

Running Head: INDIVIDUAL GROWTH AND DEVELOPMENT

Individual Growth and Development Indicators (IGDIs):

Assessment that Guides Intervention for Young Children

Judith J. Carta, Ph.D., Charles R. Greenwood, Ph.D., & Dale Walker, Ph.D.

University of Kansas

Ruth Kaminski, Ph.D. & Roland Good, Ph.D.

University of Oregon

Scott McConnell, Ph.D. & Mary McEvoy, Ph.D.

University of Minnesota

To be published in

M. Ostrosky & E. Horn (Eds.). Assessment: Gathering meaningful information.
The Young Exceptional Children Monograph Series #4. Longmont, Co: Sopris West.

Individual Growth and Development Indicators (IGDIs):
Assessment that Guides Intervention for Young Children

As a home visitor for an Early Head Start program, Ronda visits several infants and toddlers and their families during the course of a week. While the focus of each of these visits varies depending on the needs of the children and families, the overriding purpose of this early intervention program is to ensure that children's development is on a positive course-- that children are making progress toward important outcomes. While Ronda conducts occasional assessments of children who are on her caseload to see where they stand relative to developmental milestones, these assessments don't really help Ronda know whether individual children's progress toward important outcome areas is keeping up with that of other typically developing children. Ronda would really like to be able to identify when a child's rate of progress in an area is not on course compared to other children so she can change or intensify her interventions in that area when that happens. Yet, at times when Ronda needs to make a decision like that, she has few tools at her disposal and usually must rely on her general knowledge of children's development. She thinks she would be more effective if she had some tool that would give her more frequent information about children's progress that could guide her intervention decisions.

This story illustrates what many early interventionists know. While many tools are available for assessing infants and toddlers, persons who work with very young children on a regular basis have limited means of knowing whether their intervention practice is helping a child make progress toward important outcomes. As a field, our emphasis in assessment has been on documenting a delay or diagnosis at the expense of assessing to inform intervention decision-making (Meisels & Atkins-Burnett, 2000). Usually, assessments are not conducted

often enough to provide practitioners and parents with ongoing information on how a child is doing or whether a program of intervention is working. Existing measures typically are too long and cumbersome to be used at frequent intervals, they often cannot be implemented by the practitioners who need to act on the assessment information, and they generally lack an easy way of tracking rates of growth toward specific meaningful outcomes. Therefore, a gap exists between assessments available and the tools needed to inform practitioners like Ronda who are trying to influence children's progress in programs.

Individual Growth and Development Indicators

Individual Growth and Development Indicators (IGDIs) are measures that can fill the gap by providing helpful information about children's growth toward outcomes. These new tools for young children are part of an approach to assessment called General Outcomes Measurement (GOM) (Deno, 1997). In this approach, key skill elements that have been specifically linked to important outcomes and selected to represent the domain of interest are measured. A key distinction between this approach and other more traditional assessment like criterion-referenced testing is that with GOM, the same set of key skill elements are measured repeatedly over time allowing for the depiction of growth toward identified outcomes. With criterion-referenced testing, on the other hand, a child is assessed on all the specific subskills in a given domain at the child's developmental age.

Examples of a well-known IGDI in the field of pediatrics are children's growth charts (Centers for Disease Control and Prevention, 2000). Repeated measurement and charting of height and weight provides an inexpensive, yet informative means of determining a child's rate of growth toward the important general outcome of normal healthy development (See Figure 1). The graphic record of a child's height and weight plotted over time and compared to children of

similar ages easily conveys to the pediatrician and the parents about whether intervention may be needed. This is based not only on the difference between a child's height or weight and those of children of a similar age but also in the child's *rate of growth* or growth velocity. When a child's rate of growth is lower than age-mates, a pediatrician may consider intervention in the form of improved nutrition or hormonal intervention. Then, the same height and weight charts continue to be used to track rates of growth and the effectiveness of the chosen intervention. While height and weight certainly do not provide a comprehensive measure of a child's general health status, they act as *indicators* of it. Indicators such as these provide helpful information because they are highly correlated to the general outcome of health and because their ease of use allows them to be used repeatedly and often. Indicators like these are the type of tools that interventionists such as Ronda need to inform them about children's growth in areas other than health.

