately, aphasiologists have not yet defined assessment models that will guide functional treatments.

### AAC ASSESSMENT MODELS

In addition to standardized language tests and the limited functional communication assessment tools available to aphasiologists, the field of AAC offers

models for the assessment of communication needs, capabilities, and environmental factors that must be considered in planning functional communication treatment (Beukelman & Garrett, 1988; Beukelman & Mirenda, 1988, 1992; Beukelman, Yorkston, & Dowden, 1985; Dowden, Beukelman, & Lossing, 1986; Hux, Beukelman, & Garrett, 1994; Yorkston & Karlan, 1986). Over the past decade, three models of AAC assessment have evolved: (1) candidacy or process models, (2) the communication needs model, and (3) the participation model.

These models address issues such as candidacy for AAC use, system selection based on an individual's communication needs and capabilities, and assessment of environmental barriers and opportunities. The common thread of all of the models currently in use is the concept that assessment must be an ongoing process integrated with treatment. Critical decision-making points act as triggers for reassessment as needs change, when new unmet needs emerge, or if change is likely to occur in the near future (Yorkston & Karlan, 1986). This idea of integrating assessment with treatment is not new to the field of aphasiology. What is new, and potentially very useful to aphasiologists, is the concept that communication needs and patterns of interaction must be constantly monitored. Changes in any of these areas should trigger reassessment.

### Candidacy and Process Models

Beukelman and Mirenda (1992) described early practitioners in the field of AAC who worked primarily with models of assessment that attempted to determine if individuals were candidates for AAC intervention. These have been grouped as candidacy models. They seek to ascertain whether AAC intervention is required and whether individuals considered for intervention meet the criteria of strong cognitive and linguistic abilities in the presence of chronic expressive communication disorders. Individuals who do not meet these criteria are required to perform "perpetual readiness" activities that are designed to teach skills assumed to be prerequisites for communication.

Candidacy models have lost favor in recent years for all populations of communicatively impaired individuals, including those with the most severe intellectual disabilities (Mirenda, 1993). Mirenda says that "breathing is the only prerequisite that is relevant to communication" (p. 4). She asserts that AAC techniques and devices are available now that are simple to learn and offer flexible symbol options for those who categorize the world differently than the majority culture. It has been suggested recently that there are only two AAC candidacy criteria for adults with aphasia: (a) "those persons who do not regain sufficient natural speech for communication of basic needs, and (b) those persons who rely on natural speech to meet many of their communication needs but find it inadequate or inefficient in

certain instances" (Hux et al., 1994, p. 341). This perspective suggests that there must be very few severely aphasic adults for whom some level of AAC assessment and intervention is not appropriate.

In contrast to answering questions only related to candidacy, the process model has three objectives: (1) to determine whether a discrepancy exists between skills possessed by normal communicators and the individual being assessed, (2) to explore patterns of communication being used, and (3) to determine the benefit of remediation for a dysfunctional speech system (Beukelman & Garrett, 1988). These objectives remain viable for assessing communication disabilities in persons with severe aphasia. However, they provide only a fragment of the information currently considered necessary for a complete AAC assessment.

The standardized norm-referenced tests most frequently used to assess aphasic adults, the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass & Kaplan, 1983), Western Aphasia Battery (WAB) (Kertesz, 1982), and the PICA (Porch, 1967), are examples of instruments that address skill discrepancies between the individual being assessed and normal communicators. Although the process model seeks to determine the benefit of remediation and to identify patterns of communication being used, subsequent models more comprehensively address the assessment of communication needs and preserved communication capabilities.

### Communication Needs Model

The communication needs model documents unmet communication needs, identifies communication methods that are effectively meeting some needs, and provides guidance for planning AAC intervention using residual communication abilities (Beukelman & Mirenda, 1992). It represents an important step beyond the process model. Rather than emphasizing the identification of communication deficits, this approach attempts to detect unique communicative skills in the individual, and to enhance those skills in areas where communication needs are unmet (Beukelman et al., 1985; Dowden et al., 1986; Yorkston & Karlan, 1986). All methods available for collecting information about residual skills are considered. These may include use of norm-referenced or criterion-referenced standard measures, nonstandard measures, and observation of functional communication in natural settings. Branching decisions that rely upon assessment of maximum communicative performance, in areas required for specific AAC interventions, may be considered in lieu of comprehensive assessment in selected cases. Two instruments currently within the aphasiologist's inventory of assessment tools may address communication capabilities for this model. The Boston Assessment of Severe Aphasia (BASA) (Helm-Estabrooks, Ramsberger, Morgan, &

Nicholas, 1989) offers important contextual information about an aphasic adult's residual communicative abilities. The Communicative Abilities in Daily Living (CADL) (Holland, 1980) may also be useful for determining how an aphasic individual employs alternative modalities when communicating in natural settings.

In addition to these aphasia tests, a guide for assessment of communication needs is included in *Communication Augmentation: A Casebook of Clinical Management* (Beukelman et al., 1985). Another useful tool that was designed to measure functional communication outcomes, but that may also provide clues to the communication needs of aphasic adults, is the CETI (Lomas et al., 1989).

Beyond the use of those tools mentioned above, the communication needs model guides observation and assessment of communication needs in the natural environment. Hux et al. (1994) suggest that a first step to such an assessment entails consideration of the typical communication patterns of an individual's nondisabled peers. For example, retelling stories, engaging in conversations that emphasize friends rather than family members, and increased use of games as a focus for interaction all represent unique communication patterns of elderly adults (Stuart, 1991). These communication patterns may serve as a basis for the communication needs assessment of elderly aphasic individuals.

