

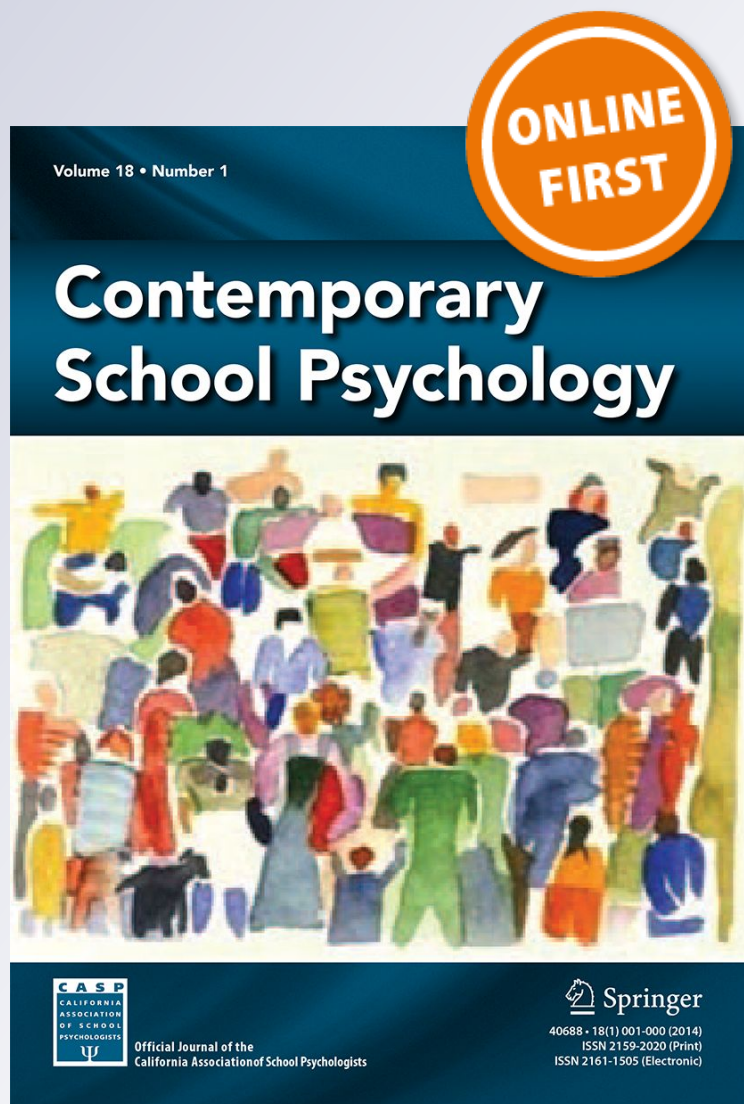
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Standardized Assessment Accommodations for Individuals with Intellectual Disability

Talia Thompson¹ · Jeanine M. Coleman¹ · Karen Riley¹ · Laurel A. Snider¹ · Londi J. Howard¹ · Stephanie M. Sansone^{2,3} · David Hessl^{2,3}

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Abstract

Standardized cognitive and educational assessments of individuals with intellectual disability (ID) provide crucial information for parents, researchers, and educators. Understanding the unique developmental strengths and challenges of an individual with ID is imperative to determining appropriate educational placements, developing intervention plans, and measuring growth. However, challenges associated with ID in areas such as communication, attention, and self-regulation can interfere with the validity of test results and lead to students being labeled “untestable.” Unfortunately, there is a paucity of research regarding administrative procedures that yield valid standardized assessment results with this population. This paper outlines best practices in standardized assessment accommodations based on a literature review, professional standards, legal precedence, and extensive field research. A model for assessment will be proposed, consisting of an iterative four-stage cycle of planning, administration, evaluation, and reporting. Practical ideas for accommodations will inform school psychologists so they can obtain valid and useful scores when administering standardized assessments with students with ID.

Keywords Standardized assessment · Intellectual disability · Accommodations

Over the past several decades, the focus of the school psychologist has shifted in many ways, with none greater than their role in the assessment process. The shift away from the test/deficit/place model to a Multi-Tiered System of Supports (MTSS) approach is monumental in many ways and recent literature is replete with studies and recommendations for adapting to and implementing this shift (Eagle et al. 2015; Utey and Obiakor 2015). Regardless of the level of MTSS application and implementation, school psychologists remain presented with the difficult task of assessing a variety of students, many with intellectual disability (ID).

Advances ranging from the introduction of new assessment tools designed to measure specific constructs to the mapping of the human genome and subsequent identification of genetically linked disabilities have both improved and further complicated the assessment process (Munger et al. 2007). The difficulty for the school psychologist lies not only in dealing with the developmental and behavioral characteristics associated with these disorders, but also with the challenge of finding the best match between the child and the assessment tool and providing accommodations to enhance validity of results. This situation is further compromised by the various reasons for which assessments are conducted, including but not limited to eligibility, placement, Individual Education Program (IEP) development, progress monitoring, and research.

A multi-site National Institute of Child Health and Human Development (NICHD) funded project is validating the NIH Toolbox Cognitive Battery for individuals with ID and is the context for this paper (Hessl et al. 2016). Extensive field research coupled with a review of the literature has revealed useful strategies to improve standardized assessments for individuals with ID. This paper outlines a model for practice developed through this research and provides unique considerations for assessing individuals with ID. First, it explores professional standards for assessment with individuals with

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disabilities and the legal precedence for providing accommodations. Next, a model for assessment with individuals with ID will be proposed, consisting of a four-stage cyclical approach to the assessment process. Practical ideas for accommodations will inform researchers, clinicians, and educators so they can appropriately meet the unique needs of individuals with ID when administering standardized assessments, with the aim of yielding more valid and representative results. Finally, this report ends with three subsections regarding assessment issues specific to the behavioral phenotypes of those with fragile X syndrome (FXS), Down syndrome (DS), and comorbid ID with autism spectrum disorder (ASD).