The General Outcome approach has been used in other areas of education for over twenty years to monitor older children's progress in reading (e.g., Shinn, 1989). Frequent quick probes of the number of words a child can read in a short reading passage in one minute provide a measure of a child's oral reading rate--an indicator that has proven to be highly related to the more general outcome of reading ability (Deno, Mirkin, & Chaing, 1982). These measures have been demonstrated not only to be reliable and valid but also to be sensitive to instructional intervention (Fuchs & Fuchs, 1986). Therefore, when growth in reading rate is tracked over time, it can give a teacher an indication of when a child is falling below expected rates of growth in reading rate, and when specific reading interventions currently being employed are moving a child rapidly toward desired proficiency—just like children's growth charts. In short, the reading rate indicator provides important clues to the teacher when a change in instruction may be needed in order to change a child's rate of reading growth. Growth information like this is just

what Ronda would find helpful in knowing when to make needed changes in intervention for young children.

Extending the Concept of General Outcome Measurement to Young Children

IGDIs are GOMs for younger children that have only recently become available (Greenwood, in press; Luze et al., 2001). Researchers with the Early Childhood Research Institute on Measuring Growth and Development (ECRI-MGD) began the process of developing IGDIs by identifying the general outcomes toward which growth should be measured. Through a national survey of parents and professionals in early childhood and early childhood special education, a list of 15 of the most “socially valued outcomes” for young children was identified (Priest et al., in press). The most highly rated outcome that emerged from this national consensus was the following early communication outcome: “Child uses gestures, sounds, words, and word combinations to express meaning to others.” Other general outcomes were identified in self-help/adaptive development, movement, social competency, and cognitive/problem-solving areas.

Specific IGDIs for these outcomes are being developed for children from birth to three years, for children from three to five years, and for children from five to eight years. For example, to assess infant and toddler growth on the expressive communication outcome described above, a play-like measure that encourages child communication has been developed and validated (Luze et al., 2001). For preschoolers, on the other hand, a more advanced indicator of expressive communication is a measure of children’s naming of pictures in a few minutes (McConnell, Priest, Davis, & McEvoy, 2001). Both communication indicators have been demonstrated to be highly correlated to standardized measures of communication and they are also correlated to each other at age 3, where the two measures share a common age (Greenwood, 2001).

Example of a Communication IGDI for Infants and Toddlers

The Early Communication Indicator (ECI) (Luze et al., 2001) provides information regarding the number of communication behaviors an infant/toddler exhibits during play with a familiar adult. During a 6-minute play period, the infant/toddler is encouraged to play with either a Fisher Price toy house or barn with a familiar adult or caregiver. The role of the play partner is to engage the child with the toy (i.e., the Fisher-Price Barn or House) always following the child's lead. The play partner comments generally on the child's play, answers the child's questions and asks questions based on the child's interest. This partner role by the adult requires some training to be sure the adult is not overly directive in prompting the child to communicate.

During this 6-minute play session, another adult records the child's communication behaviors. These are simple tallies of each of the following: (a) the child's gestures (the physical movements the child makes during attempts to communicate) (e.g., giving or showing an object, pointing); (b) vocalizations (non-word verbal utterances voiced by the child (e.g. babbling, laughing); (c) single-word utterances (e.g. "Mine") or multi-word utterances (e.g. "That my toy.") (see Figure 2-score sheet). At the end of the 6-minute play session, the adult who has been recording (Coder) sums every category of communication behavior (e.g., gestures, vocalizations, etc.) that occurred during the session and also calculates a Total Communication score by combining the totals for each separate category of communication behaviors. The rate per minute of total communication is then calculated by dividing the total communication score by 6--the number of minutes for the entire play session.

Putting the ECI into practice. The ECI can be used in home visiting programs like the one in which Ronda works or in center-based programs. Because the assessment requires two adults (one to serve as play partner for the child and one to serve as the coder who records the

child's communication behaviors), it will work best if Ronda can recruit another adult who can tally the child behaviors while Ronda acts as the play partner during the assessment. While parents or child care providers in centers can serve as play partners, they may need some training to follow the child's lead during the assessment and not engage in a multitude of drill-like questions that may evoke one-word responses. Another alternative, if no additional adults are available, is to videotape the 6-minute play sessions and code the child behaviors from the videotapes at a later point.