Patterns of communication will differ among individuals depending on the age group to which they belong, the restrictiveness of their living setting, and their level of language impairment. Regardless of these differences, Light (1988) has identified four social purposes of communication that are shared by all disabled and nondisabled persons. These four purposes include (1) communication of wants and needs, (2) communication for transfer of information, (3) communication for social closeness, and (4) communication for social etiquette. Although the relative importance of these communication purposes will vary, all individuals will communicate to achieve each of Light's four purposes. A perceptive clinician will explore each of these areas when completing a communication needs assessment in the natural environment and will also attempt to determine which communication needs are being met through the use of natural methods, such as gesture or automatic phrases. Hux et al. (1994) caution that messages already being conveyed with natural communication methods are not likely to be accessed by an aphasic person if they are included in an AAC system.

### Participation Model

In addition to communication needs, the latest assessment model considers an individual's participation patterns when implementing AAC interventions. The participation model takes into consideration access and opportunity barriers that prevent treat-

ment candidates from communicating in a manner similar to their peers (Beukelman & Mirenda, 1992). The underlying causes of these barriers are identified and interventions are directed at managing deficiencies in opportunity, natural ability, and environmental adaptation for AAC system introduction. Simultaneously, environments most conducive to communication are exploited. This model incorporates the concept of ongoing assessment. As interventions create additional communication opportunities, reassessment takes place, and interventions are created or modified accordingly (Beukelman & Mirenda, 1988, 1992).

Barriers to opportunity may include limitations in available professional support, limitations in financial support, and the level of family and friends' communication skills and support (Hux et al., 1994). The participation model recognizes that the speech-language pathologist's knowledge regarding AAC options and their implementation will affect the outcome of an intervention. The choice of AAC systems may also be limited by the financial resources of an aphasic individual and the willingness of a third-party payer to purchase necessary equipment. Family members' or friends' knowledge and willingness to provide appropriate assistance will also influence the use and usefulness of AAC systems. Guidelines are available for assessing partner attitudes toward the aphasic adult's communication loss, and checklists have been developed for identifying interactional skills important for aphasic adults' successful communication (Garrett & Beukelman, 1992; Hux et al., 1994).

Natural ability is examined in the participation model, with a difference in emphasis from the earlier process model. Natural ability is considered for its potential to create barriers and influence opportunities for communication. The participation model examines contextual awareness, language comprehension, recognition of communicative desire, message recognition, and the formulation and revision necessary for use of AAC systems. Each of these abilities is assessed during communication interactions between persons with aphasia and their communication partners. AAC support is implemented at each level where breakdowns occur. For example, language comprehension deficits may be augmented through writing, drawing, or picture/symbol choices presented by the conversational partner (Hux et al., 1994).

### **Beyond the Participation Model**

The next step in the application of AAC assessment and treatment models with aphasic adults might be called the communicative independence model. Although the participation model encourages the creation of opportunities for aphasic clients, it does not address the adult's need to learn in the context of his own experience and interests. The participation model helps identify opportunity and access barriers and to

view AAC as a means for overcoming these environmental constraints (Mirenda, 1993). However, it does not identify motivating factors that are likely to facilitate learning and to promote use of AAC systems in nonclinical environments. The next step will require speech-language pathologists to employ treatment methods that provide incentives for learning. It may be necessary for speech-language pathologists to release some control of clinician-directed assessment and treatment tasks to which they have become accustomed. If this is the case, and if clients are able to become active agents in their own communication recovery, they may demonstrate improved motivation to learn and may more efficiently generalize use of newly learned skills to other environments (Fox, 1990; Fox & Fried-Oken, 1996; Lyon, 1992).

Developing methods for assessing preferences and levels of motivation in severely aphasic adults will require creativity and ingenuity from speech-language pathologists. It will require development of nonverbal methods for determining preferred communication topic areas, for assessing motivation for AAC system use, and for assuring investment of aphasic individuals and their conversational partners in treatment outcomes.

Tools and techniques that augment an aphasic person's auditory comprehension and verbal expression will need to be developed in order to determine communication preferences. A method for obtaining input regarding preferred communication topics might be created by examining communication patterns of nondisabled peers (Stuart, 1991). Pictorial systems may be created so that aphasic adults can select topics from those typically of interest to their peers. Selection of topics might be as simple as choosing from an array, or may require more structured assistance from the clinician. Paired comparisons of pictured topics may be useful, or it may be possible to rank-order preferred topics using methods such as the Q-sort (Stephenson, 1953). Written choice communication would be used to clarify specific issues and interests within a topic area.

Motivation to learn and willingness to accept nonverbal communication methods will need to be considered as interventions are begun, before systems are selected for aphasic adults. Tools, such as those developed to predict a child's receptivity to different communication options, will need to be modified for use with adults (Culp & Carlisle, 1988). In contrast to the participation model, which addresses barriers that may interfere with use of AAC systems, the communicative independence model will address internal and external factors that motivate aphasic individuals to learn and to use communication systems in natural environments.