For the purposes of this paper, there are a number of key terms that merit definition. First, this paper addresses a variety of professionals, including but not limited to school psychologists, clinical psychologists, research psychologists, special educators, and speech-language pathologists. The term assessment administrator (AA) refers to anyone conducting psychoeducational assessments. This report discusses assessment practices with individuals with ID, who may be students, patients, research participants, consumers, or clients. ID is a disability characterized by significant deficits in the areas of intellectual functioning, adaptive behaviors, and academic abilities (IDEA 2004). For the purposes of this paper, standardized assessments are individually administered, norm-referenced tests with “standard” or consistent administration requirements (Sattler 2008). Assessment refers to the process of data collection for evaluation of current developmental levels. This may be a part of a special education evaluation, a clinical evaluation, or a research protocol. It is important to differentiate this type of assessment from high-stakes group-administered achievement and state accountability tests (see Christensen et al. 2011).

Standardized Assessments and Intellectual Disability

Standardized cognitive and educational assessments of individuals with ID provide crucial information for parents, researchers, and educators. Understanding the unique developmental strengths and challenges of an individual with ID is imperative to determining appropriate educational placements and intervention plans (Salvia et al. 2013). Furthermore, assessments can be used in conjunction with targeted medication trials or behavioral/cognitive interventions to measure individual baseline data and examine growth in a variety of cognitive processes over time (Berry-Kravis et al. 2012). There are also legal implications, such as using cognitive assessment results to determine whether individuals are competent to stand trial (Cheung 2013). It is essential that educators, clinicians, and researchers gain an accurate measure of developmental progress and growth trajectories for individuals with

ID so that appropriate interventions can be validated and promulgated.

Research indicates that participating in standardized assessments can be a taxing experience for individuals with ID and a challenging endeavor for administrators (Berry-Kravis et al. 2006; Hall et al. 2012; Herschell et al. 2002; Kasari et al. 2013; Koegel et al. 1997). This is due, in part, to a variety of factors related to ID, including preferences for familiar and predictable routines and people, executive function challenges, sensorimotor delays, and communication deficits associated with speech, language, and/or social-emotional delays (Kenworthy and Anthony 2013). These unique individual attributes coupled with the demands of standardized assessments can be problematic. For example, frequently, the assessment room is a new setting and may unintentionally cause anxiety and discomfort for the individual with ID (Kasari et al. 2013). The AA may also be new to the individual and unfamiliar with his or her specific needs and preferences (Szarko et al. 2013). Tasks are artificial and removed from the daily context and routines familiar to the examinee. The use of ceilings (e.g., six incorrect answers in a row) as stop points for assessments can make it impossible to let the individual with ID know exactly when the session will end, thus decreasing predictability and potentially increasing stress. If the examinee has articulation delays, it may be difficult to understand verbal responses well enough to score them accurately. Social and emotional delays, oppositional temperament, or mood dysregulation can substantially impact the examinee's motivation and self-regulation to perform well with strong effort or persistence (Koegel et al. 1997; Wolf-Schein 1998). At times, these testing behaviors interfere enough with feasibility to render scores invalid for analysis (Berry-Kravis et al. 2006), or result in the unhelpful practice of deeming an individual “untestable,” negating the effort of the assessment and placing yet another negative label on the individual with ID (Bagnato and Neisworth 1994; Bathurst and Gottfried 1987; Skwerer et al. 2016).

Unfortunately, there is a paucity of research regarding the administrative procedures that yield valid standardized assessment results and the potential importance of accommodations with the ID population. Existing empirical evidence is limited and primarily focused on specific etiologies. Notably, one meta-analysis documented that accommodations aimed at improving motivation during standardized cognitive assessments significantly and positively impacted performance for examinees with below average IQ (Duckworth et al. 2011). Further, examiner familiarity (gained through intentional rapport building) may have positive testing effects on students with ASD (Szarko et al. 2013). The implementation of motivation-based accommodations in standardized assessment with individuals with ASD may reduce testing bias related to ASD symptomology (e.g., lack of social reciprocity) and enhance the validity of results (Koegel et al. 1997). In the FXS research

literature, accommodations to standardized procedures have been found to enhance feasibility of testing. Limiting complex verbal instructions, using structured teaching items with reinforcement, and employing a computerized administration can address known deficits in social communication skills related to FXS during standardized assessment procedures (Hall et al. 2012; Scerif et al. 2005). Furthermore, contingency reinforcement, frequent breaks for physical activity, and behavioral redirection have been found to increase completion rates for individuals with FXS in a research setting (Berry-Kravis et al. 2008). Thus, while limited empirical evidence does appear to support adapting standardized assessments for individuals with ID, the emerging research currently lacks depth and practical applications for practitioners.

Professional Mandates and Legal Precedence

There are several recommendations from professional organizations designed to ensure fair and valid assessment results when working with special populations (American Education Research Association (AERA 2014); National Association of School Psychologists (NASP 2010); American Psychological Association (APA 2012) (see Table 1). These organizations emphasize a person-centered approach to assessment, tailored to the individual's needs. The recommendations include using psychometrically sound assessment measures that are validated, through empirical research, with individuals with disabilities. Accommodations are critical to ensure that results measure the individual's ability as fairly as possible. Another recommendation is the use of ecological assessments, in which data are collected from a variety of sources and results are interpreted in context. Assessment administrators should ensure fairness of the assessments by reducing bias in the testing process and carefully evaluating the validity of results. Finally, reporting of results should be easy to understand and accessible to the family (AERA 2014; NASP 2010).

Accommodations

Accommodations are a critical component of fair and valid assessments for individuals with ID. The AERA defines accommodations in assessments as, "relatively minor changes to the presentation and/or format of the test, test administration, or response procedures that maintain the original construct and result in scores comparable to those on the original test" (2014, p. 58). This language was originally derived from legal cases addressing accommodations in high-stakes achievement and accountability tests (Brookhart vs. Illinois 1983; Hawaii 1990). Professional organizations and standardized test developers adopted the language

established by these cases to provide guidelines to the administrators of individual standardized assessments (e.g., Roid 2003).

