Improving the reliability of caregivers' responses on the Infant-Toddler Meaningful Auditory Integration Scales (IT-MAIS) via video

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IMPROVING THE RELIABILITY OF CAREGIVERS’ RESPONSES ON THE INFANT-TODDLER MEANINGFUL AUDITORY INTEGRATION SCALES (IT-MAIS) VIA VIDEO

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Masters of Arts

in

The Department of Communication Sciences and Disorders

by

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B.A., Louisiana Tech University, 2011
May 2014
ACKNOWLEDGMENTS

First, and foremost, I want to thank my mentor Dr. Brittan Barker. She has guided me through this entire process, and I could not have become the researcher I am without her help. She has continually challenged me to think on a higher level and encouraged me to grow as a person and researcher. She patiently waited on me through both the ups and the downs, and for that I am forever grateful to share this experience with her.

I would also like to thank both of my committee members Dr. Neila Donovan and Dr. Josh Grimm. I am so grateful for the opportunity to have you two be a part of my research. I appreciate your patience and education. Thank you for taking time from your schedules to serve on my committee.

I thank the wonderful ladies of the Speech Language Processing (SLP) Lab. You all have been so helpful and patient with me. Thank you for your help and feedback. I’d especially like to thank Rachelle Eugster. Thank you for keeping me sane and rounding up the lab ladies for me. I appreciate your help and being there for me!

Lastly, I want to thank my family for all of their encouragement. I could not have made it this far without each of your patience and understanding. I especially want to thank my boyfriend, Lee Daquanno. I do not think I could have survived without his guidance to never settle for “good enough,” his never ending love and support, and his willingness to give me the time and space to complete this project.
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ABSTRACT

The *IT-MAIS* is a caregiver-report tool used to assess a child’s functional auditory development pre- and post-implantation (Zimmerman-Phillips, et al., 2001) and as a measure of functional auditory behaviors in studies exploring cochlear implant (CI) candidacy (Barker, Kenworthy, & Walker, 2011; Franz 2002; Osberger, Zimmerman-Phillips, & Koch, 2002). However it lacks psychometric analysis of its overall reliability and validity, which are essential in determining the strength of the *IT-MAIS*’ conclusions in determining the direction of a child’s clinical intervention outcomes. Barker, Donovan, Schubert, and Walker (2013) showed in their longitudinal study that caregivers did not predictably respond to items from the *IT-MAIS*. These unpredictable caregiver responses to the tool’s items lower the report’s caregiver reliability. We predicted that videos for each *IT-MAIS* item could accurately depict the assessment’s targeted auditory behaviors if both rater groups found the same videos to be most representative of each *IT-MAIS* item.

In Study 1 we generated 6 video scenarios and had 10 pediatric audiologists rate the video scenarios for each *IT-MAIS* item using a 7-point Likert scale. Results from Study 1 showed that pediatric audiologists found two scenarios for each *IT-MAIS* item that differed only by their point of view. Then the results from Study 1 and were filmed the 2 top-rated video scenarios for each *IT-MAIS* item. In Study 2, 5 different pediatric audiologists determined whether each video accurately depicted its corresponding *IT-MAIS* item. In Study 3, 20 caregivers rated how representative each video was of its corresponding *IT-MAIS* item using a 7-point Likert scale. Results from Studies 2 and 3 showed that the reporting audiologists and caregivers found the same 10 videos to be most representative. Those final videos were found to accurately depict the targeted behavior in each *IT-MAIS* item, and are the first step in improving the *IT-MAIS*’ intra-
rater reliability. Our future directions suggested the need for these final 10 videos to be used in the IT-MAIS’ clinical administration to determine if they allow more predictable caregiver responses. These videos can be found to improve the IT-MAIS’ intra-rater reliability if caregiver responses become more predictable.
CHAPTER 1. PRÉCIS OF CURRENT PROJECT

Caregiver reports are essential for collecting valuable information regarding children between 0 and 36 months of age—especially when it comes to measuring functional auditory behaviors. One of the caregiver report measures currently used to assess such behaviors is the *Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS; Zimmerman-Phillips, Osberger, & Robbins, 2001)*. The *IT-MAIS* is used by speech-language pathologists and audiologists to assess a child’s functional auditory development both pre- and post-implantation (Zimmerman-Phillips, et al., 2001). The *IT-MAIS* is also used by Cochlear Implant (CI) researchers as a measure of functional auditory behaviors in studies exploring CI candidacy and tracking listening development post-implantation (Barker, Kenworthy, & Walker, 2011; Franz 2002; Osberger, Zimmerman-Phillips, & Koch, 2002). Although the *IT-MAIS* is widely used in both the clinic and laboratory, its validity and reliability are questionable. The present study was an initial step in improving the reliability of the caregivers’ responses to the *IT-MAIS* items.

Barker and colleagues (Barker, Donovan, Schubert, & Walker, 2013) recently evaluated longitudinal pre- and post-CI *IT-MAIS* data from the parents of 23 CI users, aged 10 to 36 months. The authors, through the use of Rasch analysis, showed that the *IT-MAIS* needed improvement to be better utilized by researchers and clinicians who diagnose and treat infants and toddlers with severe to profound sensorineural hearing loss. For the present project, I focused on Barker and colleagues’ specific finding that the parents reporting on their children’s behaviors over a duration of 4 years’ did not use the *IT-MAIS*’ 5-unit rating scale reliably. The person misfit data suggested that caregivers did not predictably respond to 2 items (item 1 and 10) on the 10-item *IT-MAIS*. However, caregivers must be able to predictably respond to the questions in order to establish the *IT-MAIS* as a reliable tool for assessing listening development.
The authors hypothesized that the unpredictable caregiver responses could be a result of different audiologists using different examples of the IT-MAIS’ targeted auditory behaviors to elicit responses, caregivers guessing on an item when they had limited understanding of their child’s listening behaviors, and caregivers failing to identify observable behaviors due to incoherent question wording. In order to improve the caregivers’ reliability, we needed to eliminate these possible causes of unreliable responses.

If we ensure that caregivers respond to each question reliably, then we can not only better predict how a caregiver will respond to each question but also begin to improve the reliability of the IT-MAIS overall. We proposed that one way to improve caregivers’ response reliability on the IT-MAIS was to present caregivers with standardized video examples that accompany each IT-MAIS item. For this project we took the initial step in creating such videos. We filmed scenes that featured a caregiver and a child interacting in various scenarios with the aim of creating examples of the targeted auditory behavior in each IT-MAIS item.

The present project consisted of 3 studies. In Study 1 we created 6 video scenarios for each IT-MAIS question. Next, we had 10 certified pediatric audiologists rate the video scenarios as to how representative each one was to its corresponding IT-MAIS item. Then, we created videos based upon the top-rated video scenarios for each IT-MAIS item as rank-ordered by certified pediatric audiologists. In Study 2 an additional group of 5 certified pediatric audiologists stated whether or not each video represented the corresponding IT-MAIS item. Finally in Study 3, 20 caregivers ranked how representative each video was to its corresponding IT-MAIS item using a 7-point Likert scale. We predicted that both the caregivers and pediatric audiologists would rate the same 10 videos as most representative, which would mean the videos accurately depicted the targeted auditory behavior in each IT-MAIS item.
CHAPTER 2. REVIEW OF THE LITERATURE

In 1990 the United States Food and Drug Administration (FDA) approved cochlear implantation for children who are as young as 12 months old (Holt & Kirk, 2005; Osberger et al., 2002). When a family decides a cochlear implant (CI) is the appropriate intervention for their young deaf child, she must undergo an evaluation before receiving a CI. For children ranging from 0 to 36 months old, this process typically involves various behavioral and physiological measures of audiology, speech, and language (Copeland & Pillsbury, 2004). Physiological measures such as Auditory Brainstem Response (ABR), Auditory Steady-State Response (ASSR), and Otoacoustic Emission (OAE) testing are used to objectively assess a child’s peripheral hearing and middle and inner ear integrity (Martin & Clark, 2009). While these physiological measures are useful, they can result in inaccurate or incomplete results if used as the sole basis for a child’s diagnosis of hearing loss (Johnson, 2002). Because of the physiological measures’ inability to assess integration between the peripheral and central auditory systems (Martin & Clark, 2009), audiologists turn to behavioral measures to compliment these objective measures and determine the integrity of the interactions between the auditory systems. Physiological measures are important for measuring peripheral hearing and middle and inner ear integrity while behavioral measures assess integration between the peripheral and central auditory systems (2009). Both physiological measures and behavioral measures cannot stand alone in confirming a diagnosis and are used to “cross check” each measure’s results (Jerger & Hayes, 1976). This cross checking becomes essential when determining a child’s eligibility for a CI. One of the behavioral measures audiologists use to assess functional listening skills in infants and toddlers ages 0 to 36 months is the caregiver-
The report tool known as the Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS; Zimmerman-Phillips et al., 2001).

The IT-MAIS is used by CI clinical research programs to assess and track progress of children’s functional auditory behaviors both pre- and post-implantation (Osberger, et al., 2002; Franz, 2002). It is a criterion-referenced, caregiver-report tool used with children with profound hearing loss between the ages of 0 and 36 months old. The IT-MAIS consists of 10 interview questions administered to the child’s caregivers and intended to be scored by either a speech-language pathologist or an audiologist. Each question requires the caregiver to describe the frequency of the child’s ability to vocalize, alert to sounds, and derive meaning from sound using a 5-point Likert scale: 0 (never), 1 (rarely), 2 (occasionally), 3 (frequently), and 4 (always).