As new treatment approaches for severe aphasia continue to be introduced, it will be critical for investigators to use comprehensive assessment methods before and during treatment. In order to empirically evaluate the benefit of AAC interventions, it will be

necessary for investigators to prescribe interventions that are appropriate for subjects in terms of communication needs and capabilities, address social and environmental barriers to communication, and consider each individual's interests and preferences. Assessment of each of these areas will need to be addressed repeatedly over time so that as needs, abilities, and requirements change, treatment plans will be adjusted (Fried-Oken, 1992). Without appropriate assessment, treatment findings and generalization implications will be meaningless and misleading.

### AAC AND APHASIA RESEARCH

Studies investigating outcomes of AAC interventions with aphasic persons must incorporate accepted AAC assessment practices in their design to be methodologically sound. It should be clear from the discussion above that, without comprehensive AAC assessment, treatment is unlikely to be successful, and generalization of newly learned skills to other environments cannot be expected. Recent outcome studies in AAC and aphasia will be critically examined to evaluate the methodologies used, the comprehensiveness of AAC assessment practices, and the validity of the conclusions reached by the researchers.

Outcome studies in AAC and aphasia fall into four broad classifications: comprehensive case studies, carefully controlled single-case experimental studies, group studies, and descriptive or comparative studies that do not fit into the other classifications. An examination of some of these recent studies, with an emphasis on methodology and attention to assessment methods used, may suggest appropriate directions for future research.

#### Case Studies

Case studies presented in both the aphasia and AAC literature illustrate the complexity of AAC intervention for aphasia. Cases illustrated in the literature involve lengthy interventions using multiple communication systems. Often, the use of these systems changes over time as the needs and the abilities of aphasic subjects change.

One such case study examined the use of Blissymbols as a tool for communication with a severely aphasic adult (Bailey, 1983). In this study, communication needs, capabilities, and social support were considered before the intervention began. Initial process and capability assessment included administration of the Minnesota Test for the Differential Diagnosis of Aphasia (MTDDA) (Schuell, 1965), Raven's Coloured Progressive Matrices (RCPM) (Raven, 1938), and Koh's Block Design Test (Yates, 1954). The subject's high score on the RCPM (100% correct) was considered a positive indicator for potential success with a visually based system such as Blissymbols. Vocabulary was initially based on what the author describes as "the,

then standard, 100-word chart following the Blissymbols Communication Institute programme guidelines" (p. 180). Subsequently, this vocabulary was adapted to address the subject's communication needs.

Bailey reported the subject's progress descriptively, through scores obtained in repeated administrations of the MTDDA, RCPM, and Koh's Block Design Test, and through subjective reports of system use in and outside of the training environment. Bailey found that, after 18 to 24 months of treatment, the subject was combining symbols to create new concepts and was using the symbols spontaneously at home and during treatment. At 24 to 30 months, the subject was using a 200-symbol chart and was communicating using combinations of words and Blissymbols. Overall, there were improvements on all MTDDA subtests, but performance on the RCPM and Block Design Test declined slightly.

It is ironic that, after 33 months of apparently successful use of this system, the author concluded that Blissymbols were not an ideal alternative communication method for the subject but were an effective treatment strategy. Bailey based this conclusion on the fact that, at the end of the intervention, the subject's MTDDA scores had improved; however, he had requested that Blissymbols be removed from his communication board. He wanted only words to be included on the board that he used for his spontaneous communication. In fact, a more appropriate conclusion may be that Blissymbols provided a functional alternative communication system during 30 months of intervention. Additionally, the Blissymbol training resulted in improved reading and writing of words for communication, which ultimately became this subject's communication method of choice.

An often-cited case study explored the use of manual sign by a subject with nonfluent aphasia (Coelho & Duffy, 1985). The subject of this study is described as a retired physician who scored at the 45th percentile overall on the PICA (Porch, 1967) and the 49th percentile on the auditory comprehension subtests of the DAE (Goodglass & Kaplan, 1983). The subject was taught a variety of manual signs representing nouns, verbs, and adjectives, with training including imitation, recognition, and production tasks. The authors report that, although the subject learned 73 of 90 signs presented in training, he used a trained gesture only once in monitored conversations and did not use the trained signs in interactions in his home. The authors concluded that although aphasic subjects can acquire sign vocabularies, they do not use trained signs for functional communication. It must be pointed out that the authors did not conduct a needs assessment either in the conversational or home settings before selecting vocabulary. In fact, vocabulary is described as being targeted to meet the subject's basic needs. Although the authors suggest that all tasks were designed to elicit use of the acquired signs, it could easily be argued that the communicative purposes

involved in topical conversations and in daily interactions in the home environment do not frequently require communication of basic needs (Light, 1988).

Case studies found in the AAC literature often integrate multiple communication modalities into systems that function to meet specific communication needs of aphasic adults (Beukelman et al., 1985; Garrett, Beukelman, & Low-Morrow, 1989). A case study presenting such a multimodality intervention demonstrated the ability of an aphasic adult to use and integrate a variety of communication methods at home and work (Beukelman et al., 1985). Communication needs were addressed and continuously monitored throughout the intervention. Process and capability assessment included findings of the PICA (Porch, 1967), subtests of the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1955), and the Raven's Progressive Matrices Test (Raven, 1960). Results of the PICA, administered at 1 month post stroke, found the subject with an overall score at the 22nd percentile and unable to perform any of the verbal tasks. Auditory comprehension scores were superior to verbal scores. The subject's performance was within normal limits on cognitive measures, which were administered 2  $\frac{1}{2}$  months post onset. Following the guidelines of the participation model, the subject's intervention evolved as the client's needs and abilities changed. Multiple administrations of the PICA were used to monitor language changes.

