Running head: BELIEFS REGARDING IMPACT OF ACCENT

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Beliefs regarding the impact of accent within speech-language pathology practice areas

Key words: service delivery, cultural/linguistic diversity, accents/bilingualism/dialects, scope of practice, professional policy

Abstract

With the demographic shifts in the U.S., it is increasingly the case that speech-language pathologists (SLPs) come from different language backgrounds from those of their clients and have non-native accents in their languages of service. An anonymous web-based survey was completed by students and clinic directors in SLP training programs in New York State regarding their beliefs about the appropriate scope of practice of SLPs with accents in English and other languages. Responses were received from 28 directors and 530 students. Perceived appropriateness of service by accented clinicians depended on particular disorders serviced and degree of accent, with phonologically-based services believed by the greatest number of respondents to require more native-like speech than other areas. Further efforts must be made to research effects of SLPs' accents on service delivery and plan strategies, if needed, for successful service provision in SLPs' diverse areas of practice when mismatches in language backgrounds occur.

The recent demographic shifts in the U.S. population have brought with them increased cultural and linguistic diversity in many speech-language pathologists' (SLPs') caseloads (American Speech-Language-Hearing Association [ASHA], 2011). Mismatches in client-clinician language backgrounds are occurring with increasing frequency. First, the majority of SLPs in the U.S. are native speakers of English (Kritikos, 2003; Saenz, Wyatt, & Reinard, 1998), resulting in an inadequate number of SLPs to serve the growing number of multilingual clients. In 2009, for example, less than 6% of ASHA members identified as multilingual or bilingual (ASHA, 2010a). Thus, given the number of clients who need SLP services in a language other than English, most non-native English speaking clients receive services from SLPs who either do not speak their native language or have non-native accents in the language. Secondly, possibly as a result of ASHA's attempts to recruit a more diverse student population, more racial/ethnic minorities have become new ASHA affiliates (13.3% in 2010, up from 11.7% in 2007), which is probably increasing the much needed dialectal and linguistic diversity in our field (ASHA, 2011). With more linguistically diverse clients working with native English speaking clinicians and more native English speaking clients working with clinicians from diverse language backgrounds, it is increasingly the case that clinicians speak their clients' language with a non-native accent.

ASHA's (2004) "Knowledge and Skills" document states that one of the roles of SLPs is to be sensitive to linguistic and cultural differences affecting services. Of interest is that the SLP scope of practice covers a large range of clinical domains, from dysphagia to augmentative and alternative communication (AAC) to phonological disorders (ASHA, 2007). An accent may be believed to affect outcomes in some treatment and evaluation areas more than in others. It is therefore important for the field to understand effects that accented speech (in any language) may have on clinical outcomes in those different areas of practice and, if needed, provide strategies for accented clinicians to work most effectively with their clients from different language backgrounds.

Given the limited literature on the topic, it is likely that clinicians' and clinic directors' beliefs will affect the assignment of clients to accented clinicians. That is, decisions based on these beliefs are made on a daily basis by clinic directors, who must determine whether a particular student-client pairing is appropriate (ASHA, 2011). Student beliefs can influence how well they or their fellow students feel they "fit" into the profession, which may create unspoken, but real, barriers to entry for SLP students with non-native accents.

The present study examined the beliefs of university clinic directors and students in New York State SLP programs regarding the degree of native-like speech needed to practice in the various areas serviced by SLPs. We begin by defining "accent" and providing a brief overview of the limited information known about the effects of accent on individuals without communication disorders as well as on the diverse clinical populations serviced by SLPs.

Definition of and Focus on Degree of Accent

We define "accent" as in the ASHA (2011, p. 2) professional issues statement as "pronunciation that is not the result of pathology and is perceived to be different from the listener's, whether the English was learned as a first, second or other language." Here we focus on foreign accents in any language and not on dialects, although similar issues may arise with dialectal variations. We note that "each of us has an accent" (Morley, 1996, p. 142, see also ASHA, 1998b, 2004) in that listeners perceive speakers from a language (or dialect) background different from their own as accented.