While the IT-MAIS is widely used in clinics and laboratories (e.g., Barker, Kenworthy, & Walker, 2001; Franz, Caleffe-Schneck, & Kirk, 2004; Holt & Kirk, 2005; Robbins, Koch, Osberger, Zimmerman-Phillips, & Kishon-Rabin, 2004; Taitelbaum-Swead et al., 2006; Waltzman & Roland, 2005), the current literature on the psychometric properties of the IT-MAIS shows that it has questionable validity and reliability. Validity and reliability are essential psychometric properties for assessment measures (Frost, Reeve, Liepa, Stauffer, & Hays, 2007). Validity is how well a test measures what it intends to measure, while reliability is degree to which an assessment tool produces consistent results (Bloom, 1942; Cook & Beckman, 2006; Frost et al., 2007; Portney & Watkins, 2000). Although these two psychometric properties work together to create a psychometrically sound assessment, they do not necessarily depend upon each other. A valid assessment is reliable (Portney & Watkins, 2000), but a reliable assessment is not necessarily valid (Frost et al., 2007). When an assessment has weak reliability and validity, one should be wary of the assessment’s results. Specifically, weak reliability and validity could
result in inaccurate or misleading diagnosis or performance, which could ultimately affect a child’s intervention plan. While both reliability and validity are important in terms of the IT-MAIS, our study focused specifically on intra-rater reliability and inter-rater reliability. Intra-rater reliability is the consistency of individual responses at different times on the same assessment, while inter-rater reliability is when two raters independently score the same subjects and score in the same manner (Gwet, 2012). As to be discussed in the next section, the IT-MAIS has been found to have weak intra-rater reliability. While our project did not focus on improving the IT-MAIS’ intra-rater reliability, it did focus on creating a way that was used to strengthen inter-rater reliability among possible IT-MAIS caregivers and audiologists.

Psychometric Analysis of the IT-MAIS

While there is limited information on the psychometric properties of the IT-MAIS, three studies have applied psychometric analysis to the IT-MAIS (Barker et al., 2013; Zimmerman-Phillips, Robbins, & Osberger, 2000; Zheng et al., 2009). The first to explore the IT-MAIS’ psychometrical soundness were Zimmerman-Phillips, Robbins, and Osberger (2000). The authors’ aim was to assess functional auditory skills of 9 profoundly deaf infants, aged 18 to 23 months, using the IT-MAIS. The IT-MAIS was administered to each child twice: preoperatively when they used hearing aids and 3 months after they received CIs. Although most of the children received a score of 0 (never) on a majority of the IT-MAIS items during the hearing aid trial, most of the children received a score of 1 (rarely) or 2 (occasionally) on a majority of the IT-MAIS items 3 months after implantation. While the authors suggested that the IT-MAIS yielded valuable information for determining implant candidacy and implant benefits, their results were not indicative of this conclusion. The results section stated that none of the children received a score higher than 2 (occasionally) during the preoperative hearing aid trial, and the children’s
scores were no higher than 2 (occasionally) at 3 months post-CI either. Thus, these results indicated there was no difference between functional auditory behaviors while wearing a hearing aid versus a CI, which means that according to the IT-MAIS scores the child showed no more benefit from their CIs than their hearing aids 3 months after the CIs’ initial stimulation. Therefore, these results did not yield any valuable information in determining implant candidacy or implant benefits as the authors previously stated the IT-MAIS would. Contrary to the authors’ reports of psychometric soundness, they actually showed the IT-MAIS did not measure what it intended to measure with minimal error and the caregiver ratings were inconsistent, which means that the IT-MAIS demonstrated questionable construct validity and intra-rater reliability.

In their study Zheng, Wang, Meng, Xu, and Tao (2009) intended to create a Chinese version of the IT-MAIS. They administered the assessment to caregivers of 120 Mandarin-speaking children with normal hearing thresholds between the ages of 0 and 24 months and measured internal consistency and item reliability of the IT-MAIS. The authors reported that the scores of over half of the children in the 19- to 24-month age group were at ceiling and eliminated from the final analysis. According to the results, both Cronbach’s alpha coefficient and Guttman’s split-half reliability exceeded 0.90, which indicated strong internal consistency between the IT-MAIS and the authors’ unspecified measure of auditory development. These results seemed to validate the IT-MAIS based on the strong internal consistency of the authors’ construct, but a closer look revealed weaknesses in the study. Zheng and colleagues used children with normal hearing thresholds despite the fact that the IT-MAIS was designed to be used with children who have severe to profound hearing loss. Children with normal hearing should demonstrate the targeted developmental auditory behaviors, which is why more than half of the children in the older age groups’ scores were at ceiling performance. These children’s
performance results cannot be applied to the IT-MAIS because the age group used in the study was not in the IT-MAIS’ targeted age range and had normal hearing. Therefore, Zheng and colleagues’ results do not support their findings of a valid and reliable IT-MAIS.

The original IT-MAIS focuses on children ages 0 to 36 months, but never specifically defines the tool’s underlying theoretical construct. Zheng and colleagues (2009) created their own to focus on in their study. The authors used “early pre-lingual auditory development” as the underlying construct upon which they sought to establish construct validity of the IT-MAIS. The authors’ modifications were intended to standardize the test’s construct, but by creating a different construct than the one created in original IT-MAIS not only skews results in the authors’ favor but also weakens their results. This modified construct should not be used to establish construct validity of the IT-MAIS if it is not the developers’ intended construct. Using the modified construct does not establish construct validity for the original IT-MAIS, it only establishes construct validity for the modified IT-MAIS.

Barker, Donovan, Schubert, and Walker (2013) recently explored the IT-MAIS’ validity and reliability using Rasch analysis. In their study they evaluated longitudinal, pre- and post-CI IT-MAIS data from the parents of 23 CI users aged 10 to 36 months. The authors’ Rasch analyses of 56 data points showed the IT-MAIS did not demonstrate ideal, item-level psychometric properties for the following reasons. First, 2 of the 10 IT-MAIS items exceeded misfit criteria, meaning they did not fit the observed construct of the targeted auditory behaviors. The two items were item 1: Is the child’s vocal behavior affected while wearing his/her sensory aid (hearing aid or cochlear implant)? and item 10: Does the child spontaneously associate vocal tone (anger, excitement, anxiety) with its meaning based on hearing alone? Reporting caregivers did not use the IT-MAIS’ rating scale for these two items with high intra-rater reliability, which
yielded unpredictable caregiver responses across time. This unpredictability of response is
known as person misfit. Greater person misfit indicates responders are not reliable in their
assessment responses and that in the intra-rater reliability is low. Because the IT-MAIS’ five
point rating scale was not used reliably by caregivers on these two items, responses for these two
items could not be included in the authors’ final Rasch analysis. Misfitting items raise concerns
about the IT-MAIS’ overall validity and reliability.

Barker and colleagues (2013) hypothesized that the caregivers’ responses were
unpredictable for a number of reasons: different audiologists using different examples to elicit
responses, caregivers guessing on an item when they had limited understanding of their child’s
listening behaviors, and caregivers not identifying observable behaviors due to incoherent
question wording. These hypothesized reasons for unreliable caregivers response on the IT-MAIS
suggest that there is a lack of standardization of administrator prompts and targeted auditory
behaviors, additionally the intra-rater reliability of caregiver responses needs improvement.

As stated previously, there is very little research regarding the IT-MAIS’ validity and
reliability. While the studies that explored the IT-MAIS’ psychometric properties found that the
assessment has weak validity and reliability, our study focused on reliability. Recall that
reliability is the degree to which an assessment tool produces consistent results (Bloom, 1942;
Cook & Beckman, 2006; Frost et al., 2007; Portney & Watkins, 2000). Reliability can be
measured in different forms: inter-rater reliability, parallel-form reliability, and intra-rater
reliability (Gwet, 2012). For the purpose of our study we focused on intra-rater reliability, the
consistency of individual responses at different times on the same assessment, and inter-rater
reliability, when two raters independently score the same subjects and score in the same manner
(2012). Intra-rater reliability coincides with inter-rater reliability. For example, two independent
raters with high inter-rater reliability can be seen as being mutually reliable or in agreement, but may not necessarily have high intra-rater reliability and vice versa. An important factor of inter-rater reliability is that it assumes the raters are mutually reliable; therefore, intra-rater reliability must be addressed prior to inter-reliability. This information is important in terms of the *IT-MAIS* because it shows that the consistency of caregivers’ (or audiologists’) ratings as an individual group, intra-rater reliability, must be established before caregivers’ and audiologists’ ratings are compared to determine if the two groups are consistent among their ratings, otherwise known as inter-rater reliability. Our studies will first determine intra-rater reliability among each group of responders individually in Study 1, Study 2, and Study 3. Then the results of Study 2 and Study 3 were compared to determine inter-rater reliability. Establishing intra-rater reliability and inter-rater reliability were the first steps in creating a way to improve the *IT-MAIS*’ weakened intra-rater reliability.

**Caregiver Reports**

Caregiver reports are standardized measures administered to a child’s caregiver and they are essential for gathering information about very young children. These reports allow an assessment administrator to get a more ecologically valid perspective of a child’s everyday behaviors. An important caregiver report used throughout the pediatric CI candidacy process is the *IT-MAIS*. Recall that the *IT-MAIS* is one of the behavioral measures used to assess a child’s functional auditory development both pre- and post-implantation (Zimmerman-Phillips, et al., 2001) and also served as a measure of functional auditory behaviors in studies exploring CI candidacy and a tracking of listening development post-implantation (Barker et al. 2011; Franz 2002; Osberger et al. 2002). Caregiver reports, like the *IT-MAIS*, allow audiologists insight into auditory behaviors that are present, or absent, in a child. Because caregivers spend large amounts
of time with their children in a variety of situations, they often provide a more accurate
representation of what their children can do outside of a clinical and/or laboratorial setting than a
speech-language pathologist or an audiologist seeing the child for a minute amount of time in an
unfamiliar setting (Pless & Pless, 1995; Saudino et al., 1998). The caregivers’ responses give the
professionals valuable information that guides the child’s intervention plans and goals. For these
reasons, caregiver responses need to be predictable. Predictable caregiver responses indicate the
caregiver as a reliable resource in identifying a child’s behaviors.