Using ECI data to make intervention decisions. A model for making decisions has been created to help practitioners and families use the IGDIs for guiding and adapting interventions (see Figure 3) (ECRI-MGD, 1998). This model is based on similar problem-solving models for using General Outcome Measurement (e.g., Deno, 1989; Kaminski & Good, 1996) and involves using the IGDIs in two ways: (1) to monitor growth and (2) to identify when an intervention is needed. Once practitioners have identified a need for intervention, other assessments are used to explore possible intervention solutions to do the following: (2a) generate intervention options, and (2b) implement intervention and measure the fidelity of intervention. Finally, IGDIs are used in the process to: (3) evaluate the child's growth in the course of the new intervention and (4) continue monitoring the child's progress over time.

For example, Ronda may choose to use ECI to monitor the growth of communication for the children on her caseload by conducting individual monthly ECI assessments as described earlier. Individual scores could then be entered into a specially designed EXCEL template database. Through the EXCEL program, she could generate graphs of any child's Total Communication and each separate category of communication (e.g., single words, multiple words) across months. She could also display growth charts summarizing her entire caseload

combined and how that compared to growth of all children in the entire Early Head Start program.

In the course of monthly monitoring of all children's communication growth in this way, Ronda noticed that Amy, a 14 month-old girl, was producing only between 2-3 communications per minute (see Figure 4) per month and her pattern of growth was flat if not declining one month to the next. Comparing her performance of 2 or 3 communications per minute to that of typical children her same age as depicted on the normative aim line (i.e., 8 to 9 communications per minute), her lack of progress was a concern. Just like a height and weight chart, Ronda could see from Amy's ECI chart that she was not growing at the same rate as peers her own age.

Ronda decided to refer Amy for more assessment of her communication, whereupon it was confirmed that she had a delay in expressive communication based on additional testing. After ruling out possible medical causes, Amy's intervention team (including her parents and childcare providers) examined other possible causes for Amy's delay looking for potential solutions. Through this process, it was noted that she spent most of her waking hours in a child care environment where caregivers made little effort to promote her language use. For example, an informal observation indicated that child care providers gave her very few opportunities to communicate and her requests in the child care environment were quickly met with no requirement that she elaborate or expand by using her language.

Ronda and the intervention team decided to help Amy's child care providers learn how to promote her expressive communication by following her lead and requiring her to use her limited vocabulary and by expanding on her utterances. The intervention was implemented intensively on a daily basis for 3 months during which time Ronda increased the frequency of the ECI assessments from monthly to weekly so that she could have more data to track Amy's progress in

the presence of this focused intervention. Amy's graph showed that during the 12 weeks (3 months) of intervention (see Figure 4), her rate of progress shot up dramatically and her weekly level of total communication was approaching that of typically developing peers. Ronda and the intervention team (including the childcare providers) used the data to confirm that the intervention was having the desired effect and they projected that if this rate of progress continued, she would probably be communicating at a rate similar to typically developing children within the next two to three months. Consequently, the childcare providers were encouraged to continue their successful intervention efforts with Amy and with other children under their care. Additionally, based on her progress, the frequency of ECI assessments was cut back from weekly to monthly (see Figure 4).

Using ECI to monitor programs. While IGDIs are helpful in monitoring individual children's growth over time, program directors can use the same strategy for measuring growth of all children in their programs. In this way program directors can use children's growth as an indicator of whether the program is moving children in a timely way toward meaningful outcomes. It is possible that changes in rates of growth in entire programs can be used to indicate how shifts in policies or programs (such as size of caseloads, frequency of home visits, changes in curriculum) actually affect children. For example, a program director could examine the average rates of growth of all of her children in expressive communication for a 6-month period and then continue to track growth after her staff had received training on interventions to promote responsive interaction of caregivers on their caseloads. Comparing rates of growth on the ECI for a period of time before and after training on this intervention would provide helpful information to the program director on whether the training was promoting children's growth

toward the important communication outcome of being able to use gestures, words and sentences to express their wants and needs.

The Future of General Outcome Measurement for Young Children

This short article describes only one application of Individual Growth and Development Indicators. Similar measures for assessing the growth of infants and toddlers are being validated in the areas of movement (Greenwood et al., in press), social development (Greenwood et al., in preparation), adaptive behavior and problem-solving. Information about the reliability and validity and practical utility of these instruments can be found in recently published articles (Greenwood et al., in press; Luze et al., 2001) and at our website at <http://www.jgcp.ku.edu/Grants/ecrimgd.htm>. In addition, comparable sets of measures are also being developed for preschool children by the ECRI-MGD at the University of Minnesota (<http://ici2.umn.edu/ecri>) and for children from 5 to 8 years at the University of Oregon (<http://dibels.uroegon.edu>).