The relationship between accent and intelligibility has been described as "quasi-

independent” (Derwing & Munro, 1997). For example, some native American English speakers produce Parisian French segments in a non-native manner (e.g., front rounded /y/ as similar to /ju/) that is intelligible to native speakers of French (Levy and Law, 2010). Although intelligibility (as measured by naïve listeners’ transcription accuracy) generally increases as degree of accent decreases (Rogers, Dalby, & Nishi, 2004), Derwing and Munro found that certain heavily-accented speakers are more intelligible, as well as more comprehensible (i.e., judged by listeners as more intelligible), than other lightly-accented speakers.

Unlike the field of second language (L2) learning, which has generally changed its goal of pronunciation training from producing native-like speech to producing intelligible speech, the field of SLP has continued to focus on degree of accentedness rather than on intelligibility and uses terms such as “accent modification” and “accent reduction” rather than terms such as “intelligibility enhancement.” For example, ASHA’s (1998a, 1998b) policy statement and technical report regarding working in an L2 refers to an SLP’s ability to model the target phoneme or other linguistic structure as a consideration, but makes no reference to intelligibility. In the present study, beliefs regarding how native-like speech needs to be, rather than on how intelligible it needs to be, were investigated for the purpose of reporting on the current perceptions within the SLP field.

Brief Overview of the Literature on the Effects of Foreign Accents

A paucity of information exists on the effects of non-native speech on treatment and evaluation of individuals with deficits in the diverse areas serviced by SLPs (Langdon, 1999; Wilkinson & Payne, 2005) and may reflect a publication bias in reporting evidence of accent effects rather than null results (no effect). This study examined beliefs regarding how native-like speech needs to be for clinicians to provide services in the different areas within SLPs’ expansive scope of practice.

Intelligibility of accented speech depends upon the languages paired, degree of accent, and characteristics of the stimuli and listeners. Studies by Bradlow and Bent (e.g., Bent & Bradlow, 2003; Bradlow & Bent, 2008) have indicated that more familiar accents and milder accents (as perceived by listeners) are often the most intelligible (see also Schmid and Yeni-Komshian, 1999). Bent and Bradlow (2003) demonstrated an interlanguage intelligibility benefit when listeners shared the same background as the L2 speakers. For example, native speakers of Chinese (of various dialects) found English uttered by native speakers of Chinese more intelligible than English uttered by native speakers of American English (AE). Furthermore, these Chinese listeners also found Korean-accented English to be more intelligible than English uttered by AE speakers, suggesting that some accented speech uttered by individuals from particular language backgrounds may be more intelligible to non-native listeners than native speech. In addition, vowel production errors are more detrimental to intelligibility than are consonant production errors, and segmental errors at the beginning of a word are more detrimental to intelligibility than are errors in other word positions (Bent, Bradlow, & Smith, 2008).

Burda and her colleagues have studied perception of accented speech as a function of the age of the listener. Burda, Scherz, Hagemen, and Edwards (2003) found that older listeners performed significantly less accurately than younger listeners in understanding accented speech. Furthermore, elderly adults perform more accurately on familiar accents and on longer utterances than on shorter utterances spoken with unfamiliar accents, probably benefiting from context to understand accented speech (Burda, Overhake, & Thompson, 2005). **In addition, background noise has** been found to increase the difficulty of comprehending unfamiliar accents (Adank,

Evans, Stuart-Smith, & Scott; Gordon-Salant, Yeni-Komshian, & Fitzgibbons, 2010a; 2010b). Thus, factors other than the ability to model a target are likely to be important to communicative success in the SLP setting, although a native-like model might be more important in certain domains of SLP than in others.