The intra-rater reliability of caregivers’ responses is important because the consistency of
the caregiver-report tool’s conclusions depends upon the caregivers’ abilities to make predictable
judgments regarding their children’s behaviors (Bender et al., 2007; Saudino et al., 1998).
Reliable responses indicate the caregiver can repeatedly guide the clinician to the most
appropriate clinical intervention for her child. In the case of the IT-MAIS, the clinical
intervention is listening therapy, which can vary depending on the child and her needs. If a child
receives a low score on the IT-MAIS prior to receiving a CI, the score may suggest that the child
has weak functional listening skills, while a high score may suggest that a child has strong
functional listening skills. Each of these misleading results can lead a professional to
misunderstand performance level and implement the incorrect plan for the child and her family.

Caregiver Reports’ Weaknesses

Intra-rater reliability can be influenced by a number of variables such as social
desirability, correspondent characteristics, and memory ability of the caregiver herself (Bender et
al., 2007). Because of the influences these variables have on the consistency of caregivers’
responses, the responses can become unpredictable. These unpredictable responses can
negatively affect the overall reliability of the reports themselves by misestimating their
children’s behaviors (Bender et al., 2007; Saudino et al., 1998). Misestimation can affect caregiver reliability and is strongly influenced by the social desirability effect, which is the desire of the caregiver to portray a positive impression to the report administrator (Bender et al., 2007). Bender and colleagues investigated the impact of interview mode on the accuracy of the parent and child adherence reports of asthma-controller medication. 104 children, between the ages of 8 and 18 years, and their parents were interviewed about medication adherence on the day before and in the past week. Results showed that caregivers tended to underreport undesirable behaviors, such as their child not taking her medicine, and overreport desirable behaviors, such as their child taking her medicine. These results indicated that caregivers using the *IT-MAIS* could underreport or overreport the frequency of their children’s auditory behaviors based upon their opinion of how undesirable or desirable the targeted behaviors are. The caregivers misestimating their children’s auditory behaviors based solely upon their opinions of the desired answers can lead to decreased intra-rater reliability. Recall, the unpredictability of caregiver responses over time is what weakens the *IT-MAIS*’ overall reliability. In order to improve the assessment’s overall reliability, caregivers must be able to consistently quantify the targeted auditory behaviors solely upon frequency of the auditory behavior not subjective opinion of the desired response.

Recall that Barker and colleagues (2013) found that the caregivers’ *IT-MAIS* responses exhibited low intra-rater reliability caused by unpredictable caregiver responses. The authors hypothesized the unpredictability may have been caused by both the caregivers’ inexperience with the report and/or the caregivers’ difficulty identifying the report’s targeted auditory behaviors. Caregivers having no specialized training in the targeted behaviors measured (Buttenshoen, Stephan, Watanabe, & Nekolaichuk, 2013; Thal et al., 1999) can lead to the
caregivers having difficulty understanding terminology (Garyali et al., 2006; Nekolaichuk, Maguire, Suarez-Almazor, Rogers, & Bruera, 1999; Schulman-Green et al., 2009; Watanabe, McKinnon, Macmillan, & Hanson, 2006) and unpredictably using the assessment tool’s rating scale (Buttenschoen et al., 2013). For example, Nekolaichuk and colleagues (1999) examined the inter-reliability of the *Edmonton Symptom Assessment System* (ESAS; Bruera, Kuehn, Miller, Selmser, & Macmillan, 1991) using multiple raters during the assessment of advanced cancer patients. Symptom assessments were completed for 32 patients independently by each patient, a nurse, and a caregiver. Results showed consistent intra-rater reliability, but the ratings varied between both the different symptoms and patients. The raters’ inabilities to identify targeted behaviors and predictably use the score scale led to inconsistent scoring of the patient’s symptoms based upon the variable meanings of each patient’s symptoms. Inconsistent scores could lead to raters unpredictably responding to report questions, which in turn lowers the intra-rater reliability. The results from the study suggested that specific behaviors needed to be explicitly defined in order for the raters to be more consistent with their answers and increase intra-rater reliability. In the case of the *IT-MAIS*, reporting caregivers on the *IT-MAIS* could have had trouble discriminating between the report’s targeted behaviors because the tool doesn’t explicitly define the auditory behaviors, which could explain the weak intra-rater reliability on the IT-MAIS. In order for the intra-rater reliability to increase, the *IT-MAIS*’ targeted auditory behaviors need to be explicitly defined to improve as evidenced by the variable raters’ meanings of patient’s symptoms in the Bruera and colleagues study.

The previously mentioned variables influence intra-rater reliability and can negatively affect the overall validity and reliability of the reports themselves. Because the *IT-MAIS*’ reliability is dependent on the caregivers’ reports, the only way the *IT-MAIS* can be
psychometrically improved is by finding ways to overcome the weaknesses created by caregiver inconsistencies.

**Improving Caregiver Reports**

While we argue that improving the intra-rater reliability on the *IT-MAIS* is a step toward improving the overall psychometrics of the *IT-MAIS*, we must first find a way to accurately depict the *IT-MAIS*’ targeted auditory behaviors. Recall that Barker and colleagues (2013) found that caregivers’ responses were not predictable on the *IT-MAIS*. The researchers suggested that the caregivers’ responses were unpredictable because of 1) audiologists providing caregivers with variable prompts and examples use to elicit responses, 2) caregivers’ lacking understanding about their child’s listening behaviors, and 3) ill-worded questions not reflecting identifiable or observable behaviors. Addressing any of the above hypotheses could help improve the intra-rater reliability of the *IT-MAIS*. Subsequently improving the intra-rater reliability on the *IT-MAIS* would also improve the *IT-MAIS*’ overall reliability. In the present study, we hypothesized that both caregivers and pediatric audiologists would rate the same videos as most representative, which would mean that those top videos accurately depicted the *IT-MAIS*’ targeted auditory behaviors. It is our hope that these videos could then be ultimately employed to improve the predictability of caregiver responses on the *IT-MAIS*, which would improve the *IT-MAIS*’ intra-rater reliability.

The intra-rater reliability of caregiver-report assessments typically depends on the caregiver’s ability to consistently recall information from memory (Baxter et al., 2004; Pless & Pless, 1995). Reliable recall depends upon the recency of behaviors and/or events (Pless & Pless, 1995). Recall seems to improve with caregiver-report measures that capitalize on caregivers’ observations of their children (Glascoe & Dworkin, 1995). In the case of the *IT-MAIS*, caregivers
are to recall specific auditory behaviors from their children’s everyday experiences and rate those behaviors using a scale that corresponds to the auditory behaviors’ percentage of occurrence. This percentage of occurrence is determined by how accurately a caregiver can recall how often the child exhibits the targeted auditory behavior. While recall is the typical format for caregiver-report tools, such as the IT-MAIS, we argue that facilitating a caregiver’s ability to recall can result in more predictable responses. To improve intra-rater reliability, responding caregivers must be able to visualize examples of targeted auditory behaviors that are needed to consistently observe and determine their children’s listening behaviors (Axilbund, Hamby, Thompson, Olsen, & Griffin, 2005). When a caregiver is able to see examples of the IT-MAIS’ targeted auditory behaviors, she may have a better understanding of which behaviors to identify from her own child. This improved caregiver understanding could lead to caregivers’ responding more predictably to IT-MAIS items over time.

The IT-MAIS does not currently define targeted auditory behaviors or provide standardized administrator prompts (Osberger et al., 2002; Robbins et al., 2004; Zimmerman-Phillips et al., 2001). Because the IT-MAIS does not operationally define its targeted auditory behaviors caregivers may not understand the targeted listening behaviors. This misunderstanding leads to weak intra-rater reliability on the IT-MAIS. Video examples of auditory behaviors associated with each IT-MAIS item would be used to familiarize the responding caregivers with the IT-MAIS’ targeted auditory behaviors. These videos would combine both audiologists’ and caregivers’ understandings of the IT-MAIS’ targeted auditory behaviors and provide a visual representation of targeted auditory behaviors, thus improving caregivers’ intra-rater reliability. Based on the literature reviewed in the next section, we argue video examples would provide standardized examples for the IT-MAIS’ targeted auditory behaviors. We hypothesized that both
the caregivers and pediatric audiologists would rate the same videos as most representative, which meant the videos accurately depicted the *IT-MAIS*’ targeted auditory behaviors.

**Video Support**

Employing video examples is a practical method to standardize an assessment and monitor an assessment’s reliability. For example, Lyden and colleagues (1994) were interested in improving the intra-rater reliability of the *National Institute of Health Stroke Scale (NIHSS)* (Brott et al., 1989) using videos to train and certify investigators to use the *NIHSS* consistently. The authors trained and certified 162 investigators using a two-camera videotape method that optimized the visual presentation of clinical findings of the *NIHSS*. In order to become certified all investigators watched the videotapes. Results indicated a moderate to excellent agreement on most Stroke Scale items between raters and improved intra-rater reliability with video training as compared to the *NIHSS*’ reliability with trained raters and no video examples (Brott et al., 1989, Goldstein, Bertels, & Davis, 1989). Because Lyden and colleagues (1994) found video examples were shown to be effective training tool for both trained and untrained raters and improved raters’ responses on the *NIHSS*, we believe that video examples could used in the case of the *IT-MAIS* to make caregiver responses more predictable and improve intra-rater reliability among caregivers on the *IT-MAIS*.