Initial intervention was designed to augment auditory comprehension deficits, meet the basic communication needs of the rehabilitation environment, and subsequently allow the subject to begin communicating about his business. In accordance with Aten's (1986) functional communication treatment, AAC intervention was conducted simultaneously with a program emphasizing improvement in expressive and receptive language skills. Initially, communication books were used to augment and teach improved auditory comprehension skills. At 9 months post onset, following improvements in auditory comprehension, melodic intonation therapy was introduced (Sparks & Holland, 1976). As the subject returned to work, workplace needs were identified and communication systems were changed to address new needs. The subject ultimately returned to his interior design business. His home office was reorganized so that catalogues and design materials could be easily accessed and used as augmentative communication tools, an artist was hired to assist with the communication of design concepts, and a voice output communication aid was added to his repertoire for topic introduction and conversational control.

Another successful AAC case study demonstrated the ability of an aphasic adult to use a number of communication modalities independently, switching between a hierarchy of modalities ranked for efficiency of use (Garrett et al., 1989). Prior to starting the intervention, a process and capability assess-

ment was completed with the WAB (Kertesz, 1982) and communicative competencies were assessed following the participation model. This assessment revealed strengths in communicative intent, supplementary use of gestures, and inconsistent ability to use an alphabet card for first-letter spelling. The subject used pointing, drawing, reading, and writing for communication. Nonstandard assessments of environmental awareness, pragmatics, reading, gesture, drawing, pointing, and first-letter spelling were conducted. A needs assessment indicated that the subject moved around his community independently and interacted with familiar and unfamiliar people on a daily basis. Communication barriers were identified in the multiple attempts required for familiar communication partners to decode messages, and frequent breakdowns that occurred with unfamiliar communication partners.

Intervention in this case study involved the introduction of multiple components to create a functional communication system, along with the use of natural communication in the form of speech, writing, and drawing. Components of the subject's communication system included the following: (1) a word dictionary organized by topics that could be accessed logically by the subject, (2) an alphabet card with first letters used to cue himself in verbal production or to cue his listener, (3) a new information pocket for storage of conversational props, (4) a card containing clues to assist an unfamiliar partner in formulating questions that would assist the subject in word retrieval, (5) printed conversational control phrases, and (6) blank writing paper. Once the system was established, barriers to effective communication were identified. They included the subject's inability to choose the most efficient mode of communication, his persistence in using inefficient communication methods, and his inability to resolve communication breakdowns. As a result, twice weekly treatment was conducted over 7 to 8 months to teach switching from most to least efficient communication modes in conversational activities, and to teach use of natural communication or control phrases for topic initiations and changes. Pre- and postintervention measures with an unfamiliar conversational partner showed improvement in conversational initiations, in total number of conversational turns, in frequency of communication breakdowns, and in the frequency and percentage of turns in breakdown repair. The subject reported satisfaction with use of his system in the community.

The case studies reported above suggest that when a complete AAC assessment is conducted, the outcome of AAC intervention may be successful for individuals with severe aphasia. In particular, treatment is effective when intervention is directed by the aphasic person's communication needs and capabilities, and when it addresses relevant social and environmental considerations. Although case studies do not demonstrate that the ultimate communication system for an

aphasic person will include all AAC elements used during recovery, all demonstrate use of AAC systems clinically and in the natural environment when communication needs cannot be adequately met with the use of natural methods. The last case study also illustrates the ability of a well-designed AAC system to supplement and to facilitate use of natural communication methods.

### Single-Case Experimental Research

One challenge of empirical AAC and aphasia research is to examine the effectiveness of interventions that appear in case studies. This challenge can be met only by designing studies that adhere to the standards of rigor applied to all research and have documented social validity. In the case of AAC and aphasia research, social validity not only implies significance in the lives of the population under study but significance to the disciplines under study. If the accepted practices of assessment for AAC intervention are not incorporated in planning and conducting empirical research, the validity of the research is in doubt.

Single-case experimental designs offer strength in their ability to deal with the variability of individual behavior and their ability to generalize by replicating the studies' findings (Barlow & Hersen, 1984). In single-case research, variability is controlled through the use of repeated measures, either presented sequentially over time or in a rapidly alternating manner. Generalization of behavior change may be measured in three ways in single-case research: (1) across subjects, (2) across behaviors, and (3) across settings. Single-case research is particularly well suited to answering questions about which type of treatment is appropriate for a given client, for a specific type of activity in a given setting. Recently published AAC and aphasia single-case experimental studies will be reviewed with questions regarding methodology (variability and generalizability of findings) and social validity (relevance in the lives of clients and clinicians) in mind.

### Withdrawal and Reversal Designs

Withdrawal and reversal designs are best used when a treatment effect would not be anticipated after treatment is withdrawn. The internal validity requirements of withdrawal designs demand that the treatment effect be demonstrated at three points in time (ABAB designs are therefore superior to AB or ABA designs). Replication across at least three subjects is a requirement for external validity in these studies. Additionally, in order to demonstrate a functional effect of the independent variable on the dependent variable, stability must be documented at three points prior to initiation of treatment and at each phase during treatment (Barlow & Hersen, 1984).