Less is known about the perception of accented speech by listeners with speech sound disorders and by listeners with cognitive disorders. To the authors' knowledge, the only peer-reviewed study regarding accent perception by children with speech sound disorders is by Nathan and Wells (2001). The authors report on a lexical decision task performed by children with "speech difficulties" and typically-developing controls in London. Stimuli were words such as "mox" vs. "box" uttered in an unfamiliar (Glaswegian) accent versus a familiar (London) accent. The listeners with speech difficulties made more errors with the Glaswegian stimuli than with the London stimuli, whereas responses by the typically-developing children were not affected by accent (but cf. Wilkinson & Payne, 2005). The authors suggest that listeners with phonological disorders may have difficulty mapping variations of speech sounds onto their phonological inventory.

Regarding populations with cognitive difficulties, Burda, Hageman, Brousard, and Miller (2004) found that adults with dementia performed significantly less accurately than age-matched peers on comprehension of words and sentences spoken by adults with foreign accents. (See also Mahendra, Bayles, and Tomoeda, 1999, for similar results.) In the realm of language disorders, Burda, Brace, and Hosch (2007) found that listeners with aphasia (the type was unspecified) performed significantly less accurately than their age-matched peers without aphasia on transcribing medical sentences, particularly when the sentences were produced by accented speakers. (See also Dunton, Bruce, and Newton, 2010, for similar results.)

In summary, the sparse literature on the topic, with a probable publication bias toward accent effects, suggests that accent may indeed affect intelligibility for most individuals with and without communication disorders. The clinical impact of accented SLPs is little understood and needs to be balanced with the strong need for SLPs to service the many languages represented by clients in the field. It should be noted that a clinician's accent in one language often indicates native-like speech in another language that is needed by the field of SLP.

Beliefs About Accent

Despite the paucity of information about the importance of native-like speech for SLP service delivery, multilingual clients continue to be served in their native languages by clinicians with non-native accents in their clients' languages. With little information and few policies in place about placement of accented clinicians (Levy & Crowley, 2011), professionals who assign SLPs to their clients are forced to make placement decisions based on their beliefs about the impact of a clinician's accent on SLP service delivery rather than on evidence or clearly stated policies.

Beliefs are of practical interest because they affect institutions' policies and practices, as well as experiences of SLPs with accents. For example, Levy and Crowley (2011) demonstrated that students with accents in English were more likely to be asked to receive accent modification (and indeed followed the recommendation) than were students with accents in Spanish. Within SLP programs, the beliefs of students and clinic directors alike contribute to the overall perception of the impact of accents on services. Students bring these beliefs with them when, as professionals, they make decisions regarding clinicians with accents. Research has indicated that simply a photograph of an Asian instructor resulted in listeners perceiving the instructor as more accented than the same speech paired with a photograph of a Caucasian instructor (Rubin &

Smith, 1990). In addition, the speaker who was perceived as more heavily accented (due to the photograph presented with the speech) was also perceived as being a less-adequate instructor than the speaker who was perceived as less accented. These findings suggest that attitudes toward speakers' accents are based on much more than the speech signal and affect the perceived competence of the speaker, which may, in turn, affect the speaker's professional experience.

The present study examined clinic directors' and students' beliefs regarding 1) in which areas of practice an accented SLP can provide treatment and evaluations appropriately, and 2) how native-sounding an SLP needs to be in order to treat or evaluate clients within each area of practice. In Langdon's (1999) California survey, all 38 bilingual SLP respondents were relatively inconsistent on the level of accent or intelligibility needed in their L2 in order to treat their clients in that language. For the present larger study, New York State was selected as the location, as it is a state with a linguistically diverse population. It was expected that the perceived importance of pronunciation and the extent of native-like speech needed would vary as a function of the area of practice and the degree of accent, with accent modification and phonological disorders selected as areas for which more native-like speech would be needed.