The intent is to provide a sensitive, practical tool that measures growth toward important outcomes that can be used in a standardized way focused on authentic child behaviors. While the measures have been constructed to meet rigorous standards of reliability and validity, a critical measure of their quality is their sensitivity to growth over time and to the effects of intervention. The ultimate goal is to put easy-to-use assessment tools in the hands of more people working with children so that practitioners and programs will know when they are truly making a difference in moving children closer toward socially meaningful outcomes.

Note: Preparation of this manuscript was supported by Grant H024560010, funded by the Office of Special Education and Rehabilitation Services (OSERS), U. S. Department of Education Grant. The opinions expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education and no official endorsement by the U. S. Office of Education should be inferred. The authors would like to thank all the team members of the ECRI-MGD project who helped conceptualize this work and especially Gayle Luze, Deborah Linebarger, Carol Leitschuh and Jeff Priest.

Note: You can reach Judith J. Carta by email at carta@ukans.edu

References

- Centers for Disease Control and Prevention, National Center for Health Statistics (2000). CDC Growth Charts: United States.
- Deno, S. (1997). Whether thou goest...Perspectives on progress monitoring. In J. W. Lloyd, E. J. Kameenui, & D. Chard (Eds.), *Issues in educating students with disabilities* (pp. 77-99). Mahwah, NJ: Erlbaum.
- Deno, S. L., Mirkin, P. K., & Chaing, B. (1982). Identifying valid measures of reading. *Exceptional Children, 49*(1), 36-45.
- ECRI-MGD. (1998). Research and development of exploring solutions assessments for children between birth to age eight. (Technical Report 5). Minneapolis, MN: Early Childhood Research Institute Measuring Growth and Development.
- Fuchs, L. S., & Fuchs, D. (1986). Linking assessment to instructional intervention: An overview. *School Psychology Review, 15*, 318-323.
- Greenwood, C. R. (2001, February). Monitoring growth and development of infants and toddlers. Presentation at the Pacific Coast Research Conference. LaJolla, CA.
- Greenwood, C. R., Luze, G. L., Cline, G., Kuntz, S., & Leitschuh, C. (In press). Developing a general outcome measure of growth in movement in infants and toddlers. *Topics in Early Childhood Special Education*.
- Kaminski, R. A., & Good, R. H. (1996). Toward a technology for assessing basic early literacy skills. *School Psychology Review, 25*, 215-227.
- Luze, G. J., Linebarger, D. L., Greenwood, C. R., Carta, J. J., Walker, D., Leitschuh, C., & Atwater, J. B. (2001). Developing a general outcome measure of growth in expressive communication of infants and toddlers. *School Psychology Review, 30*, 383-406.

McConnell, S. R., Priest, J. S., Davis, S. D., & McEvoy, M. A. (2001). Best practices in measuring growth and development for preschool children. In A. Thomas & J. Grimes (Eds.) *Best practices in school psychology IV: Vol. 2*, pp. 1231-1246. Bethesda, MD: National Association of School Psychologists

Meisels, S. J., & Atkins-Burnett, S. (2001). The elements of early childhood assessment. In J. P. Shonkoff & S. J. Meisels (Eds.) *Handbook of early intervention* (2nd Ed.), (pp. 231-257). Cambridge, UK: Cambridge University Press.

Priest, J. S., McConnell, S. R., Walker, D., Carta, J. J., Kaminski, R. A., McEvoy, M. A., Good, R. H., Greenwood, C. R., & Shinn, M. R. (in press). General growth outcomes for children between birth and age eight: Developing and validating a foundation for a continuous progress measurement system. *Journal of Early Intervention*.

Shinn, M. R., (Ed.), (1989). *Curriculum-based measurement: Assessing special children*. New York: Guilford.