Legal cases emphasized that accommodations are mandated under Section 504 of the Rehabilitation Act of 1973 (Brookhart vs. Illinois 1983). Furthermore, AAs must consider the skills being measured and then ensure that a change in procedures does not impact the validity of the assessment. For instance, providing a reader to a student with dyslexia is inappropriate for those sections of a state-wide graduation assessment specifically designed to assess reading ability. Conversely, providing a reader during the math or science portions of the assessment is an appropriate accommodation that preserves the validity of the math or science skills being measured. Most importantly, these cases emphasized the importance of considering accommodations on an individual basis with regard to the skills of the individual and the goal of the assessment (Hawaii 1990).

When deciding the appropriateness of any given accommodation, both target skills and access skills should be reviewed before an accommodation is provided (Braden and Elliott 2003; Phillips 1994). Target skills refer to the construct that an assessment intends to measure, while access skills are those abilities—such as joint attention, fine motor skills, and language ability—that are required in order for an individual to demonstrate his or her understanding of testing conditions, content, and instructions during a standardized assessment (Braden and Elliott 2003). When conducting assessments with individuals with ID, results can be rendered invalid by a variety of access skills, including reduced communicative ability, lack of behavior regulation, compromised fine motor dexterity, and poor trunk stability. Practitioners must consider the individual's abilities and implement accommodations that are appropriate for the individual's profile of access skills (Braden and Elliott 2003).

It is also important to delineate the difference between accommodations and modifications. Modifications are changes in standardized assessment procedures that result in an underrepresentation of the desired target skill (AERA 2014). Consider a subtest designed to measure auditory memory by asking the individual to listen to a stream of spoken numbers and repeat them back to the AA. Individuals with ID must have the access skill of joint attention with the AA to demonstrate the target skill of auditory working memory with validity. An AA may provide an accommodation to support deficits in joint attention by providing a visual or verbal cue to indicate the item will soon be presented and to encourage the examinee to attend to the task. Conversely, changing the standardization procedures by repeating the stimulus or presenting it visually would change the target skill of the assessment and therefore render norm-based scores invalid (AERA 2014).

Table 1 Alignment of recommended practices from professional organizations

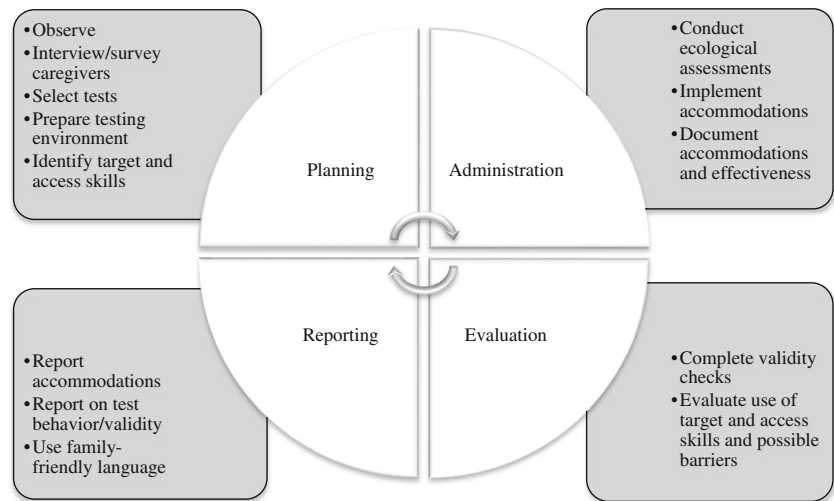
Recommended practices	American Education Research Association <i>Standards for Educational and Psychological Testing</i> (AERA 2014)	American Psychological Association <i>Guidelines for Assessment of and Intervention with Persons with Disabilities</i> (APA 2012)	National Association of School Psychology <i>Professional Principals for Professional Ethics</i> (NASP 2010)
1. Individualize the assessment process	Standard 10.5: - Selected tests should be suitable for the characteristics and background of the test taker.	Guideline 13: - Consider disability as a dimension of diversity.	Principle II.3. Responsible Assessment and Intervention Practices, Standard II.3.5: - Conduct valid and fair assessments. - Pursue knowledge of the student's disabilities and background. - Select, administer, and interpret instruments and procedures in light of those characteristics.
2. Use psychometrically sound assessments with appropriate accommodations	Standard 3.0: - The testing process should be designed to minimize construct-irrelevant variance and to promote valid score interpretations. Standard 3.9: - Test developers and users are responsible for developing and providing test accommodations when appropriate. - Test accommodations should remove construct-irrelevant barriers. Standard 3.10: - Test developers and users are responsible for documenting and monitoring the implementation of the accommodation.	Guideline 14: - Implement the assessment approach that is most psychometrically sound, fair, comprehensive, and appropriate for clients with disabilities. Guideline 15: - Determine whether accommodations are appropriate for clients to yield a valid test score.	Principle II.3. Responsible Assessment and Intervention Practices, Standard II.3.2: - Use assessment techniques and practices that the profession considers to be responsible, research-based practice.
3. Consider data from a variety of sources	Standard 10.12: - Consider other factors that may influence a particular testing outcome. - Include a description of such factors in the report.	Guideline 16: - Strive to appropriately balance quantitative, qualitative, and ecological perspectives. - Articulate strengths and limitations of the assessment process.	Principle II.3. Responsible Assessment and Intervention Practices, Standard II.3.3: - Base assessment on a variety of different types of information from different sources. Standard II.3.4: - Assess in all areas related to the suspected disability.
4. Evaluate fairness of assessment to reduce bias and ensure validity	Standard 3.11: - Obtain and document evidence of score validity if a test is changed to remove barriers to accessibility of the measured construct.	Guideline 17: - Maximize fairness and relevance in interpreting assessment data of clients who have disabilities. - Apply approaches that reduce potential bias.	Principle I.3. Fairness and Justice, Standard I.3.1: - Do not engage in or condone actions or policies that discriminate against persons based on actual or perceived mental, physical, or sensory disability.
5. Use family-friendly language when reporting results	Standard 10.11: - Share test scores in language that the test taker or, when appropriate, the test taker's legal representative, can understand.	APA Guidelines do not specifically address this topic.	Principle II.3. Responsible Assessment and Intervention Practices, Standard II.3.8: - Present results in clear, understandable terms so that the recipient can make informed decisions.