Method

Survey Development

Two questionnaires were developed and revised multiple times in response to piloting: The "director survey" was created for clinic directors, department and program chairs, and clinic coordinators in NY State graduate and undergraduate SLP training programs. (See https://www.surveymonkey.com/s.aspx?sm=GNvsGpTgARrHhgXPOq_2f9rA_3d_3d for the director survey.) The "student survey" was developed for SLP students at the same institutions. (See https://www.surveymonkey.com/s.aspx?sm=X2YPmGMPV_2b_2fbVyINUKcbYg_3d_3d for the student survey.) Both surveys included multiple choice questions, rating scales, and comment boxes for open-ended questions. SurveyMonkey (www.surveymonkey.com) software was used with an encryption device for assuring anonymity. For details regarding the development and circulation of the surveys, please see Levy and Crowley (2011), which reported on policies and practices regarding SLP students with accents in different languages. The present article reports on the respondents' beliefs regarding degree of native-like speech needed for the various treatment and evaluation areas serviced by SLPs.

Participants and Sampling Procedure

Institutional Review Board (IRB) applications were processed through 20 institutions. The director survey was sent to 33 NY State undergraduate and graduate programs listed on the ASHA website, to the National Academy of Preprofessional Programs in Communication Sciences and Disorders (NAPP), and the Metropolitan Council of Clinic Directors. After IRB approval, the directors were asked to distribute the student survey via e-mail to all of their students. In 18 of the institutions, directors stated that they had done so. Students also forwarded the survey to other SLP students in NY State. The respondents included students in master's (53%) and bachelor's (47%) degree programs. Most respondents (56%) were studying in an urban setting, 24% in a suburban setting, and 20% were studying in a small town or rural setting. Most (81%) were native speakers of English. Please see Levy and Crowley (2011) for further descriptions of the participants and measurement tools.

Data Analysis

Data files in SurveyMonkey software were exported to SPSS for analysis. Inferential statistics were performed on the student survey, but not on the director survey because of the small number of director responses. Reliability for the director survey was performed by a

graduate student by means of fact-checking program level and setting for the 67% of clinic directors who listed their universities. For these questions, director surveys were 100% consistent. Of the student surveys, 326 were analyzed by a graduate student for consistency among responses to what their native language was and their age of acquisition of the language. For example, if students answered that their native language was English and also responded to “How old were you (in years) when you began learning English?” with “0-2 years old,” this was considered consistent. Reliability was 89%.

Results

Responses were received from 28 directors and 530 students. For each survey, percentages for each question reported are the frequency of a particular response divided by the number of individuals responding at that point in the survey.

Accents and Treatment Areas

Figure 1 represents directors’ and students’ responses to the question “Generally speaking, please select all the areas you feel can be TREATED appropriately by an accented clinician.” The darker line represents students’ responses and the lighter line represents directors’ responses. Responses are presented in order of the highest number of student responses per area to the lowest. The percentage of directors who felt accented clinicians could appropriately treat clients ranged from 64% to 96% (mean = 84%). A pattern of fewer directors selecting the phonologically-centered areas (accent modification [72%] and phonological disorders [64%]) than areas such as voice (96%) and dysphagia (92%) as appropriately treated by accented clinicians was revealed.

The percentage of students who felt that accented clinicians could appropriately provide treatment in the various SLP domains was lower than the directors’, ranging from 37% to 80% (mean = 66%). The fewest students selected “accent modification” (37%) and “phonological disorders” (43%) as domains appropriately treated by an accented clinician, areas in which the target of the treatment would be speech sounds. The percentage of students who selected the remaining areas (child language disorders, adult language disorders, AAC, voice disorders, communication in autism spectrum disorders, fluency disorders, dysphagia, and aural habilitation and rehabilitation) ranged from 65% to 80%. McNemar tests were administered to examine differences in number of student responses for each category. (Please see Appendix A for McNemar values for treatment and evaluation areas.) Phonological disorders and accent modification were selected by significantly fewer students than all other areas (e.g., phonological disorders vs. adult language disorders (73%): $p < 0.001$). Dysphagia was selected by significantly more students (80%) than all other areas except AAC (77%), $p = 0.119$ (e.g., dysphagia vs. adult language disorders: $p < 0.05$). Fluency was selected by a surprisingly low percentage of students (65%); the other treatment areas selected by the fewest students were language-, phonology-, or hearing-based. It was not expected that students would be as concerned about the impact of a clinician’s accent on the treatment of fluency, meaning the speech disorder of stuttering, as they would be about its effect on the treatment of a language disorder, for example. One could speculate that the students understood “fluency” to denote “language proficiency” or “fluency in reading” rather than “stuttering” and other fluency disorders. Twenty-five students (7%) indicated that they felt that accented clinicians were not appropriate for any treatment area. (No clinic director responded similarly.)