Only one study in AAC and aphasia, Garrett's unpublished dissertation (1993), meets all of the valid-

ity criteria outlined above. The published report based on Garrett's dissertation included data from only one of her subjects, so it does not meet the external validity requirement (Garrett & Beukelman, 1995). This study used an ABAB'B reversal design to examine the effect of an augmentative communication strategy (written choice) employed by conversational partners of severely aphasic subjects. The partner writes two to five words or phrases that are presented to the aphasic subject as response choices during conversation. Dependent measures included the following: (1) proportion of exchanges per topic, (2) comprehensibility of responses, and (3) accuracy of responses. Subjective ratings of the subject's satisfaction with the interaction also were evaluated. Garrett found that the level of all dependent measures improved when either thematic or nonthematic written choice was used. The aphasic subject's satisfaction ratings were idiosyncratic and unrelated to the other dependent variable measures.

Subject selection for the study involved administration of a number of criterion-referenced measures designed to identify individuals who possessed the necessary communication abilities required for the intervention (e.g., word matching and pointing to written words to respond to questions in a conversational context). The author also screened for communication need by determining that the subjects were not able to use natural communication methods to respond to questions in conversation. Personally relevant conversational topics were selected from a questionnaire completed by a person familiar with the aphasic subjects' interests and experiences. Each of these pre-measures represents an adaptation of standard AAC assessment practices. Together, they lend strength to the validity of the study's findings. Although external validity of the unpublished dissertation is not in doubt, unfortunately, the published paper's presentation of only one subject leaves the consumers of AAC and aphasia research in doubt about the generalizability of the study's conclusions.

### Multiple-Baseline Design

Studies conducted with multiple-baseline designs are used when treatment effects would be anticipated after treatment is withdrawn. A multiple-baseline design across behaviors will control for the effects of a treatment variable as treatment is sequentially initiated for different behaviors. A multiple-baseline design across subjects examines changes in a single behavior across multiple subjects who are, presumably, exposed to identical environmental conditions. A multiple-baseline design across environments examines changes in the behavior of a subject who is exposed to different environmental conditions (Barlow & Hersen, 1984).

A study conducted by Bellaire, Georges, and Thompson (1991) used a multiple-baseline design

across behaviors to investigate the use of communication boards by two subjects with severe Broca's aphasia. This study sought to achieve three objectives: (1) to determine whether aphasic individuals could be trained to use communication board vocabulary items, (2) to determine whether training would result in generalization to other items or other settings, and (3) to determine whether role playing or training communication board use in the natural setting would improve use of the boards in a coffee-hour setting. WAB (Kertesz, 1982) scores serve as process and capability assessment. The subjects received aphasia quotients of 11.5 and 11.0 on a 100-point scale. Both subjects scored 0 on all subtests, with the exception of the auditory comprehension subtest, on which they scored 5.75 and 4.1, respectively. Scores of 20.7 and 14.3 were reported for the subjects' cortical quotients. The cortical quotient represents an aggregated score for reading and writing subtests, Raven's Progressive Matrices (Raven, 1960), and a block design test. Although no formal communication needs assessment was conducted, the subjects were trained to use communication boards with items intended for use during the coffee hour at their nursing home. Generalization of communication board use to a natural setting was measured during these coffee-hour periods.

The authors sequentially trained their subjects to identify pictures representing vocabulary that addressed three different communication purposes: (1) items that might be requested during coffee hour, (2) personal or historical information about the subjects, and (3) social responses (e.g., "hi" or "thank you"). With five pictures devoted to each of the three communication purposes, the dependent measure was the ability of each subject to point to the 15 target responses on the communication board.

They found that both subjects were able to use communication boards for making requests and for personal responses but not for social responses during training sessions. No generalization to the coffee-hour setting was noted until training in that environment was instituted. Following training in the environment, both subjects used their communication boards to make requests and to communicate personal information during coffee hour, but not to produce social responses, such as "hi" and "thank you." As the subjects did not use the communication board for social responses, the authors suggested that communication boards may only be appropriate for communication of "specific content" items used for making requests or conveying specific information. They speculated that social responses may not have been used because they could not be depicted on the boards in a nonabstract manner or, as Hux et al. (1994) have suggested, because they were able to convey these messages using head nods and other naturally occurring gestures.

The Bellaire et al. (1991) study confirms that a well-designed single-case experimental study may substantiate some of the findings suggested by comprehensive case studies. The authors have shown that, when individuals with severe aphasia are taught to use communication boards designed to meet their needs in a natural setting, learning occurs. They have also demonstrated the importance of training severely aphasic people to use communication systems in the natural setting in order for generalization to take place.

### ***Alternating Treatment Design***

An alternating treatment design compares two treatments in a single subject. Important procedural rules help to control for the potential confounding effects of this design. One rule calls for counterbalancing treatments so that an order effect does not occur. Carry-over (always possible when learning is occurring) may be reduced by separating treatments with a time interval, counterbalancing, and slowing alterations in treatments (Barlow & Hersen, 1984).