A Model for Assessment with Individuals with ID

When conducting standardized assessments with individuals with ID, it may be helpful to utilize a cyclical approach to the assessment process. The proposed cycle of assessment has been successfully used in a research setting to increase validity and enhance feasibility for several standardized assessments

with a variety of individuals with ID (Hessl et al. 2016). It includes four distinct, yet iterative stages, including planning, administration, evaluation, and reporting (see Fig. 1). This framework fills a gap in the current assessment literature by synthesizing and operationalizing recommended practices from a variety of professional organizations (AERA 2014; APA 2012; NASP 2010) and several empirically tested methods, to provide the AA with direction and guidance for

Fig. 1 Assessment cycle



the assessment process. Furthermore, a set of guiding questions for each stage of the cycle (see Table 2) encourages thoughtful planning and reflection to enhance professional judgment when conducting assessments with individuals with ID.

Planning

Time dedicated to the planning phase is well spent, as it can be recaptured through a smooth assessment session. The AA

must prepare both the examinee and the environment. One way to prepare the individual with ID is to provide as much information as possible in a manner that he or she can understand. Time spent intentionally building rapport, during a home or classroom visit, may allow the individual to become familiar with the AA in a safe and predictable environment, thereby reducing the anxiety of the individual with ID when he or she comes to the assessment room for testing (Szarko et al. 2013). A social story is also a useful method for preparing the individual for the assessment process (Gray 2015). The

Table 2 Guiding questions for the assessment cycle

Stage of the assessment cycle	Guiding questions
Planning	What is the purpose of the assessment? What target skills do I want to measure? What access skills, specific to this individual, may interfere with the assessments? What do I know about this individual's phenotype that can guide my assessment plan? How will I reduce barriers in the assessment process? Which test will best help me to measure the target skill with this individual? What can I learn from prior assessment reports for this individual? What worked, and what was challenging?
Administration	Have I considered multiple sources of data? What accommodation is required to assure that I am measuring the target skill? Will the accommodation affect the validity of the results of the test?
Evaluation	What target skill did I aim to measure? What access skills may have interfered? (e.g., self-regulation and dexterity) What accommodations did I use to address access skills? How effective were those strategies? Did I accurately measure the target skills in this administration? Was this administration valid? Why or why not?
Reporting	Did I answer the referral questions? Did I use multiple methods to convey assessment results to the family? Did I report on accommodations, testing behavior, and validity? Did I include suggestions for future assessments?

AA can provide a detailed and illustrated social story to the family ahead of time, with drawings, photographs, or videos of the environment, the AA, and the assessment items, as well as a storyline for what to expect during the assessment (Hessl et al. 2016). Finally, the AA might consider meeting the family in the parking lot of an unfamiliar setting in order to support a smooth transition inside for assessment.

Semi-structured interviews or parent surveys can provide the AA with crucial information about the individual being tested (Kasari et al. 2013). If the individual has a known developmental disability (e.g., FXS, ASD, DS) related to the ID, the AA can use information on the phenotype of the disability to guide the questioning. AAs may wish to inquire about triggers for anxiety, sensory preferences or aversions, history of aggression, current behavior plans or reward systems, and preferred foods, items, or experiences to be used for behavior reinforcement. Observations in the individual's home or school setting can also inform the AA of behavioral challenges that may act as a barrier during the assessment process (Braden and Elliott 2003). The AA can prepare accommodations for the assessment by making note of any current accommodations and verbal cues used in the individual's regular routine. A review of records will inform the AA about prior accommodations that were used successfully in previous assessment sessions.

Equipped with information about the unique individual from surveys, interviews, observations, and a review of records, the AA can then engage in thoughtful test selection. It is best practice to utilize assessments that have been shown to be valid and reliable with individuals with ID and any other comorbid conditions such as attention-deficit/hyperactivity disorder (ADHD), anxiety, or ASD (Brue and Wilmshurst 2016; Crepeau-Hobson 2014). The AA should check the standardization manuals to see if any of these subpopulations were included in the norming sample or in validity testing. Examiner's manuals may also include suggestions for specific accommodations when working with special populations. Research has demonstrated that certain cognitive assessments consistently result in significantly higher or lower IQ scores for individuals with ID and ASD (Bodner et al. 2014; Silverman et al. 2010). AAs must take special care to research the validity of the tests they intend to use with this population, as results may be skewed depending on the test. For individuals functioning developmentally below the age of six, the AA may consider supplementing standardized testing with a non-standardized assessment such as the Transdisciplinary Play-Based Assessment (TPBA2) (Linder 2008). While these types of assessments do not provide a standardized score, they can help provide more authentic information related to developmental progress (Bagnato 2008).

Next, the AA can prepare the assessment environment to reduce any distractions or stress triggers for the individual with ID (Sattler 2008). Whenever possible, the

assessment should take place in a quiet room, free of distractions. Limiting the number of visual distractions on the walls, or extraneous sounds, may help the individual to focus his or her attention on the assessment tasks (Kylliäinen et al. 2014). Any visual schedule or behavioral prompts should be prepared ahead of time and should be readily available to the practitioner during testing. It is helpful to have all test materials organized and prepared to begin assessment before bringing the examinee into the testing space (Sattler 2008). This ensures that the AA can focus his or her attention and efforts to further establish rapport, respond to the any initial discomfort, and gauge the appropriate time to begin testing.