[Insert Figure 1 about here]

Accents and Evaluation Areas

As shown in Figure 2, the directors’ and students’ responses to “Generally speaking,

please select all the areas you feel can be EVALUATED appropriately by an accented clinician” followed the same patterns as the treatment question. However, more respondents tended to be accepting of accents for evaluation than for treatment (Students’ range: 59%-87%, mean = 79%; directors’ range: 70%-100%, mean = 89%). McNemar tests confirmed that for evaluation areas, as well, more students believed these phonologically-oriented areas to require native-like speech than other areas, e.g., phonological disorders (64%) vs. adult language disorders (84%), $p < 0.001$; accent modification (59%) vs. adult language disorders (84%), $p < 0.001$. One director commented that all areas could be evaluated or treated if they could be modeled, and another stated that “Because evaluation requires interaction with the client, all...areas could be affected if the accent was ‘strong.’”

[Insert Figure 2 about here]

Ratings

Students and directors were further asked “If the above answer regarding treatment [or evaluation] depends on how strong the accent is, please use the 1-9 scale below to indicate how native-sounding you feel a clinician should be in order to treat[/evaluate] each area.” On this scale, 1 indicated “very native-sounding” and 9 indicated “very foreign-sounding.” In Figures 1 and 2, the median ratings for treatment and evaluation are listed to the right of each area listed. Although the ratings ranged from 1 to only 6, students’ and directors’ ratings regarding treatment and evaluation were consistent with percentages of responses. For example, the median ratings were among the lowest (i.e., most native-like speech required) for phonological disorders (median of 1.5 for directors, 2 for students for treatment; median of 2 for directors, 3 for students for evaluation) and for accent modification (median of 3 for directors, 1 for students for treatment; median of 3 for directors, 3 for students for evaluation). The ratings were highest (i.e., most foreign-sounding) for the non-linguistically-based area of dysphagia (median of 5 for directors and students for treatment; median of 6 for directors, 5 for students for evaluation).

Considering Accents

In addition to the research questions presented about areas of practice, the director survey asked whether directors considered accents when making placement decisions. Among the directors, 44% reported they did consider accents when arranging for placements, the same percentage reported they did not, and 12% reported that they did not know. Approximately 40% reported that a client or caregiver had shown concern about or resistance to working with a student because of his or her accent, whereas more than half (60%) reported that this had not occurred. Regarding whether programs provide information regarding strategies to use to improve use of English, 19 (73%) answered yes, 6 (23%) answered no, and 1 (4%) did not know.

Students who planned to practice in their non-native languages were asked if having an accent had affected their treatment. Of those who had practiced, a total of 135 (80%) answered that their accent had not affected their treatment, 21 (12%) answered it had minimally affected their treatment, 11 (7%) answered that it had moderately affected it, and 2 (1%) answered that it had greatly affected it. Comments included “Many parents believe that an SLP with an accent cannot treat certain areas and request change of clinician,” “I have to practice myself the non-native sounds or tape them to make sure I provide the right-model,” and “It is difficult to provide good language modeling to a child with delayed language if the clinician's accent is not good.”

Students were further asked if they believed that their accent had affected their clinic’s decisions regarding the sorts of disorders they would treat. A total of 21 students (17%) responded that their accent had affected their clinic’s decision; 101 (83%) said it had not. The 15 comments included “I don't think my accent affected my clinic's decisions about what disorders I

will treat, but I would be hesitant about doing accent reduction therapy because of my own slight accent,” and “Not yet learning the possible language.”