We proposed video examples could also serve as a viable means for providing visualization of targeted auditory behaviors to a child’s caregiver if the videos closely represent a real-life scenario while incorporating both visual and auditory features relevant to the caregiver (Mechling, 2005), but only if the videos are ideal. According to Axilbund, Hamby, Thompson, Olsen, and Griffin (2005), the ideal video would provide necessary features to attract the viewer’s attention to important pieces of information. According to Mechling (2005), the best
way to highlight the important pieces of information is to use video modeling—more specifically subjective point of view video modeling. In subjective point of view video modeling video examples are filmed from the caregiver’s point of view, as if the caregiver were performing the skill or observing the behavior (Shipley-Benamou, Lutzker, & Taubman, 2002). This subjective point of view can serve as a method to prime memory recall and increases the predictability of the skill or behavior (Schreibman, Whalen, & Stahmer, 2000). The IT-MAIS could benefit from video examples in the subjective point of view. Such a point of view would allow the caregiver to put herself in an everyday situation with her child and visualize auditory behaviors that are targeted by the IT-MAIS, thus improve caregiver response reliability. In order to improve the caregiver recalling if her child “spontaneously alerts to new sounds in new environments” (Zimmerman-Phillips, Osberger, & Robbins, 2001) from memory, she would see a video depicting a child and her caregiver in a new environment. Watching the video would ideally allow her to better recall the targeted behavior and more consistently answer the IT-MAIS items throughout her child’s development. In order to ensure the subjective point of view is the best way to highlight the tool’s targeted auditory behaviors, we will employ both subjective point of view and objective point of view shots in our videos.

The Present Project

Taken together, the literature reviewed within this chapter suggested that the IT-MAIS’ intra-rater reliability must be strengthened to make the caregiver-report tool a more psychometrically sound assessment. The first step in improving caregiver intra-rater reliability was finding a way to help caregivers understand what the IT-MAIS’ targeted behaviors were. We proposed the best way to help caregiver understanding of these targeted behaviors was to incorporate videos depicting the IT-MAIS’ targeted auditory behaviors. The literature within this
chapter suggested that caregivers’ responses should become more predictable when the caregivers are better educated on the *IT-MAIS*’ targeted auditory behaviors (Buttenshoen, Stephan, Watanabe, & Nekolaichuk, 2013; Garyali et al., 2006; Nekolaichuk, Maguire, Suarez-Almazor, Rogers, & Bruera, 1999; Schulman-Green et al., 2009; Thal et al., 1999; Watanabe, McKinnon, Macmillan, & Hanson, 2006). We proposed that videos that accurately depicted the *IT-MAIS*’ targeted auditory behaviors would provide both caregivers and pediatric audiologists with a way to visualize the *IT-MAIS*’ targeted auditory behaviors.

In order to achieve the long-term goal of improving the *IT-MAIS*’ overall reliability, the present project focused on finding a way to aid caregivers’ understandings of the *IT-MAIS*’ targeted auditory behaviors through the use of video examples. This project consisted of 3 separate studies. Study 1 had 10 certified pediatric audiologists rate 6 video scenarios for each *IT-MAIS* question according to how representative each video was of its corresponding question. Then, we turned the video scenarios found to be most representative by the aforementioned audiologists into videos for Study 2 and Study 3. In Study 2, 5 certified pediatric audiologists stated their opinions; using “yes” or “no,” as to how representative each video was of its corresponding *IT-MAIS* item. In Study 3, 20 caregivers rated how representative each video was of its corresponding *IT-MAIS* item using a 7-point Likert scale. The caregivers’ mean similarity judgments were calculated to determine which video was the most representative example of each *IT-MAIS* question. We predicted that both caregivers and pediatric audiologists would rate the same videos as most representative for the *IT-MAIS* items, which would mean the chosen videos accurately depicted the *IT-MAIS*’ targeted auditory behaviors.
CHAPTER 3. ESTABLISHING VIDEO SCENARIOS TO ACCOMPANY THE IT-MAIS QUESTIONS

The goal of the present research project was to create individual videos that were representative of the auditory behavior targeted in each IT-MAIS (Zimmerman-Phillips et al., 2001) item, ideally improving caregiver intra-rater reliability on the IT-MAIS by giving caregivers visual examples of the IT-MAIS’ targeted auditory behaviors. This first study focused on determining ideal video scenarios for each IT-MAIS item, so that they could later be filmed and edited into videos that would accompany each item. In order to ensure these video scenarios were viable, our procedure involved experienced, pediatric audiologists choosing the 2 most representative video scenarios for filming based on the mean rank-orders of 6 proposed video scenes. A ranking of 1 was assigned to the video scenario that was most representative of the auditory behavior targeted in each IT-MAIS question; a ranking of 7 was assigned to the least representative scenario. The top 2 videos for each IT-MAIS item determined in this study were later filmed and employed as stimuli in Study 2 (Chapter 4).

Methods

Design

We used a non-experimental design to determine which video scenarios were most representative of the auditory behavior targeted in each IT-MAIS question.

Participants

10 certified pediatric audiologists were recruited to participate through a convenience sampling method using email correspondence. Inclusion criteria were as follows: each audiologist self-reported to 1) be a certified audiologist in accordance with American Speech Hearing Association (ASHA) requirements; 2) be in possession of accurate, maintained, and up-to-date licensure; 3) have at least 5 years of in-field experience as a pediatric audiologist; 4) be a
native English speaker; and 5) have no uncorrected hearing and/or vision problems. The audiologists were screened for inclusion using an emailed questionnaire prior to their completion of the survey. While 12 participants responded to the survey, data from 10 participants were included in the final analysis due to 2 participants failing to complete the survey.

**Stimuli**

Six representative video scenarios for each *IT-MAIS* question (N = 60) were generated by 8 adults with knowledge of pediatric listening development. Each scenario illustrated the auditory behavior targeted in the specific *IT-MAIS* question and was eligible for filming. Each scenario was approximately 2-3 sentences in length (Risse & Kliegl, 2011); involved no more than 4 main characters: a child (approximately 24-months-old), a second and third child, and an adult caregiver; and was filmed from either the subjective point of view (i.e. the caregiver’s point of view) or objective point of view. Recall that while Mechling (2005) found that using the subjective point of view to highlight the important pieces of information and to allow the caregiver to put herself in an everyday situation with her child and visualize auditory behaviors that are targeted by the *IT-MAIS*, our study includes both subjective and objective points of view to determine which of the two is most beneficial to caregivers. See Appendix A for the video scenarios and accompanying *IT-MAIS* questions.

**Apparatus**

We used the internet-based software offered by *surveymonkey.com* to collect data. *Surveymonkey.com* is an online service that allows individuals to create surveys, collect responses, and analyze results. The video scenarios (Appendix A) were input into a survey and submitted to *surveymonkey.com* for data collection.
Procedure

Participants completed the survey online via surveymonkey.com on their personal computers. To begin, each eligible participant was emailed the survey link. Each participant provided informed consent by clicking on the survey link. After clicking on the email’s survey link, the survey opened up in the participant’s web browser. The survey’s welcome screen informed each participant about the survey’s purpose and the 7-point Likert scale used to rate each video scenario. The following scale anchors were used by the participants to rate how representative each video scenario was of its corresponding IT-MAIS item: 1 = the scenario was most representative of the question and 7 = the scenario was least representative of the question. After reading the instructions, the participant clicked the next button at the bottom of the screen and began the survey. The survey continued as follows: Question 1 of the survey was presented at the top of the screen and 6 video scenarios were listed below the question. After reading a scenario, the participant chose the corresponding rank on the Likert scale that indicated how representative the participant thought the scenario was of the corresponding IT-MAIS question (Figure 1). For each participant the IT-MAIS questions were presented randomly without repetition. All data was saved anonymously; no IP numbers were stored.

Results

We used the M data collected from surveymonkey.com (see Table 1) to establish which video scenarios were chosen to be most representative by pediatric audiologists. We then rank ordered the video scenarios for each IT-MAIS question according to their M ratings. We determined the 2 scenarios with the lowest M scores to be the most representative of each IT-MAIS question. The range of rating for the top two videos was 1.50 to 2.80. While these numbers seem close, our rating scale was not interval in that there was a defined amount of weight for
each rating’s number. Because our rating scale was not interval, there really was no way to definitively say that the top 2 videos were substantially better than the other scenarios.

Regardless of the non-interval ratings, these top scenarios were later filmed and edited to serve as video stimuli in Study 2.

Figure 3.1- Screen shot of the rating procedure used in surveymonkey.com for IT-MAIS question 1 in Study 1.

Conclusions

These data show that the 10 responding pediatric audiologists found two video scenarios to be most representative for each IT-MAIS item. The results indicated—according to the professional opinions of the pediatric audiologists—that the top 2 video scenarios adequately demonstrated the targeted auditory behavior of the accompanying IT-MAIS items. It was also noted that the only difference between the each of the top 2 ranked video scenarios was their point of view. For example, one video scenario was to be shot in the subjective point of view (as if looking in on the scene from the caregiver’s perspective) while the other video scenario was to be shot in the objective point of view (as if looking in on the scene from an outsider’s
perspective). This study’s findings were important because they helped determine which scenarios were most representative of *IT-MAIS’* targeted auditory behaviors.

Table 3.1- Pediatric audiologists’ mean rankings (N = 10) for each video scenario (n = 6) and its accompanying *IT-MAIS* question. Note: * Represents the top 2 rated scenes. These scenarios were filmed and used to answer the remaining studies’ questions.