A recent study used an alternating treatment design to explore the benefits of verbal versus nonverbal aphasia treatment on three subjects' ability to describe picture stimuli (Avent, Edwards, Franco, Lucero, & Pekowsky, 1995). The verbal treatment consisted of a program to improve spontaneous language production. The nonverbal treatment was a PACE-like program that emphasized gesture, writing, and drawing. Counterbalancing morning and afternoon sessions controlled for order effect. An attempt was made to control for potential carry-over effects through the use of different stimuli in the two treatment conditions. Avent et al. did not report assessment procedures or findings for their clients, other than to note aphasia type and aphasia quotients for each subject. They did not report which communication modalities were dominant for each of their subjects prior to initiation of treatment, nor did they report language subtest differences or findings of cognitive testing. Therefore, although the study is methodologically strong, the absence of a comprehensive AAC assessment casts doubt on the validity of its conclusions.

As each of the three subjects showed unique response patterns to the two treatments, the authors concluded that optimal treatment programs may be idiosyncratic for individuals with chronic aphasia. They recommended that the stability of baseline data points be used as an indicator of treatment outcome, as they interpreted variability of a communication modality's baseline condition to predict greater improvement during and following treatment. It is possible, however, that other factors related to the language or cognitive skills of their subjects explain the apparently idiosyncratic performance. For example, if baseline performance is considered an indicator of natural communication abilities, one might conclude

that the subjects responded best to the treatment that targeted the communication modality each favored naturally. Unfortunately, without comprehensive assessment data for each subject, the validity of any conclusion is in doubt.

Although not referred to as an alternating treatment design, another recently published study fits the design description (Steele, Kleczewska, Carlson, & Weinrich, 1992). This study compares a single aphasic person's ability to comprehend instructions given through three different language modalities. The researchers counterbalanced treatments within each session. However, they did not report attempts to control for carry-over effects. Although comprehensive assessment information is not provided, it is apparent that the subject's communication needs and capabilities were considered when designing the study. The subject scored zero in the naming, reading, and repetition subtests of the BDAE (Goodglass & Kaplan, 1983). The authors describe his fluency of speech as profoundly impaired and melodic line as absent. Auditory comprehension is described as only slightly less impaired than expressive language. Communication need is identified in the authors' statement that "impetus for the controlled study came from pilot work using the C-VIC system to assist the subject in recipe preparation" (p. 189).

Using a 15-point scale adapted from PICA scoring, Steele et al. (1992) found that their subject consistently followed commands better when the commands were produced by C-VIC (a computer-based system that uses icons for communication) versus written or spoken commands. Although no treatment, per se, was administered during the study, an alternating treatment design was appropriate for assessing the benefit of different methods of communicating commands to the aphasic subject. The nature of the study does not demand a baseline period, and clear differences in performance levels in the three different conditions lend strength to the authors' conclusion that C-VIC is the superior input communication modality for this type of task with this type of patient.

### **Experimental and Nonexperimental Group Studies**

Experimental group studies offer clear advantages when the objective of a study is to make inferences about causes and effects. According to Keppel and Zedeck (1989), three elements are critical to experimental within-subjects group designs: (1) subjects must be randomly selected, (2) treatments are manipulated by the experimenter, and (3) the experimenter has control over the conduct of the experiment. There have been no experimental group studies conducted to examine AAC interventions with aphasic people that meet all of these criteria.

In the past 5 years of aphasia and AAC literature, there has been one group study of multimodality training with severely aphasic adults (Purdy, Duffy, &

Coelho, 1994). This study used a within-subjects design to determine whether 15 aphasic adults could use trained symbols in structured communication tasks, which modalities they would use, and whether they would spontaneously switch between modalities when necessary. The study does not meet the criteria of an experimental design, as there is no indication that subjects were randomly selected.

Although they did not clearly follow AAC assessment practices, the investigators made an effort to consider communication needs and capabilities of their subjects in the study design. Process assessment consisted of administration of the PICA (Porch, 1967). Criteria for admission to the study required a PICA overall percentile of 25 or greater based on findings from Coelho and Duffy (1985). Communication needs were considered, as trained symbols would later appear as targets in conversational probes. Vocabulary used in the probes was drawn from the CADL (Holland, 1980) and was "judged to be representative of everyday communicative activities" (p. 347). Subjects were required to be living at home with communication partners, as it was thought that they would be more likely to have opportunities for communication and would be more likely to succeed at functional communication tasks.

All 20 selected target symbols were trained in each communication modality. However, training tasks were slightly different for each communication modality. Communication board training consisted of the examiner first pointing to each symbol and identifying it. The subject was asked to identify the symbol when its name and a sentence containing its name were given. If the subject was unable to identify the symbol, the examiner gave verbal prompts, demonstrated a correct pointing response, and then asked the subject to point to the symbol again, giving its name in isolation and in a sentence. Gestural training began with the examiner showing the subject a picture of the target and demonstrating the target gesture while a verbal cue for the gesture was provided. Then the subject was asked to imitate the gesture. Physical prompts were provided if necessary. Verbal responses were taught by the examiner first showing a picture, saying the target word, and asking the subject to imitate it. If necessary, phonemic, semantic, and visual placement cues were provided. Training in each modality ended when subjects reached 80% accuracy on all symbols. Baseline probes continued in previously trained modalities as training continued in new modalities. Eighty percent accuracy in at least two of the trained modalities was required for participation in the final measures of the study.

In the testing sessions, the subjects participated in two communication tasks: one task involved answering questions that required production of the target symbols and the second task required the subject to communicate the target symbols they identified in 15 multisymbol pictures. For both tasks, six dependent

variables were measured: (1) number of symbols produced spontaneously, (2) number of symbols produced following a cue, (3) method of communication used, (4) successful attempts to switch modalities, (5) unsuccessful attempts, and (6) the ratio of switching attempts to opportunities.