Finally, AAs should ensure that the individual being tested has used the bathroom, has eaten a meal, and has had adequate sleep. Examinees must bring along corrective lenses and any augmentative communication devices so that sensory or communication impairments do not interfere with results. AAs may consider rescheduling an assessment session if the individual is ill, or if he or she is managing any complicating side effects from medications. This is also a good time to discuss whether a caregiver should or should not be present in the assessment room. For some individuals, this will bring emotional comfort, while for others, this can be highly disruptive (Perry et al. 2002; Sattler 2008). If a caregiver is present, the AA should explain the standardized nature of the assessment and emphasize the caregiver's role in providing reassurance and support rather than assistance in answering questions.

Administration

During the administration stage of the assessment cycle, the AA can utilize several testing accommodations to enhance validity of the test results (see Braden and Elliott 2003; Mather and Wendling 2014, p. 41). It is critical that the accommodations do not alter the construct being measured and only reduce barriers (AERA 2014). Some common accommodations that may be useful when testing individuals with ID are organized by domain type in Table 3. There are many other appropriate accommodations that will work well based on the individual's strengths and needs. Furthermore, some of these accommodations may not be relevant or useful depending on the target and access skills identified as critical during the planning stage of assessment. AAs should always document and report the specific accommodations used and the potential effects. This practice provides insight into the assessment being reported upon and can help to inform accommodations for future sessions (AERA 2014).

It is important to note that standardized assessments are only one part of a comprehensive assessment process, especially in clinical or school-based evaluations. An ecological

Table 3 Accommodations for standardized assessment with individuals with ID

Domain	Accommodation
Behavioral	Reinforce engagement/effort
	Token economy system
	Planned ignoring for undesirable behaviors
	Visual cues for behavioral expectations (e.g., first/then board, active listening visual prompt)
	Provide frequent breaks to accommodate attention span and low stamina
	Provide breaks following positive behaviors so as not to reinforce avoidant behaviors
	Use abbreviated forms of tests to reduce time spent in testing situation
Communication	Visual schedule (can be detailed with photos of actual test sections)
	Provide examinee with a break card or alternative method to request a break
	Use only nonverbal subtests, a nonverbal composite, or a nonverbal test
	Use simplified instructions to emphasize key phrases
	Allow talkers or other assistive technology for communicating responses
	Allow examinee to point, rather than verbalize response
	Provide ample/extended wait time for responses
Relational	Repeat instructions as needed (unless invalidates item)
	Home visit prior to testing
	Provide plenty of time to build rapport
	Start session with play, or a social activity to connect
Sensory	Utilize digital assessment measures to increase motivation and/or remove stress caused by social interactions with examiner
	Allow a transitional object from home to address issues of separation anxiety
	Use substitute subtests if there are sensory concerns with subtest (e.g., block tapping is too loud and visual scanning task is visually over-stimulating)
Environmental	Implement individualized sensory integration therapy/sensory diet strategies before testing and in between subtests ¹
	Provide fidget toys when examinee does not need to use hands for assessment tasks
	Provide a cozy corner, tunnel, or tent for breaks
	Provide a sensory area with sensory toys/items
	Test examinee over multiple days
	Choose a test with no time limits or remove time limits—unless time limits impact target skills (e.g., when measuring processing speed)
Motor	Test examinee in a familiar room (in the home, a familiar classroom, etc.)
	Allow family member or familiar companion to be present in room (if this is helpful)
	Allow examinee to provide examiner with verbal directions for item manipulation if he or she is unable to execute action with precision
	Use touch/scan response, where the examiner scans items with finger, and examinee indicates his or her choice with verbal or nonverbal signals

¹ Empirical results on the use of sensory integration (SI) therapy are mixed (Leong et al. 2015). However, SI therapy is used extensively in clinical practice and may be useful for the assessment process (see Hickman et al. 2008). Examples of sensory diet activities include deep pressure, sensory table, walking/motor breaks, swinging, pulling, pushing, lifting, blowing bubbles, and chewing gum

assessment model is the recommended approach, in which the AA gathers data from multiple sources to assemble a comprehensive understanding of an individual's strengths and needs (APA 2012; Brue and Wilmschurst 2016; Crepeau-Hobson 2014; NASP 2010). However, for research purposes, standardized assessments may be the sole source of data. In either case, it is critical that assessment results are a valid representation of the individual's ability (AERA 2014).

Evaluation

The evaluation stage of the assessment cycle involves reflection on the fairness of the assessment administration and the validity of the test results. Assessment results should be interpreted in context, considering each individual's diverse life experiences and profile of access skills (AERA 2014). This stage may reveal some flaws in the testing situation,

and some ideas for improving validity upon future testing. Figure 2 depicts a decision-making process for the AA to utilize in the evaluation stage. Careful consideration of target skills, access skills, accommodations used, and the effectiveness of such adaptations will help the AA to determine validity of the assessment process.