<table>
<thead>
<tr>
<th><em>IT-MAIS</em> Item</th>
<th>Video Scenario</th>
<th>M Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the child’s vocal behavior affected while wearing his/her sensory aid?</td>
<td>1</td>
<td>4.50</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4.90</td>
</tr>
<tr>
<td></td>
<td>3*</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4.50</td>
</tr>
<tr>
<td></td>
<td>6*</td>
<td>1.90</td>
</tr>
<tr>
<td>2. Does the child produce well-formed syllables and syllable sequences that are recognized as “speech”?</td>
<td>1</td>
<td>3.80</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>3*</td>
<td>2.10</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3.70</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>6*</td>
<td>1.90</td>
</tr>
<tr>
<td>3. Does the child spontaneously respond to his/her name in quiet with auditory cues only (no visual cues)?</td>
<td>1</td>
<td>4.10</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4.10</td>
</tr>
<tr>
<td></td>
<td>3*</td>
<td>2.20</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3.70</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>6*</td>
<td>1.80</td>
</tr>
<tr>
<td>4. Does the child spontaneously respond to his/her name in the presence of background noise with auditory cues only (no visual cues)?</td>
<td>1*</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3.80</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4.60</td>
</tr>
<tr>
<td></td>
<td>4*</td>
<td>2.80</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4.33</td>
</tr>
<tr>
<td>5. Does the child spontaneously alert to environmental sounds in the home without being told or prompted to do so?</td>
<td>1</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>2*</td>
<td>2.20</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4.50</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2.90</td>
</tr>
<tr>
<td></td>
<td>5*</td>
<td>2.30</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4.67</td>
</tr>
<tr>
<td>6. Does the child spontaneously alert to environmental sounds in new environments?</td>
<td>1*</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3.60</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4.60</td>
</tr>
<tr>
<td></td>
<td>4*</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>3.70</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4.60</td>
</tr>
<tr>
<td>7. Does the child RECOGNIZE auditory signals that are part of his/her everyday routines?</td>
<td>1</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>2*</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3.50</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>5*</td>
<td>1.70</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>3.40</td>
</tr>
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</table>
(Table 3.1 continued)

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2*</th>
<th>3</th>
<th>4</th>
<th>5*</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Does the child demonstrate the ability to discriminate spontaneously</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>between two speakers with auditory cues only (no visual cues)?</td>
<td>4.30</td>
<td>1.70</td>
<td>3.80</td>
<td>4.20</td>
<td>1.70</td>
<td>3.80</td>
</tr>
<tr>
<td>9. Does the child spontaneously know the difference between speech and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-speech stimuli with listening alone?</td>
<td>4.00</td>
<td>3.80</td>
<td>1.70</td>
<td>4.10</td>
<td>3.60</td>
<td>1.50</td>
</tr>
<tr>
<td>10. Does the child spontaneously associate vocal tone (anger, excitement,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>anxiety) with its meaning, based on hearing alone?</td>
<td>4.90</td>
<td>4.50</td>
<td>3.10</td>
<td>4.70</td>
<td>3.40</td>
<td>2.60</td>
</tr>
</tbody>
</table>
CHAPTER 4. AUDIOLOGIST-APPROVED VIDEOS TO ACCOMPANY THE IT-MAIS QUESTIONS

The goal of this study was to determine if the filmed and edited videos, based on the 2 top-ranked video scenarios from Study 1, were representative of each corresponding IT-MAIS item as determined by pediatric audiologists. The audiologists in this study judged whether or not the two videos accurately represented each IT-MAIS item

Methods

Design

We used a non-experimental design to determine if the top 2 videos were representative of their corresponding IT-MAIS questions.

Participants

Using the inclusion criteria from Study 1 (Chapter 3), we recruited 5 additional certified pediatric audiologists through a convenience sampling method using email correspondence.

Video Stimuli

The 2 most-representative video scenarios, as determined by the survey rankings from Study 1, were filmed and edited for use in Study 2. First, three adult researchers created storyboards corresponding to each top-ranking video scenario from Study 1 (see Appendix B). These storyboards guided the filming and editing of the final videos.

Three families from the community volunteered to help with filming, ultimately only two were included in the final videos due to family availability. Filming took place over a day’s time. We filmed the videos using a Sony HDR-SR7, an iPhone 5s, and a Cisco Flip MinoHD Video Camera—3rd generation with 720p. We edited the films with iMovie (Apple, 2011) and Audacity (Audacity, 2013) computer software on an Apple MacBook Pro laptop computer with a 2.5 GHz Intel Core i5 processor using OS X v.10.8.4. Each edited video ranged from 5 to 24 seconds and
averaged 10.65 seconds in duration. After editing, each 720p or 1080p mpg-formatted video was uploaded to a private video viewing account through the Internet service YouTube.com. There were 2 videos for each IT-MAIS question (N = 20).

**Apparatus**

The 20 edited videos placed on YouTube.com were embedded into a survey via surveymonkey.com (see p. 19 for surveymonkey.com details). The videos were randomly ordered manually by the experimenter and placed into surveymonkey.com. Each video was assigned a number provided by the True Random Number Generator on random.org. Then, each video and its corresponding question were put into the survey on surveymonkey.com.

**Procedure**

Each eligible participant was emailed the survey link. Consent and participant instruction was executed in the same manner as Study 1 (p. 17).

The survey continued as follows: first survey question appeared at the top of the screen, with the video and the “yes” and “no” answer options presented underneath the question (Figure 2). The participant clicked on the accompanying video for viewing. After viewing the video, the

![Figure 4.2- Screen shot of rating procedure and format used in surveymonkey.com for IT-MAIS question 1 in Study 2.](image)
participant indicated whether the video accurately depicted the behavior targeted in the specific IT-MAIS question listed at the top of the screen by clicking yes or no with her computer mouse. Each participant clicked the done button after completion of the survey to end her participation and save the data to the surveymonkey.com server. All data was saved anonymously; no IP numbers were stored.

**Results**

First, we calculated the total number of yes or no responses from the surveymonkey.com data file. We deemed the video with the greatest number of yes responses as the most accurate representation of the accompanying IT-MAIS question. The results follow in Table 2. These data indicated that the 5 responding pediatric audiologists found one video to be most representative for each IT-MAIS item. Each of the top videos had a total of 5 yes ratings, which indicates unanimous agreement among the group of 5 pediatric audiologists. This unanimous agreement is extremely important to the IT-MAIS’ administration because it shows that the pediatric audiologists determined if each video was representative of its corresponding IT-MAIS item. Having professionals agree so strongly about the top videos representativeness means that the videos accurately depicted the IT-MAIS’ targeted behaviors and that caregivers could possibly mimic the same results.

**Conclusions**

The results imply that the audiologists believed the IT-MAIS’ targeted auditory behaviors were adequately demonstrated according to professionals’ opinions. These findings are important because they indicate the most representative videos based upon professional opinion, which are valuable in determining the audiologists’ understanding of the IT-MAIS’ targeted auditory behaviors. The top videos indicate unanimous agreement among professionals as to which videos
were the most representative of the targeted auditory behaviors.

Table 4-2. Total number of yes/no votes for each video scene and its accompanying *IT-MAIS* question as rated by pediatric audiologists.

<table>
<thead>
<tr>
<th><em>IT-MAIS</em> Item</th>
<th>Video</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the child’s vocal behavior affected while wearing his/her sensory aid?</td>
<td>1:3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1:6*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>2. Does the child produce well-formed syllables and syllable sequences that are recognized as “speech”?</td>
<td>2:3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2:6*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>3. Does the child spontaneously respond to his/her name in quiet with auditory cues only (no visual cues)?</td>
<td>3:3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3:6*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>4. Does the child spontaneously respond to his/her name in the presence of background noise with auditory cues only (no visual cues)?</td>
<td>4:1*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4:4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Does the child spontaneously alert to environmental sounds in the home without being told or prompted to do so?</td>
<td>5:2*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5:5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>6. Does the child spontaneously alert to environmental sounds in new environments?</td>
<td>6:1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>6:4*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>7. Does the child RECOGNIZE auditory signals that are part of his/her everyday routines?</td>
<td>7:2*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>7:5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Does the child demonstrate the ability to discriminate spontaneously between two speakers with auditory cues only (no visual cues)?</td>
<td>8:2*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>8:5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Does the child spontaneously know the difference between speech and non-speech stimuli with listening alone?</td>
<td>9:3</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>9:6*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>10. Does the child spontaneously associate vocal tone (anger, excitement, anxiety) with its meaning, based on hearing alone?</td>
<td>10:3*</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>10:6</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
CHAPTER 5. CAREGIVER SIMILARITY RATINGS OF VIDEOS TO ACCOMPANY THE IT-MAIS QUESTIONS

This final study focused on a set of caregivers choosing the most representative video for each corresponding IT-MAIS question. The participants consisted of parents of young children with normal hearing. Since the IT-MAIS is a caregiver-report assessment, this parent group was vital to determining the top videos because the group is representative of parents who are naïve to the IT-MAIS. In order to create the 10 final videos, the top ranked videos as determined by caregivers in this study were compared to the top ranked videos as determined by pediatric audiologists in Study 2. These final videos were the first step in finding a way to improve caregiver responses on the IT-MAIS.

Methods

Design

We used a non-experimental design to determine if the top 2 videos from Study 1 were representative of each corresponding IT-MAIS question.

Participants

Twenty caregivers, who were naïve to the IT-MAIS and its goals, were recruited via a convenience sampling method using email correspondence to rate the videos. Inclusion criteria were as follows: each parent self-reported to 1) be a native English speaker, 2) be without any uncorrected hearing and/or vision problems, 3) be a parent, 4) have no previous experience or knowledge of the IT-MAIS, and 5) have a typically-developing child with normal hearing aged 0 to 36 months. The parents were screened for these criteria via an emailed questionnaire prior to their completion of the survey.

Video stimuli

The same 20 edited videos from Study 2 (pp. 23) were used in this study.
Apparatus

As in Study 2, the edited videos placed on YouTube.com were embedded into a survey via surveymonkey.com (see p. 23 for surveymonkey.com details). Each video and its corresponding question were put into the survey on surveymonkey.com in the same manner as determined in Study 2 (see p. 23 for details).

Procedure

Each eligible participant was emailed the survey link. Consent to participate in the survey was given upon clicking on the survey link. Participants completed the survey online via surveymonkey.com on their personal computers. After clicking on the email’s survey link, the survey opened up in the participant’s web browser. The survey’s welcome screen instructed each participant about the survey’s purpose and the selected rating scale used to rate each video.