Discussion

In summary, an anonymous web-based survey was circulated in NY State SLP training institutions, requesting information from clinic directors and students regarding their beliefs about the appropriateness of treatment and evaluation by accented clinicians in the various areas serviced by SLPs and the degree of native-like speech needed for each area. Respondents were most concerned about accents for SLP domains in which speech sounds themselves are the targets of services (i.e., phonology, accent modification). For areas in which pronunciation and language may be thought less directly involved (e.g., dysphagia), more respondents were accepting of accents. A subset of directors and students reported that accents had been a consideration in their placement decisions.

The respondents' ratings regarding their beliefs on how native-like speech needs to be indicated that students and directors believe that certain areas within the SLP domain, especially those in which speech sounds are the target of services, require more native-like speech than others. Language disorders in adults were not among the areas of service perceived as needing clinicians with the most native-like accents, despite the literature (e.g., Burda et al., 2003; 2007) indicating that elderly adults, particularly those with aphasia, have greater difficulty understanding accented speech than native speech.

Given the paucity of policies and information on the topic (Levy & Crowley, 2011), it is likely that beliefs will determine decisions made regarding clinical placement of accented SLP students and professionals. Indeed, ASHA's Office of Multicultural Affairs reports that it fields numerous calls both from faculty members deciding whether to permit students with accents to participate in practica and from students who request assistance when clinical opportunities are denied to them because of concerns about their accents (ASHA, 2011).

It is important to increase our understanding of the impact of accented speech on perception by individuals with the wide variety of disorders serviced by SLPs and to identify effective strategies for improving communication when appropriate. Several areas of speech research may contribute to knowledge on which appropriate decisions regarding matching clients with accented clinicians can be based (see Huer & Saenz, 2003). First, if a clinician's speech needs to be modified, it is important to know the efficacy of the “treatments” the speaker might undergo. It is widely understood that accents are often based on the speaker's perceptual representation of L2 speech sounds and that accents are not easily modifiable in adulthood (Flege, 1995). However, techniques targeting perceptual accuracy (Bradlow, Pisoni, Akahane-Yamada, & Tohkura, 1997) and intelligibility, rather than elimination of accents, might be advisable if needed. For example, Bradlow and her colleagues trained native Japanese adult listeners to perceptually identify the AE /r-l/ contrast. The Japanese participants made gains not only in their identification accuracy, but also in their production of AE /r/ and /l/ (without any production training), suggesting that gains from perceptual training can transfer to production skills. The hyperarticulating mode of “clear speech,” a speech style typically directed at non-native listeners or listeners with hearing impairments may increase intelligibility for non-native speakers (DeMasi, & Krause, 2010). Clear speech is characterized by more pauses, a slower rate of speech, and a higher fundamental frequency than typical (“conversational”) speech (Bradlow, Kraus, & Hayes, 2003; Krause & Braid, 2002; Uchanski, 2005). However, the “clear speech advantage” (i.e., the documented intelligibility benefit provided by this speech style) is greater for native than for accented speakers (Levy, Garcia, Leone, & Lew, 2010; Rogers, Smiljanic & Bradlow, 2008).

Secondly, successful clinicians can have accents (ASHA, 2011), and their clients may thus be motivated to adapt to their accents. Perceptual difficulty with an accent may be decreased with exposure to the accent, even if it is uttered by a different person with that accent (Bent & Bradlow, 2003). Thus, in appropriate cases, such as when a client is interested in working with a particular clinician, efforts can be made to expose the client to a clinician's accent in order to assist the client in understanding the clinician.

Most of the studies reviewed examined perception by individuals with intact communication and may be relevant for SLP populations such as those with dysphagia or voice disorders. In order to apply more directly to other populations for whom speech processing may be decreased, replications with listeners and speakers in clinical settings are needed. Meanwhile, clinic directors making decisions about the scope of practice of an accented clinician might take into thoughtful consideration the literature on the topic, but also be aware that the nonacceptance of students or clinicians solely on the basis of an accent is discriminatory (ASHA, 1998a) and that along with accents come some very capable SLPs and much-needed diversity in our field (ASHA, 2011). In turn, SLP students and clinicians, regardless of their accents, are responsible for determining their own personal scope of practice (ASHA, 2010b).