Results showed that, following training, subjects used the verbal modality more frequently in both the simulated conversation and picture description tasks ( $p < .01$ ). This was despite the fact that all 15 subjects had reached 80% criterion for successful use of communication board and gestural modalities, and only 4 reached criterion during training on the verbal task. The authors also found that, despite training in multiple modalities, the subjects switched modalities only 37% and 41% of the time, respectively, when opportunities arose in the two tasks. They speculated that preference for verbal responses was due to the more automatic nature of those responses, and that switching was rare because aphasic subjects do not have the ability to recognize their failure or plan alternate strategies. The authors suggested that research is still needed to examine cognitive variables that influence aphasic adults' ability to use alternate communication strategies and to assess the benefit of training in modality switching.

This study provides a clear example of research that offers little new information relevant to AAC intervention. Although the study documents the internal barrier that switching communication modalities presents for many aphasic individuals, it does not address factors that might influence learning of modality switching. The barrier of resistance to switching modalities had earlier been identified in the Garrett et al. (1989) case study. This case study offered no evidence that the aphasic subject could switch modalities without training. In fact, the study documented that successful switching required 7 to 8 months of treatment using role playing.

An interesting follow-up question, with more clinical relevance, might be to ask what influence different treatments have on teaching modality switching. Is role playing the most effective and economical method for teaching this behavior or are other treatments more effective? Bellaire et al. (1991) found environmental training critical to carry-over of communication board use to the natural environment. A study with greater social validity might compare the effects of different levels of environmental training on teaching modality switching. Is it necessary to train a behavior in a specific environment, or will the behavior be generalized if training takes place in a simulated environment or in a group treatment environment?

### ***Descriptive and Comparative Studies***

In addition to the studies described above, which incorporate accepted research designs, a few studies have been published that fit into no clear design cat-

egory but are significant to the field in some manner. Most of these studies attempt to link language or linguistic mapping theory with AAC interventions in aphasia (Funnell & Allport, 1989; Goodenough-Trepagnier, 1995; Salvatore & Nelson, 1995; Weinrich, McCall, Weber, Thomas, & Thornburg, 1995). One represented a follow-up to the Coelho and Duffy case study of sign acquisition (Coelho & Duffy, 1990).

Studies that explore the relationship between AAC system learning and underlying language processes offer potentially significant information to AAC and aphasia clinicians. By exploring the relationship between symbol use and underlying language competence, clinically relevant information is likely to emerge. It is important to remember, however, that the methodological weaknesses of these studies do not allow for generalization of the authors' conclusions to all candidates for AAC intervention. They may, however, provide clues to assist in process and participation assessment for AAC interventions in aphasia. For example, Goodenough-Trepagnier's (1995) study suggests that C-VIC performance may identify preserved linguistic capabilities that are not accessible through other communication modalities, and that deficits not likely to respond to treatment may be identified as well.

Unfortunately, some descriptive studies have not always been interpreted as providing guidelines for exploring internal opportunities or barriers to communication. Coelho and Duffy's (1985) case study of sign acquisition in an aphasic adult is often cited in subsequent research as justification for excluding aphasic individuals with low PICA scores from AAC intervention. Use of such weak evidence for determining overall candidacy of an aphasic individual for AAC intervention represents a contradiction of accepted AAC assessment practices.

### **DIRECTIONS FOR FUTURE RESEARCH**

Many of the case studies, single-case experimental, descriptive, and comparative studies discussed above fall short of proving the efficacy (benefit derived under ideal conditions) and the effectiveness (benefit derived under typical conditions) of multimodality or AAC treatments for severe aphasia (Blockberger, 1993). Case studies provide examples of treatment practices that appear to have merit, but only empirical research allows us to prove the usefulness of those practices. The absence of comprehensive AAC assessment in much of the empirical research and over-reliance on general candidacy questions seriously hamper our ability to make clear statements about aphasic adults' ability to use specific communication strategies and tools.

Although the field of AAC has moved well beyond simple candidacy models, some studies examining outcomes of multimodality or AAC intervention still seek to determine whether aphasic adults are candi-

dates for system use (Coelho and Duffy, 1985, 1990). This emphasis on candidacy results in research that frequently asks the wrong questions and often results in disappointing answers. As Bailey (1983) found in her attempt to study the outcome of a Blissymbols system intervention, asking only questions pertaining to candidacy makes it easy to miss more clinically relevant information. Had Bailey sought to examine how, not whether, a Blissymbol system benefited an aphasic adult, the conclusions would have had more therapeutic significance.

Less emphasis on questions of overall candidacy and the addition of needs, capabilities, and environmental constraints assessment will not weaken future studies. Research that incorporates these critical AAC assessment practices will lend strength to the rationale for a treatment approach and will make it possible to draw conclusions regarding both the efficacy and the effectiveness of that treatment.

This review of recent research illustrates that AAC intervention is a complex endeavor, dependent on assessment practices that consider multiple individual, environmental, and social factors. The difficulty of doing good AAC research with severely aphasic adults is further complicated by the nature of aphasia itself. Just as there is not only one AAC intervention to investigate, there is not one manifestation of severe aphasia. When research subjects' test scores and other evidence of communication strengths and weaknesses are considered, it is easy to see the complexity of the population under study. The wise investigator of the future will frame research questions with these considerations in mind.