![Figure 5-3. Screen shot of rating procedure and format used in surveymonkey.com for IT-MAIS question 1 in Study 3.](image)

After reading the instructions, the participant clicked the next button at the bottom of the screen and began the survey. The survey continued as follows: the first survey question appeared at the
top of the screen, the video was located underneath the question, and the 7-point rating scale appeared under the video (Figure 3). The participant then clicked the video (n = 2; N = 20) for viewing. After viewing the video, the participant rated each scenario using her computer mouse and the same 7-point Likert scale used in Study 1. Each participant clicked the done button after completion of the survey to end her participation and save the data to the surveymonkey.com server. All data was saved anonymously; no IP numbers were stored.

**Results**

We used each scenario’s M data collected in surveymonkey.com to rank order the videos for each IT-MAIS question and determine which video was most representative. The video with the lowest M score was determined to be most representative of each IT-MAIS item. The data follow in Table 3. These results suggest that the caregivers chose the videos they believed were most representative of each IT-MAIS item’s targeted auditory behavior. The data indicated that the pediatric audiologists determined one video to be most representative for each IT-MAIS item. The caregivers’ ratings for the top video ranged from 1.40 to 2.65. While this range seems like a minute difference, there is no way to determine how significant the difference between the ratings is because our rating scale was ordinal, not interval.

Next we analyzed the combined data sets of Study 2 and Study 3 (see Table 4.3). We specifically compared the top videos chosen by caregivers from this study to the top videos as chosen pediatric audiologists. We conducted this comparison to determine if the proposed videos were found to be representative by both sets of raters. Both sets of raters unanimously agreed upon the most representative 10 videos. These top 10 videos were found to accurately depict the IT-MAIS’ targeted auditory behaviors. Because both sets of raters agreed upon the same videos, this indicates high inter-rater reliability.
Table 5.3- Descriptive statistics for video ratings from caregiver raters. Note: ^ denotes most representative videos as determined by caregivers in Study 3 and *denotes which videos as determined by audiologists in Study 2. Most representative videos from both rater groups were deemed to be top 10 videos.

<table>
<thead>
<tr>
<th>IT-MAIS Item</th>
<th>Video</th>
<th>Caregivers’ M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the child’s vocal behavior affected while wearing his/her sensory aid?</td>
<td>1:3</td>
<td>3.45</td>
</tr>
<tr>
<td></td>
<td>1:6^*</td>
<td>1.45</td>
</tr>
<tr>
<td>2. Does the child produce well-formed syllables and syllable sequences that are recognized as “speech”?</td>
<td>2:3</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>2:6^*</td>
<td>1.40</td>
</tr>
<tr>
<td>3. Does the child spontaneously respond to his/her name in quiet with auditory cues only (no visual cues)?</td>
<td>3:3</td>
<td>3.65</td>
</tr>
<tr>
<td></td>
<td>3:6^*</td>
<td>1.25</td>
</tr>
<tr>
<td>4. Does the child spontaneously respond to his/her name in the presence of background noise with auditory cues only (no visual cues)?</td>
<td>4:1^*</td>
<td>1.35</td>
</tr>
<tr>
<td></td>
<td>4:4</td>
<td>4.35</td>
</tr>
<tr>
<td>5. Does the child spontaneously alert to environmental sounds in the home without being told or prompted to do so?</td>
<td>5:2^*</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>5:5</td>
<td>4.55</td>
</tr>
<tr>
<td>6. Does the child spontaneously alert to environmental sounds in new environments?</td>
<td>6:1</td>
<td>4.10</td>
</tr>
<tr>
<td></td>
<td>6:4^*</td>
<td>2.65</td>
</tr>
<tr>
<td>7. Does the child RECOGNIZE auditory signals that are part of his/her everyday routines?</td>
<td>7:2^*</td>
<td>1.40</td>
</tr>
<tr>
<td></td>
<td>7:5</td>
<td>4.90</td>
</tr>
<tr>
<td>8. Does the child demonstrate the ability to discriminate spontaneously between two speakers with auditory cues only (no visual cues)?</td>
<td>8:2^*</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>8:5</td>
<td>3.70</td>
</tr>
<tr>
<td>9. Does the child spontaneously know the difference between speech and non-speech stimuli with listening alone?</td>
<td>9:3</td>
<td>4.55</td>
</tr>
<tr>
<td></td>
<td>9:6^*</td>
<td>1.45</td>
</tr>
<tr>
<td>10. Does the child spontaneously associate vocal tone (anger, excitement, anxiety) with its meaning, based on hearing alone?</td>
<td>10:3^*</td>
<td>1.70</td>
</tr>
<tr>
<td></td>
<td>10:6</td>
<td>4.65</td>
</tr>
</tbody>
</table>

Conclusions

These data show that the 5 pediatric audiologists of Study 2 and the 20 caregivers of Study 3 unanimously found the same video to be most representative for each IT-MAIS item.
The results indicate the pediatric audiologists and the caregivers both agreed upon the video scenarios that adequately demonstrated targeted auditory behaviors. The unanimous agreements between audiologists and caregivers suggest that the videos accurately depicted the IT-MAIS’ targeted auditory behaviors. Unanimous agreement between both rater groups means that these videos accurately depict the IT-MAIS targeted behavior from both professionals’ opinions and caregiver ratings. These results also indicate that because agreement was so high between the two different rater groups, there can be no caution as to whether or not these 10 videos are in fact accurately depicting the IT-MAIS’ targeted auditory behaviors. While our results did not determine if these 10 final videos improve intra-rater reliability, they were the first step to improving predictability caregiver responses on the IT-MAIS.
CHAPTER 6. DISCUSSION

Recall Barker and colleagues (2013) found that caregivers’ intra-rater reliability on the IT-MAIS (Zimmerman-Phillips, et al., 2001) is weak, which lowers the measure’s overall reliability and causes concern over the consistency of the IT-MAIS’ results. The authors suggested that caregiver responses were unreliable because 1) audiologists providing caregivers with variable prompts and examples use to elicit responses, 2) caregivers’ lacking understanding about their child’s listening behaviors, and 3) ill-worded questions not reflecting identifiable or observable behaviors (Barker et al., 2013). The present study focused on creating videos that accurately depicted targeted auditory behaviors for each IT-MAIS item with the long-term goal of ultimately using these videos to improve caregivers’ intra-rater reliability.

For the present study we chose to use video examples of the IT-MAIS’ targeted auditory behaviors as a viable means for providing visualization of targeted auditory behaviors to a child’s caregiver. We hypothesized that both caregivers and pediatric audiologists would rate the same videos as most representative, which would mean the videos accurately depicted the targeted auditory behaviors in each IT-MAIS item. Recall that 6 video scenarios were created for each IT-MAIS item in Study 1 based upon the IT-MAIS’ administrator prompts and targeted auditory behaviors. In Study 1, pediatric audiologists ranked each video scenario as to how representative it was of its corresponding IT-MAIS item using a 7-point Likert scale. The 2 top-rated video scenarios for each IT-MAIS item were then filmed for use in Studies 2 and 3. In Study 2 pediatric audiologists watched the videos and determined whether or not each video accurately represented its corresponding item. Results indicated that audiologists found one video of the two proposed videos to be most representative of each IT-MAIS item. In Study 3, parents of young children rated how representative each video was of its corresponding IT-MAIS
items using the same 7-point Likert scale from Study 1. The top videos as determined by caregivers were compared to the top videos as determined by pediatric audiologists in Study 2. The results showed that both audiologists in Study 2 and caregivers in Study 3 unanimously agreed on the same 10 videos, which implies that both groups of participants had understandings of the *IT-MAIS’* targeted auditory behaviors with the use of visual examples. The agreement between both rater groups was so high that the chosen videos are in fact accurately depict the *IT-MAIS’* targeted auditory behaviors and that there can be no question about the strength of the studies’ findings.

The videos were filmed to be ideal in that they closely represented a real-life scenario while incorporating both visual and auditory features relevant to the caregiver (Mechling, 2005) and highlighting the targeted auditory behaviors (Axilbund, Hamby, Thompson, Olsen, & Griffin, 2005). While Mechling (2005) found the best way to ensure ideal videos was to use video modeling—more specifically subjective point of view video modeling, our results do not support this research. Based on our results, only 6 of the 10 final videos actually incorporated the subjective point of view video modeling. This means that while the *IT-MAIS* showed benefit from video examples, the hypothesized subjective point of view was not necessarily shown to better allow the caregiver to put herself in an everyday situation with her child and visualize auditory behaviors that are targeted by the *IT-MAIS*. These results indicate that Mechling (2005) does not generalize to the present study—the subjective point of view was not most beneficial in highlighting important information for caregivers. In the case of our *IT-MAIS* videos, these results imply that caregivers and pediatric audiologists rated the videos based upon how well each video depicted the auditory behaviors, not how well they highlighted certain information.
Some of the proposed *IT-MAIS* videos depicted the auditory behaviors better in the subjective point of view, while others were depicted better in the objective point of view.

**Impact on Reliability**

Recall there are no video examples of the *IT-MAIS*’ targeted auditory behaviors. The results of the present studies suggest that because the video examples accurately depicted the *IT-MAIS* targeted auditory behaviors audiologists and caregivers rated the same videos as most representative. Recall that the *IT-MAIS* had non-standardized administrator prompts and targeted auditory behaviors that lacked operational definitions. We proposed that video examples would reduce variability among *IT-MAIS* administrators and provide both caregivers and pediatric audiologists with a way to visualize the *IT-MAIS*’ targeted auditory behaviors. If both sets of raters found the same videos to be most representative of the *IT-MAIS* items, then those results would imply that the videos accurately depicted the *IT-MAIS*’ targeted auditory behaviors. Our results indicated that both audiologist and caregiver understanding were unanimously in accord when comparing the top 10 videos as chosen by audiologists in Study 2 and caregivers in Study 3. These results indicate that audiologists and caregivers had a shared understanding of the *IT-MAIS*’ targeted auditory behaviors with the use of video examples, which means that the top videos accurately depicted the *IT-MAIS*’ targeted auditory behaviors.