Figure Captions

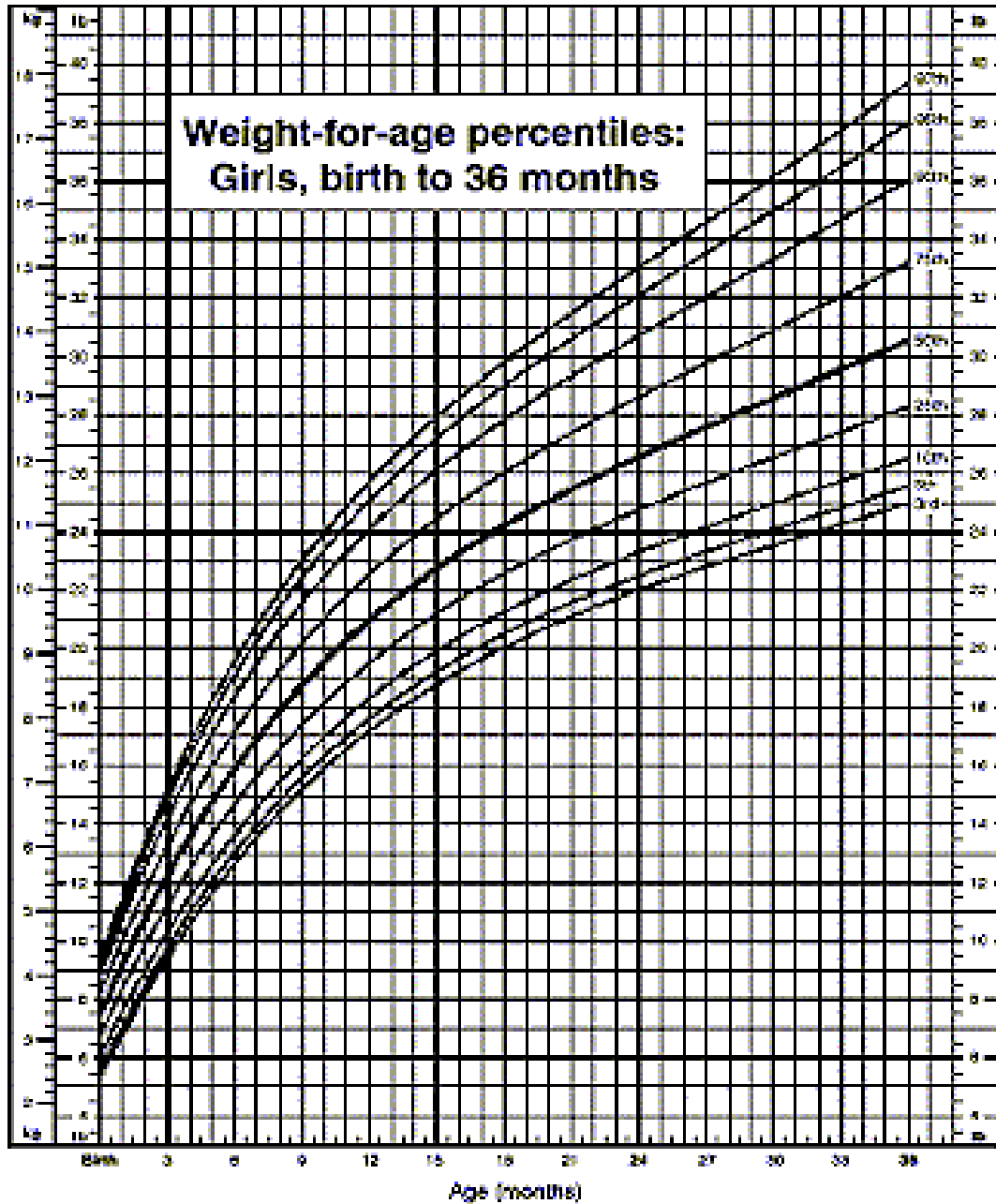
Figure 1. Weight chart for girls from birth to 36 months from the Centers for Disease Control and Prevention, National Center for Health Statistics. CDC growth charts, United States.

Figure 2. Early Communication Indicator Recording Form showing data recorded during the 6 minute play session.

Figure 3. Decision-making model using IGDIs to monitor progress on interventions.

Figure 4. Example of progress monitoring using IGDIs during monthly monitoring, intervention, and follow-up during continued intervention.