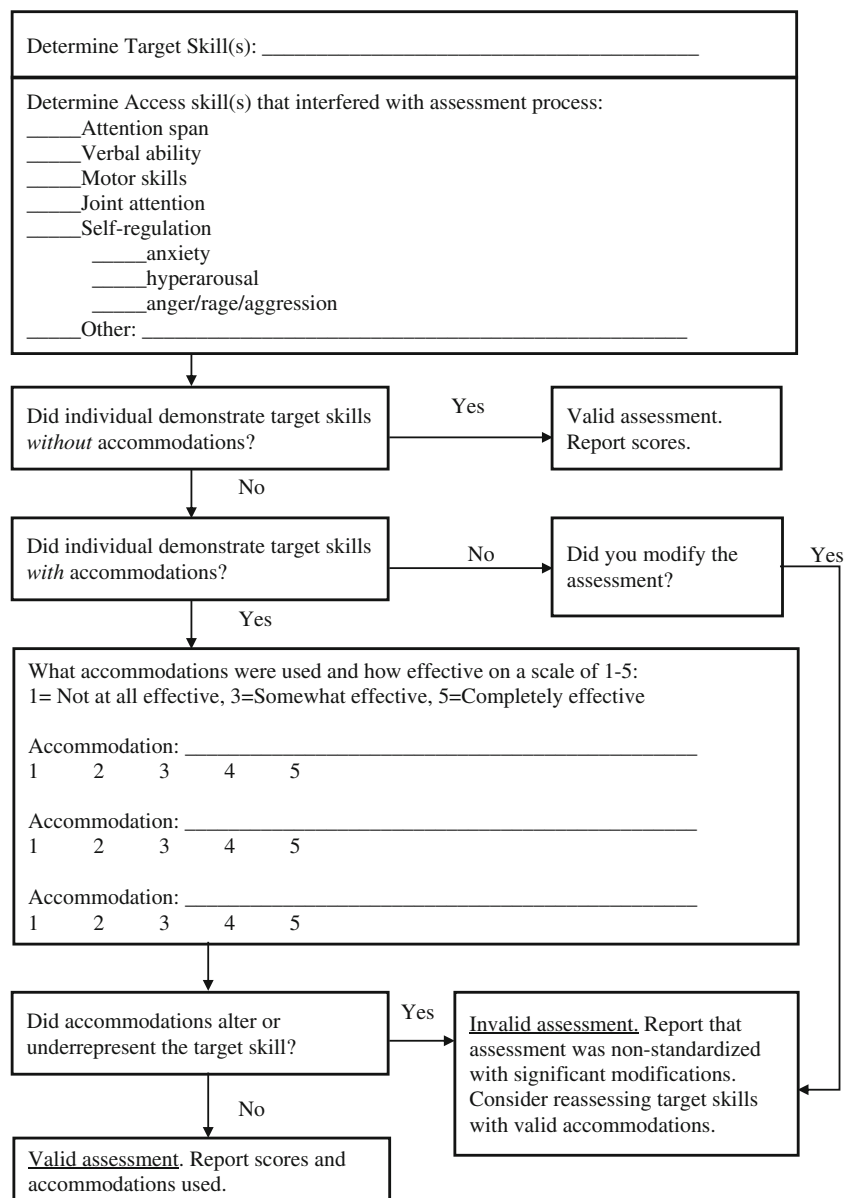
Evaluation of testing validity can help the AA to differentiate between an invalid administration and low performance. If the AA determines that the assessment was valid, and that target skills were, indeed, measured fairly during administration, then he or she can continue to the reporting stage of assessment. However, the evaluation stage data may indicate a need to return to the planning and administration stages before moving on to the reporting stage. Data from the evaluation process can act as a guide to address barriers that

interfered with the testing process as the AA conducts further assessments. It is critical that AAs determine their test results to be valid and meaningful before reporting and using data for critical decision-making.

Reporting

The synthesis of information gained through the assessment and translation of that information into applicable knowledge is the true goal of assessment (Riley 2008). In the reporting stage of the assessment cycle, the AA presents the data to the family and decision-making team in a useful and family-friendly manner (AERA 2014; NASP 2010). A strengths-based approach is recommended, in which the report includes

Fig. 2 Evaluation stage validity check. A data-based decision-making process for the AA to use when determining validity of assessment



strengths and preferences of the individual (APA 2012; Climie and Henley 2016; Mastoras et al. 2011).

Conveying the essence of the assessment experience while capturing the profile of the child and expressing it in a manner that is clear, accurate, and sensitive is a complex task (Riley 2008). The written report is not a perfunctory recitation of skills and numbers. Rather, it is a descriptive picture of an individual that will (1) help the family and other professionals who will serve the individual to better understand his or her development and factors that are influencing that development, (2) lead the family and professionals who will interact with individual to a better understanding of his or her needs, and (3) integrate the family in a meaningful way into the assessment outcomes and intervention plan (Brotherton 2001; Soodak and Erwin 2000). The report should emphasize what the individual can do at this time, and what the next steps are in his or her development. Individual preferences, likes, and dislikes can also be included in reporting to encourage strengths-based intervention planning. However, this is not to say that reporting should not document the individual's delays or challenges. It is crucial to address an individual's areas of concerns and next steps in order to determine accommodations for the classroom and/or community and to inform intervention plans. The report is the critical bridge that connects assessment with intervention and also can inform planning for future assessments. In order to construct a solid functional bridge, it is necessary to understand the varied audiences and purposes of the report and, therefore, the crucial components and characteristics of the document (Riley 2008).

Data from standardized assessments can be complicated and may be difficult for parents to understand, especially if the results trigger an emotional response (e.g., learning your child has a lifelong disability; Graungaard and Skov 2007). AAs can address these concerns by using multiple modes of representation when reporting data (e.g., provide visuals and concrete examples of skills being measured) and using an empathic and collaborative communication style (Graungaard and Skov 2007; Tharinger et al. 2008). Furthermore, a pre-meeting to go over results prior to a larger team meeting can allow the family to process results in a less stressful and more intimate setting. If possible, smaller meetings limited to the core team members reporting results from assessments may help reduce anxiety for parents. Debriefing after the meeting can help assure comprehension of results and allow the family to communicate any concerns or questions in a more private setting.

Additionally, person-first language is a critical component of reporting. Person-first language is a form of expression in which the author conveys respect and a positive attitude for the subject of the report (Snow 2009). The emphasis is placed on the person first, before the disability and literally means that the author will describe the person before the disability (e.g., "patient with Down syndrome" rather than "Down

syndrome patient," or "student with an intellectual disability" rather than "disabled student"). This language communicates respect and emphasizes that there is much more to understand about the individual than his or her disability.