Recall that while there are many different types of reliability our studies focused on both intra-rater reliability and inter-rater reliability. Intra-rater reliability was first determined by each study’s individual results, while inter-rater reliability was determined in the comparison of Study 2 and Study 3 results. Because the *IT-MAIS* has been shown to have low overall reliability, both types are essential in improving the *IT-MAIS*’ overall reliability. While our results did not focus on improving the *IT-MAIS*’ overall reliability, our studies were the first step in improving the *IT-
*MAIS’* intra-rater reliability through our findings on inter-rater reliability, which indicated that the proposed videos accurately depicted the *IT-MAIS’* targeted auditory behaviors. In order to determine if these videos actually improve intra-rater reliability, there needs to be clinical implementation of the videos.

**Clinical Implications of the Present Results**

Recall that our results indicated that both sets of raters, caregivers and pediatric audiologists, found the same videos to be most representative of the *IT-MAIS’* targeted auditory behaviors. This unanimous agreement between the two groups of raters indicate that the videos accurately depicted the *IT-MAIS’* targeted auditory behaviors. The *IT-MAIS* is an important behavioral measure used in the CI process and these videos are important to the clinical administration of the *IT-MAIS*. Because the *IT-MAIS’* results can be used to guide a child’s intervention needs, we want the caregivers to respond as reliably as they can in order to ensure the most beneficial intervention direction based on their child’s needs. As we stated earlier, while our study did not focus on improving intra-rater reliability, we did create the first step in improving the consistency of individual caregiver responses across time through the use of video examples. Clinically, these videos will provide caregivers with a way to visualize and identify what specific behavior the corresponding *IT-MAIS* item is eliciting through all stages of the child’s life.

Child development is dynamic in the sense that a child is constantly changing not only physically but also mentally and emotionally. With that said, researchers need a way to standardize the *IT-MAIS’* targeted auditory behaviors. We believe our videos will provide caregivers with the support they need to predictably answer—not just when they respond to various administrators, but also when the child receives intervention and grows. We want the
caregivers to be predictable responders at every point in their child’s intervention. In order to successfully determine if these videos can provide caregiver’s with the necessary visual information they need, we suggested that the videos as determined by our projects be employed into everyday IT-MAIS administration.

Future Direction

We propose a future direction one can take to improve the overall psychometric soundness of the IT-MAIS would be to incorporate the top 10 IT-MAIS videos as determined by this project into clinical use of the IT-MAIS. Recall that Barker and colleagues (2013) found that the IT-MAIS had weak validity and reliability. In terms of the authors’ findings of reliability, person misfit caused intra-rater reliability to be low. While our study did not focus on improving intra-rater reliability, our study laid the groundwork to finding a way to provide visual examples of the IT-MAIS’ targeted auditory behaviors. Our studies yielded 10 videos that, according to our results, accurately depicted the IT-MAIS’ targeted auditory behaviors. As stated earlier these videos were the first step in creating a way for caregivers to more predictably respond to IT-MAIS items, but these videos need to be employed in to clinical use to ensure more predictable caregiver responses. Our suggestion is to employ the videos into every day clinical use through the use of a mobile-device application. The final 10 videos determined to be most representative in this project would be incorporated into this mobile-device application. When a speech-language pathologists or an audiologist administered the IT-MAIS to caregivers, the administrator would administer the IT-MAIS and use the software application to show the caregiver the video for the corresponding IT-MAIS item. This application would provide caregivers with the video examples that could be shown to improve predictability of caregiver responses in regards the identification of their children’s auditory behaviors.
Conclusions

In this study, we focused on finding a way to help caregivers respond more predictably to IT-MAIS items. Recall low intra-rater reliability caused the IT-MAIS’ overall reliability to be low. Our results indicated that both pediatric audiologists and caregivers found the same videos to be most representative videos, which indicated the top videos accurately depicted the IT-MAIS’ targeted auditory behaviors. Based on these results, we suggested that the videos be employed in the every day clinical administration of the IT-MAIS in order to determine if these videos actually are the first step in improving intra-rater reliability on the IT-MAIS items. As stated previously, once intra-rater reliability has been improved, the IT-MAIS’ overall reliability will be improved.
REFERENCES


iMovie (2011) [computer software]: Apple, Inc.


APPENDIX A. IT-MAIS VIDEO SCENARIOS

**Item 1: Is the child’s vocal behavior affected while wearing his/her sensory aid (hearing aid or cochlear implant)?**

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] Child is sitting on floor playing with a toy. Mom walks towards the child and says “You are quiet today!” As the mom checks the child’s device, she says “Mommy didn’t turn your device on! No wonder you’re not talkative!”

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] Child is sitting on floor playing with a toy and singing a song. Mom walks towards the child and says “You are very talkative today!” As the mom checks the child’s device, she says “Mommy turned your device on! You are singing so pretty, baby!”

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] Child is sitting on floor playing with a toy. Mom walks towards the child and says “You are quiet today!” As the mom checks the child’s device, she says “Mommy didn’t turn your device on! No wonder you’re not talkative!” Mom turns the child’s device on, and the child begins to babble.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] Child is sitting on floor playing with a toy. Mom walks towards the child and says “You are quiet today!” As the mom checks the child’s device, she says “Mommy didn’t turn your device on! No wonder you’re not talkative!”

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] Child is sitting on floor playing with a toy and singing a song. Mom walks towards the child and says “You are very talkative today!” As the mom checks the child’s device, she says “Mommy turned your device on! You are singing so pretty, baby!”

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] Child is sitting on floor playing with a toy. Mom walks towards the child and says “You are quiet today!” As the mom checks the child’s device, she says “Mommy didn’t turn your device on! No wonder you’re not talkative!” Mom turns the child’s device on, and the child begins to babble.
Item 2: Does the child produce well-formed syllables and syllable-sequences that are recognized as speech?

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child and parent are playing with bubbles. The child says “buhbuh” as the parent blows them towards her.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child is sitting in her room playing with a baby doll. The child says “bebe” as she holds the baby doll.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child is sitting in her room playing with her toy phone. The child says “heyo! budegabeh?” into the toy phone.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child and parent are playing with bubbles. The child says “buhbuh” as the parent blows them towards her.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child is sitting in her room playing with a baby doll. The child says “bebe” as she holds the baby doll.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child is sitting in her room playing with her toy phone. The child says “heyo! budegabeh?” into the toy phone.
Item 3: Does the child spontaneously respond to his/her name in quiet with auditory cues only (i.e., no visual cues) when not expecting to hear it?

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be sitting on the floor crying, while the caregiver is behind the child at the kitchen counter. The caregiver will say the child’s name, and the child will stop crying.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be spinning around in the kitchen, while the caregiver is behind the child at the kitchen counter. The caregiver will say the child’s name, and the child will stop spinning.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be sitting on the kitchen floor playing with a baby doll, while the caregiver is behind the child at the kitchen counter. The caregiver will say the child’s name, and the child will turn around to the caregiver.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be sitting on the floor crying, while the caregiver is behind the child at the kitchen counter. The caregiver will say the child’s name, and the child will stop crying.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be spinning around in the kitchen, while the caregiver is behind the child at the kitchen counter. The caregiver will say the child’s name, and the child will stop spinning.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be sitting on the kitchen floor playing with a baby doll, while the caregiver is behind the child at the kitchen counter. The caregiver will say the child’s name, and the child will turn around to the caregiver.
**Item 4: Does the child spontaneously respond to his/her name in the presence of background noise with auditory cues only (i.e., no visual cues)?**

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be sitting on the floor playing with a baby doll. The caregiver and two other adults will be seated behind her talking in a conversation. The caregiver says the child’s name and the child stops playing with the toy.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be playing with a group of other children on the living room floor. The caregiver, seated behind the child on the couch, will say the child’s name. The child will stop playing and turn towards the caregiver.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be watching TV on the living room floor. The caregiver, seated behind the child on the couch, will say the child’s name. The child will turn towards the caregiver.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be sitting on the floor playing with a baby doll. The caregiver and two other adults will be seated behind her talking in a conversation. The caregiver says the child’s name and the child stops playing with the toy.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be playing with a group of other children on the living room floor. The caregiver, seated behind the child on the couch, will say the child’s name. The child will stop playing and turn towards the caregiver.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be watching TV on the living room floor. The caregiver, seated behind the child on the couch, will say the child’s name. The child will turn towards the caregiver.
Item 5: Does the child spontaneously alert to environmental sounds (dog, toys) in the home without being told or prompted to do so?