Clinic directors may wish to initiate program-wide discussions on current approaches to client pairings and clinical placements for students with accents. In these discussions, clinic directors may also consider identifying and offering support early to students, developing accent modification/intelligibility enhancement plans, focusing on client perceptions of student accents, and working to develop student accent self-awareness (ASHA, 2011). These discussions may lead to modifications in policies and procedures for working with students with accents and, potentially, to developing important research avenues for faculty and students alike.

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Figure 1. Directors' and students' responses to the question "Generally speaking, please select all the areas you feel can be TREATED appropriately by an accented clinician." The "median rating" column lists median ratings by directors and students in response to "If the above answer regarding treatment depends on how strong the accent is, please use the 1-9 scale below to indicate how native-sounding you feel a clinician should be in order to treat[/evaluate] each area," with 1 indicating "very native-sounding" and 9 indicating "very foreign-sounding."

Figure 2. Directors' and students' responses to the question "Generally speaking, please select all the areas you feel can be EVALUATED appropriately by an accented clinician." The "median rating" column lists median ratings by directors and students in response to "If the above answer regarding evaluation depends on how strong the accent is, please use the 1-9 scale below to indicate how native-sounding you feel a clinician should be in order to treat[/evaluate] each area," with 1 indicating "very native-sounding" and 9 indicating "very foreign-sounding."

Appendix A

McNemar values for (two-tailed) tests of differences in number of student responses for each treatment and evaluation area

Comparison		McNemar value	
Disorder 1	Disorder 2	Treatment	Evaluation
Adult language disorder (ALD)	Child Language Disorder (CLD)	0.002	0.549
Phonological/speech disorder (Phon)	CLD	0.000	0.000
Augmentative-Alternative Communication (AAC)	CLD	0.001	0.090
Voice	CLD	0.056	0.126
Autism Spectrum Disorder (ASD)	CLD	0.003	0.035
Fluency (F)	CLD	0.208	0.568
Accent Modification (AM)	CLD	0.000	0.000
Dysphagia (D)	CLD	0.000	0.144
Aural Habilitation (AH)	CLD	0.002	0.888
Aural Rehabilitation (AR)	CLD	0.434	1.000
Phon	ALD	0.000	0.000
AAC	ALD	0.193	0.243
Voice	ALD	0.906	0.211
ASD	ALD	0.583	0.110
F	ALD	0.002	0.322
AM	ALD	0.000	0.000
D	ALD	0.010	0.291
AH	ALD	0.002	1.000
AR	ALD	0.011	0.644
AAC	Phon	0.000	0.000
Voice	Phon	0.000	0.000
ASD	Phon	0.000	0.000
F	Phon	0.000	0.000
AM	Phon	0.009	0.029
D	Phon	0.000	0.000
AH	Phon	0.000	0.000
AR	Phon	0.000	0.000
Voice	AAC	0.321	1.000
ASD	AAC	0.504	0.839
F	AAC	0.000	0.020
AM	AAC	0.000	0.000
D	AAC	0.119	1.000
AH	AAC	0.000	0.150
AR	AAC	0.000	0.050
ASD	Voice	0.813	1.000
F	Voice	0.000	0.006
AM	Voice	0.000	0.000
D	Voice	0.011	1.000
AH	Voice	0.001	0.164
AR	Voice	0.004	0.060
F	ASD	0.000	0.010
AM	ASD	0.000	0.000
D	ASD	0.025	0.860

AH	ASD	0.000	0.080
AR	ASD	0.001	0.029
AM	F	0.000	0.000
D	F	0.000	0.020
AH	F	1.000	0.392
AR	F	0.598	0.672
D	AM	0.000	0.000
AH	AM	0.000	0.000
AR	AM	0.000	0.000
AH	D	0.000	0.175
AR	D	0.000	0.050
AR	AH	0.359	0.508