AAs must report any accommodations used during testing and whether standardization was upheld through these accommodations (AERA 2014). If the AA determined in the evaluation stage that the administration was non-standardized, the report should include a statement about interpreting test results with caution, or abandoning standardized scores altogether and relying on qualitative results and clinical judgment instead (Brue and Wilmschurst 2016). Next, the AA should report on the individual's testing behavior, noting whether this behavior is typical or unique to this testing situation. A clear declaration of validity based on accommodations and testing behavior will help readers with the interpretation of results. AAs will also want to report that the standardized scores are merely an estimate of ability in a given area, and they may over or under estimate the individual's true ability or what he or she might express in his or her natural environment. If access skills had a depressing effect on the individual's scores, the AA can emphasize that, although skills may be an under estimate, results may be an accurate depiction of the individual's current functioning in the community without proper accommodations. Furthermore, the individual's abilities may change over time to varying degrees depending on how fluid or crystallized the constructs of functioning are (Sattler 2008).

Finally, statistical issues with standardized scores in the lower ranges of performance on cognitive assessments can preclude AAs from obtaining and reporting meaningful assessment results. Floor effects limit the sensitivity of the assessment tools, especially in the lower ranges (e.g., below standard score of 40 on many tests) (Whitaker and Gordon 2012). Hessel et al. (2009) and Sansone et al. (2014) addressed this flooring effect problem in some commonly used IQ tests by creating "deviation scores" using a *z*-transformation of raw scores relative to normative data, by age band of each examinee. The deviation scores captured clinically significant and meaningful variation on the group and individual level that was not documented using traditional standard scores. The authors recommend the use of deviation scores for clinical studies that need to track changes over time or measure response to interventions. Importantly, this method improves sensitivity only among individuals with ID who have subtest scaled scores at the floor ($SS = 1$), which is quite common among those in the moderate or severe range of ID. They may be also useful for studies examining cognitive profiles, or for group matching on dimensions such as IQ. Researchers examining IQ test results of individuals with ID may wish to consult these authors for assistance with the scoring method. Professionals should strongly consider using this method in educational and clinical settings. As such, they should present both the standard scores (in cases where this is mandatory)

and the z deviation scores derived from this method with appropriate citations. Comparison of the traditional and revised scoring method over time by various professionals in multiple contexts will help determine the predictive validity of the new approach.

Special Populations with ID

The following sections address specific syndromes frequently associated with a diagnosis of ID. Using knowledge about the etiology of an individual's ID may help the AA to tailor the assessment process based on an individual's biological needs and behavioral tendencies consistent with the phenotype of each condition. While there are documented behavioral phenotypes for individuals with FXS, DS, and ASD, every individual is quite different, and an individualized approach is still recommended for each assessment. These three examples will provide information on how specific syndromes or phenotypes are important to consider in preparing for, conducting, and reporting on standardized assessments, concepts, and issues which may be applied to other conditions associated with ID.

Fragile X Syndrome

FXS is the most common inherited form of ID (Hagerman and Hagerman 2002). FXS is caused by a mutation of the fragile X mental retardation 1 (*FMR1*) gene on the X chromosome, which results in reduction or absence of the *FMR1* protein (FMRP) and consequent abnormal brain development (Hessl et al. 2009). The spectrum of phenotypic expression of FXS in males includes overall developmental delays ranging from mild to severe with approximately 15% exhibiting borderline IQ and learning disabilities (Cornish et al. 2007). The vast majority of males with FXS present with IQ scores below 70, with an average in the 40s (Schneider et al. 2009). Additional characteristics include ADHD, speech and language delay, anxiety, sensory processing dysfunction, low tone accompanying gross and fine motor delay, poor eye contact, substantial difficulties in executive function, perseverative speech, and repetitive behaviors. Approximately 25 to 33% of males with FXS also meet the criteria for ASD (Hagerman 2006). Perhaps it is not surprising, given the constellation of characteristics associated with the disorder, that families of individuals with FXS are frequently presented with reports in which the individual was considered "untestable."

Individuals with FXS tend to be visual learners with a "gestalt" learning style (Braden et al. 2013). This means that, rather than learning in a sequential or step-be-step manner, individuals with FXS learn best when they can first observe a whole process or skill and then replicate by imitating a model (Scharfenaker and Stackhouse 2015). The use of

teaching items in standardized assessments is critical when working with individuals with FXS. Modeling the tasks, as much as is allowed within the standardized procedure, will demonstrate the expectations and provide the individual with FXS with the "gestalt" of the task.

Hyperactivity and poor attention frequently interfere with the assessment process when testing an individual with FXS. When standardization does not allow for a verbal or visual cue to attend (such as on a continuous performance test for attention), the AA should make sure to use teaching items until the individual with FXS fully understands the testing procedure and the need to sustain attention to the task. It will be important to remind the individual with FXS to slow down, "stop and think," and consider all options before answering test questions so that impulsivity does not interfere with measurement of target skills. The AA may wish to wait to record answers or move onto the next page or item in order to allow the individual with FXS to change his or her mind about a response.

Additionally, individuals with FXS tend to enjoy social interactions and may have a playful and humorous interaction style (Stackhouse and Scharfenaker 2015). An individual with FXS may enjoy playing a game, having a dance party, talking about a favorite sports team or well-known figure, or simply chatting with the AA during breaks. It is important to note that individuals with FXS tend to have better developed receptive than expressive language skills (Braden et al. 2013). Nonverbal assessments and/or composites will allow the individual with FXS to demonstrate knowledge in a target skill without the access skill barriers related to verbal communication demands (Dowling and Barbooth 2012).