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be sitting on the floor, while the caregiver sits next to her. A dog barks and the child turns her head towards the sound.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be sitting on the floor, while the caregiver sits next to her. A toy goes off and the child turns her head towards the sound.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be sitting on the floor, while the caregiver sits next to her. A car alarm sounds and the child turns her head towards the sound.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be sitting on the floor, while the caregiver sits next to her. A dog barks and the child turns her head towards the sound.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be sitting on the floor, while the caregiver sits next to her. A toy goes off and the child turns her head towards the sound.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be sitting on the floor, while the caregiver sits next to her. A car alarm sounds and the child turns her head towards the sound.
**Item 6: Does the child spontaneously alert to environmental sounds in new environments?**

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child and the caregiver will be in Lowe’s. The caregiver will be pushing the child in the shopping cart. An employee’s voice comes over the PA system, and the child looks up and around to find the voice.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child and the caregiver will be sitting at a restaurant. A baby begins to bang silverware on the table 5 feet away, and the child turns her head towards the baby.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child and caregiver will be in a store at the mall. The store’s alarm system begins to go off, the child cries.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child and the caregiver will be in Lowe’s. The caregiver will be pushing the child in the shopping cart. An employee’s voice comes over the PA system, and the child looks up and around to find the voice.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child and the caregiver will be sitting at a restaurant. A baby begins to bang silverware on the table 5 feet away, and the child turns her head towards the baby.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child and caregiver will be in a store at the mall. The store’s alarm system begins to go off, the child cries.
**Item 7: Does the child spontaneously RECOGNIZE auditory signals that are part of his/her everyday routines?**

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child and the caregiver will be in the kitchen. The caregiver will be heating up food in the microwave while the child sits on the kitchen floor playing with a toy. The microwave timer goes off, and the child looks at it.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child and the caregiver will be in the living room. The caregiver and child will be seated on the floor playing with a toy. A cellphone rings, and the child grabs it and hands it to the caregiver.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be seated on the living room floor with her back to the caregiver. The caregiver comes up behind her and says, “Peek-A-Boo!” The child places her hands over her eyes.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child and the caregiver will be in the kitchen. The caregiver will be heating up food in the microwave while the child sits on the kitchen floor playing with a toy. The microwave timer goes off, and the child looks at it.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child and the caregiver will be in the living room. The caregiver and child will be seated on the floor playing with a toy. A cellphone rings, and the child grabs it and hands it to the caregiver.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be seated on the living room floor with her back to the caregiver. The caregiver comes up behind her and says, “Peek-A-Boo!” The child places her hands over her eyes.
**Item 8: Does the child demonstrate the ability to discriminate spontaneously between two speakers with auditory cues only (i.e., no visual cues)?**

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be seated at her highchair in the middle of dinner table eating dinner, while Mom and day sit on opposite ends. Mom talks on cellphone, while Dad tells the child “Daddy says it is bath time!” The child looks up at dad.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be seated on the living room floor while her 3 siblings are playing with each other behind her. The child’s sister says “Come on, Olive! Let’s go play dolls!” The child looks at her sister.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be seated on the living room floor, while two siblings are arguing over a toy beside her. Mom comes to the doorway behind her and says “Olive! It’s time for bath!” Olive turns around to her Mom.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be seated at her highchair in the middle of dinner table eating dinner, while Mom and day sit on opposite ends. Mom talks on cellphone, while Dad tells the child “Daddy says it is bath time!” The child looks up at dad.

Video Scenario 5: [Camera will focus on the child and the caregiver. All actors will be seated in front of the camera.] The child will be seated on the living room floor while her 3 siblings are playing with each other behind her. The child’s sister says “Come on, Olive! Let’s go play dolls!” The child looks at her sister.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be seated on the living room floor, while two siblings are arguing over a toy beside her. Mom comes to the doorway behind her and says “Olive! It’s time for bath!” Olive turns around to her Mom.
**Item 9: Does the child spontaneously know the difference between speech and non-speech stimuli with listening alone?**

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be seated on the floor in her bedroom playing with a Laugh & Learn Apptivity Monkey. The child hits the music button and the music begins to play. The child begins to dance to the music. Then, the child hits the talking button and the toy begins to talk. The child begins to babble to the toy.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be seated on the floor in her bedroom playing with a Laugh & Learn Apptivity Monkey. The child hits the talking button and the toy begins to talk. The child begins to babble to the toy.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child will be seated on the floor in her bedroom playing with a Laugh & Learn Apptivity Monkey. The child hits the music button and the music begins to play. The child begins to dance to the music.

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be seated on the floor in her bedroom playing with a Laugh & Learn Apptivity Monkey. The child hits the music button and the music begins to play. The child begins to dance to the music. Then, the child hits the talking button and the toy begins to talk. The child begins to babble to the toy.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be seated on the floor in her bedroom playing with a Laugh & Learn Apptivity Monkey. The child hits the talking button and the toy begins to talk. The child begins to babble to the toy.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child will be seated on the floor in her bedroom playing with a Laugh & Learn Apptivity Monkey. The child hits the music button and the music begins to play. The child begins to dance to the music.
**Item 10: Does the child spontaneously associate vocal tone (anger, excitement, anxiety) with its meaning based on hearing alone?**

Video Scenario 1: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The child and the caregiver are outside while the child plays in a puddle. Caregiver says in a pleasant tone “Olive, please stop jumping in the water!” The child continues to play in the puddle. The caregiver then says in a stern tone “Olive! I said stop jumping in the water!” The child stops playing in the puddle.

Video Scenario 2: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] An infant is having tummy time on the floor. Mom comes up behind him and says in motherese “I see my sweet baby!” The baby then smiles.

Video Scenario 3: [Camera will focus on the child from behind the caregiver’s shoulder—as if it is from the caregiver’s perspective.] The caregiver walks into the child’s room and stands behind the child. The caregiver says in a pleasant tone “Olive, we’re going to the park!” The child turns around and says “Hooray!”

Video Scenario 4: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The child and the caregiver are outside while the child plays in a puddle. Caregiver says in a pleasant tone “Olive, please stop jumping in the water!” The child continues to play in the puddle. The caregiver then says in a stern tone “Olive! I said stop jumping in the water!” The child stops playing in the puddle.

Video Scenario 5: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] An infant is having tummy time on the floor. Mom comes up behind him and says in motherese “I see my sweet baby!” The baby then smiles.

Video Scenario 6: [Camera will focus on the child and the caregiver. Both actors will be seated in front of the camera.] The caregiver walks into the child’s room and stands behind the child. The caregiver says in a pleasant tone “Olive, we’re going to the park!” The child turns around and says “Hooray!”
The child hangs
Mom folds laundry
Mom turns page

Please don't touch
Child and soap

Mom checks phone

No wonder! You're punished!

The child

Time: 10:00

<table>
<thead>
<tr>
<th>DP</th>
<th>From outside</th>
</tr>
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<tbody>
<tr>
<td>Dir</td>
<td></td>
</tr>
<tr>
<td>Seq</td>
<td>Scene</td>
</tr>
</tbody>
</table>
Playing with her toy phone

The child says, "Hello! Buckingham!"

Child sitting in her room

Focus on child, then behind caretakers' silhouette.

Title: 2:3

CT-MA113#2: video scene, #3
Child is sitting in her room, playing with her toy phone. Child sees "neighbourhood" into the toy phone.
Title: Caregiver's Perspective

<table>
<thead>
<tr>
<th>Scene</th>
<th>Caregiver's Perspective</th>
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<tbody>
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</table>

GROWN UP_nome Oliva

While adults talk
Mom calls "Olivia"
Adults stop talking

Child plays on floor
Child is playing w/ doll

Caregiver & 2 adults are

IT MARKS #4, video scan #1
Title: 9:2

<table>
<thead>
<tr>
<th>Title</th>
<th>Scene</th>
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<tbody>
<tr>
<td>9:2</td>
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</table>

Diagram:

- Child will be sitting at a table with a child looks out the window.
- Child is playing with a toy.

Storyboard:

- Scene 1: Child sitting at a table, looking out the window.
- Scene 2: Child playing with a toy.

Notes:

- OT: 5, Video Cam: 2

Comments:

- Caregiver's perspective
62

The sound
of thunder

Toy gets off
desk and
furniture.

Child x

From outdoors

Title: G.S.
Caucalized 4 child with

Caucalized 4 child with

Caucalized 4 child with
Sally's boss wants her to find a lost child in the shopping mall. An employee will be instructed to check the lost and found area. The child's character will be seen looking for their parent.}

**Title:** 6-9

<table>
<thead>
<tr>
<th>From Outsider's Perspective</th>
<th>Dir.</th>
<th>Seg.</th>
<th>Scene</th>
</tr>
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<tbody>
<tr>
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<td>4</td>
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</tbody>
</table>
Child holds the cellphone
The child grabs it
A cellphone rings
The caregiver is child seated
A toy is floor playing with
caregiver
A caregiver in living room

<table>
<thead>
<tr>
<th>DP</th>
<th>Dir.</th>
<th>Scene</th>
</tr>
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</table>

Title: 7:2

Note: NHIS #7: video scene #2
The child walks to the seat.

Playing the violin, one of the sisters sings "Can't


Title: 8:2
The child looks out of his bedroom window. His sisters, Sarah, Emily, and John are playing outside. One of his sisters is playing solo, and the other two are engaged in a game of hide-and-go-seek. The child is looking out, thinking about joining them.
The child will be sitting on the floor. The music button on the device will be turned on. The child will press the button to dance.
APPENDIX C. TOP 10 *IT-MAIS* VIDEOS

Item 1
Item 2
Item 3
Item 4
Item 5
Item 6
Item 7
Item 8
Item 9
Item 10
APPENDIX D. INSTITUTIONAL REVIEW BOARD APPROVAL DOCUMENT

ACTION ON PROTOCOL APPROVAL REQUEST

TO: Brittan Barker  
COMD

FROM: Robert C. Mathews  
Chair, Institutional Review Board

DATE: November 19, 2013
RE: IRB# 3437

TITLE: Improving the Reliability of Caregivers’ Responses on the Infant-Toddler Meaningful Auditory Integration Scales (IT-MAIS) via Video


Review type: Full ___ Expedited X ___ Review date: 11/20/2013

Risk Factor: Minimal X ___ Uncertain ___ Greater Than Minimal ___

Approved X ___ Disapproved ______

Approval Date: 11/20/2013 Approval Expiration Date: 11/19/2014

Re-review frequency: (annual unless otherwise stated)

Number of subjects approved: 35

Protocol Matches Scope of Work in Grant proposal: (If applicable) 

By: Robert C. Mathews, Chairman

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU’s Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
8. SPECIAL NOTE:
   *All investigators and support staff have access to copies of the Belmont Report, LSU’s Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb
VITA

Chelsi Gibbons is a native of Shreveport, Louisiana. She received her Bachelor of Arts in Pre-Professional Speech-Language Pathology from Louisiana Tech University in Ruston, Louisiana in November 2011. Chelsi began her studies at Louisiana State University in August of 2012. Her professional interests include expanding her clinical knowledge and skills with both children and adult populations.