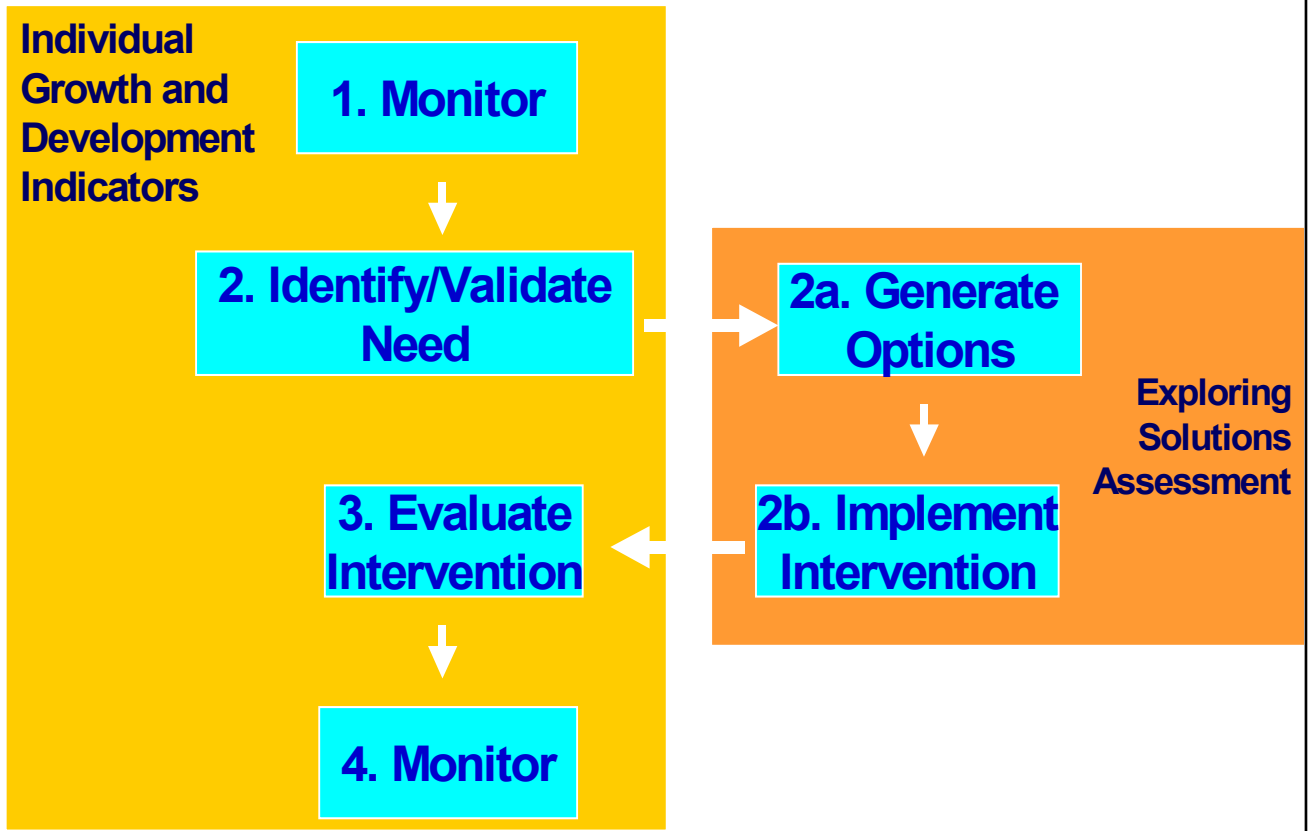
CDC Growth Charts: United States



PERCENTILES ESTABLISHED AND STUDIES CONDUCTED BY NATIONAL CENTER OF HUMAN GROWTH DEVELOPMENT AND METABOLISM
AND NATIONAL CENTER OF HUMAN GROWTH DEVELOPMENT AND METABOLISM STUDIES



Decision-Making Model





Child ID #: Amy Wave: 8

Test Date: 1/7/02 Assessor: Ronda

Coder: Gabe Circle one: Barn / House

Expressive Communication

Location: Jayhawk Room

ECI CODING SHEET

Reliability Y N Primary Coder Name: _____

	Gestures	Vocalizations	Single Word Utterances (X 2)	Multi-Word Utterances (x 3)	Total Communication
0:00	G 	V	W	M	1
1:00	G	V 	W	M	4
2:00	G 	V 	W	M	2
3:00	G 	V	W	M	2
4:00	G	V	W	M	
5:00	G	V 	W	M	2
TOTAL	G 4	V 7	W	M	11