In the summary of their position paper on aphasia research, Thompson and Kearns (1991) noted that most of the applied aphasia studies that they reviewed focused on evaluating effectiveness and few investigated treatment efficiency. They also observed that research examining generalization across settings and persons was uncommon and that social validation was often absent from the studies. The same conclusions may be drawn regarding the current body of AAC and aphasia research.

The literature itself provides some clues as to where our energy should be spent in AAC and aphasia research in the years ahead. It is clear from this review that the most clinically relevant information is contained in case studies and in single-case experimental research. As Purdy et al. (1994) have illustrated, questions of overall candidacy are not clinically relevant. Important information related to individual aphasic subject's communication needs and capabilities, and to the environmental factors influencing their outcomes, are lost when subjects are grouped together. This may explain why only one such study was found in the recent literature. It also explains why single-case experimental designs are more appropriate for many of the questions currently being asked about treatment outcomes. These

designs offer the researcher the opportunity to select subjects who possess the communication capabilities necessary for a specific intervention. The use of one to four subjects in a study allows an investigator the freedom to design a question that considers the communication needs and participation patterns of individual subjects as well as the demands of the experimental task. This review provides evidence that, using these methods, it is possible to conduct good single-case experimental research replicated across multiple subjects that is socially valid (Garrett, 1993).

The literature also provides clues as to which questions need to be asked next. This review points to the need for additional studies that examine treatment effectiveness questions, treatment efficiency questions, and questions related to generalization of new learning to the natural environment.

Treatment effectiveness studies should not focus on the general candidacy questions that many have asked in the past. Instead, questions should target specific treatments that are most effective in facilitating communication among different aphasic communicator types. For this purpose, it would be helpful to design studies targeted to one of Garrett and Beukelman's (1992) five aphasic communicator types (see Appendix A). Studies such as Bellaire et al. (1991) would answer questions about treatment effectiveness for the controlled-situation communicator. Studies designed to investigate switching behavior among multiple modalities would address treatment effectiveness questions for comprehensive communicators. Studies such as Steele et al. (1992) and Garrett and Beukelman (1995) would address the needs of the augmented-input communicator. As there is no research currently focusing on the specific needs communicator, qualitative methodologies might best isolate the questions that future investigators will seek to answer. A useful first step would be achieved if qualitative studies explored areas of communication need and asked questions regarding participation in specific settings. An objective of such a line of inquiry would be to identify environmental constraints and opportunities in the natural environments of individuals with aphasia. For example, what are the communication needs and the environmental barriers and opportunities for aphasic individuals who participate in stroke club meetings (Fox, 1996)?

Treatment efficiency studies will be especially important in coming years as cost containment continues to be a central issue in all phases of rehabilitation. Single-case experimental studies will need to compare teaching methods to determine which require the least time and energy to achieve comparable benefits. Such studies might examine direct versus indirect teaching methods. For example, is it more efficient for a clinician to teach a client to use a system or for a clinician to teach a spouse to facilitate system use? With which treatment method does the client learn to use the system most effectively and

most quickly? With which method does the client achieve the most rapid generalization of system use to the natural environment? A range of similar questions could be developed for different systems and communicator types.

As the examples above suggest, questions regarding generalization will be tied to treatment effectiveness and to the efficiency of teaching methods or tools used. However, generalization questions will require consideration of factors beyond the complications of aphasic communicator types and the multitude of treatment methods available. Generalization questions will also need to consider individual and environmental influences on system use in natural settings. When external and internal influences on communication are manipulated, we may begin to see other influences on behavior in the natural environment that will be more amenable to change than the underlying linguistic deficit of aphasia. Emphasis on the environment will expand the focus of generalization research from considering only issues of linguistic disability in aphasia to encompassing the psychosocial handicap of aphasia as well.

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## APPENDIX

## Assessment of Capabilities and Communicator Type

<i>Type</i>	<i>Communication Skill</i>
Basic-Choice Communicator	Points to clothing items given choice during morning dressing routine Points to photos in catalog to answer "favorite outfit" question Looks up when greeted Takes objects, returns them
Controlled-Situation Communicator	Attends to print Points to photos or picture symbols of needs (n = 2) to answer questions Can confirm or select topics of interest Can point to or look at written choices to answer conversational questions Aware of daily routine (e.g., gets glasses before therapy)
Comprehensive Communicator	Speaks some words Writes some words or word fragments Can communicate by drawing schematics, maps, objects Can locate items by category (structured task OK) Can communicate a specific word by pointing to first letter Gestures Pantomimes Recognizes own errors Recognizes communication breakdowns Demonstrates some pragmatic competence in discourse Knows which communication modality to use and when Wants to communicate in more than one setting with more than one partner Initiates questions and comments
Specific-Need Communicator	Has indicated need to perform specific communication task more efficiently: <ul style="list-style-type: none"> <li>• talking on the phone</li> <li>• writing letters</li> <li>• saying prayers</li> <li>• saying names of family members</li> <li>• signing name</li> <li>• making purchases</li> <li>• making lists</li> <li>• making memos</li> <li>• communicating destination on public transportation system</li> <li>• calling for assistance</li> </ul> <p>Demonstrates most skills from other communicator types</p>
Augmented-Input Communicator	Attends to print Attends to gestures Written key words appear to enhance comprehension Partner gestures appear to enhance comprehension Signals lack of understanding/breakdowns

From Garrett & Beukelman (1992).