Individuals with FXS often display increased anxiety when approaching new or unfamiliar people, events, and environments and up to 80% meet diagnostic criteria for an anxiety disorder (Bagni et al. 2012; Cordeiro et al. 2011). Furthermore, hyperarousal can impede an individual's ability to demonstrate his or her abilities (Sudhalter 2012). During an assessment, the AA can address behavioral concerns with an individual with FXS by attending to sensory needs and anxiety. For example, the AA can avoid eye contact by looking to the side of the examinee's face with a warm, approachable expression. The AA should thoroughly prepare the testing environment to reduce loud or bothersome noises that can lead to hyperarousal. Precautions to limit extraneous noises and muffle the sounds of noisy clocks, timers, buzzers, or other aspects of testing materials may help the individual with FXS to stay calm during testing (Stackhouse and Scharfenaker 2015). Additionally, taking time to build rapport and connect with the individual with FXS may alleviate the negative behaviors associated with social anxiety during testing. Finally, providing a highly individualized visual schedule may alleviate some of the stress associated with approaching a novel task. The individual with FXS can check off items as they

are completed, so that he or she knows what has been accomplished and what is left in the session (Hessl et al. 2016). Breaks can be added to the schedule so the individual knows exactly how many more items he or she must complete until a break.

Down Syndrome

Down syndrome (DS) is the most common known genetic cause of ID (Roizen 2013). DS occurs when an individual has three, rather than two, copies of the long arm of human chromosome 21. The extra genetic material associated with Down syndrome can cause a variety of developmental and medical outcomes. In terms of physical health, a diagnosis of DS places an individual at risk for a number of medical conditions, including microcephaly, developmental delays and small stature, congenital heart defects, hypothyroidism, and orthopedic conditions. Individuals with DS can have significant learning and memory problems that may intensify throughout childhood and adolescence. Functional living skills and executive functioning are diminished when compared to peers without DS and the disability is associated with pervasive deficits in the area of expressive communication (Roizen 2013). In terms of assessment, there are several factors to consider regarding the DS phenotype. First, the small stature associated with DS requires planning for a size-appropriate table and chair for the testing environment. The individual's feet should rest comfortably on the floor (or block) while seated. Issues with low muscular tone can create loose ligaments, poor trunk control, and hyperextension of the joints (Perlman 2014). These traits mean that sitting upright for long periods of time may exhaust an individual with DS, resulting in low energy and task avoidance behaviors. Proper seating, postural support, and frequent motor breaks can reduce fatigue and keep the examinee engaged with the task at hand (New York State Department n.d.). The AA should closely monitor the individual with DS for levels of engagement and physical comfort.

The unique cognitive profile associated with DS may also be useful when planning accommodations for standardized assessments. Research has documented significant relative strengths in visual memory, visual-motor integration, and visual imitation for individuals with DS, in comparison with their relative weaknesses in verbal processing abilities (Fidler 2005). Davis (2008) encourages emphasizing these visual-spatial processing strengths when working with individuals with DS. In the assessment process, this may involve providing visual cues for behavioral expectations and using adequate modeling so that the examinee can imitate the expected testing activities. The AA should also make sure to select tests that adequately measure a variety of visual-spatial target skills so that potential cognitive strengths can be quantified and utilized in intervention planning.

Another consideration when working with individuals with DS is that of motivation toward a task. Individuals with DS have a unique profile of relative strengths in social skills and significant deficits in problem solving skills. This combination of strengths and weaknesses can result in a social-motivation profile, wherein the individual with DS engages in highly social escape behaviors to avoid a challenging task (Fidler 2005). In particular, these behaviors may include playful, distracting actions, where the individual attempts to engage the AA in social banter in order to avoid the assessment requirements. In the assessment setting, the AA must be firm, yet warm, making sure to let the individual with DS know that playful conversation can take place during the break, as soon as the assessment tasks have been completed. Planned ignoring is a useful strategy, where the AA continues with the assessment process, ignores off-task behavior, and only attends to the individual with DS when he or she is on-task. The AA must limit his or her emotional expression and affect so as not to encourage silly, off-task behaviors. Clear expectations and visual cues for behavior are useful for individuals with DS. For example, the AA can teach the examinee a "ready position" (e.g., "ready hands" visual prompt for where to place hands), and/or provide a list of "Active Listening" pictures (e.g., "eyes watching," "body still," "voice quiet," and "ears listening") in the examination room (Herschell et al. 2002). When the individual with DS becomes off-task, the AA can simply point to the area of behavioral concern and provide a simple verbal cue. Finally, carefully placing the examinee away from windows, doors, and light switches may also help keep the individual with DS on-task in the assessment setting.

Comorbid Intellectual Disability and Autism Spectrum Disorder

ASD is characterized by a continuum of deficits in the areas of social reciprocity and communication, as well as restricted interests and/or repetitive behaviors (Hyman and Levy 2013). ASD is the fastest growing developmental disability in terms of prevalence (Gargiulo and Bouck 2018). Recent estimates indicate that 1 in 68 children have been identified with ASD, with boys being 4.5 times more likely than girls to receive the diagnosis (Centers for Disease Control and Prevention 2012). Approximately 40–70% of individuals with a diagnosis of ASD have ID (Hyman and Levy 2013).

Individuals with ASD tend to prefer predictability and routines (Gargiulo and Bouck 2018). This preference is frequently challenged in a testing situation, where the entire assessment process is unfamiliar. The AA can alleviate some of the stress associated with the novelty and unpredictable nature of an assessment by providing social stories ahead of time and a visual schedule during the assessment process. The AA may also consider bringing a trusted adult caregiver into the room

to help with rapport and comfort. AAs may consider consulting with the caregiver to determine whether the individual may be able to demonstrate the skill with a different behavioral prompt or request (Perry et al. 2002).

A lack of joint attention is common for individuals with ASD and can interfere significantly with the AA's ability to measure a target skill (Gargiulo and Bouck 2018). Providing a visual prompt paired with a verbal cue to "watch" acts as an attention grabber and helps to direct the examinee's attention to the task at hand (Kylliäinen et al. 2014). Some research has indicated that using tablets for instruction can improve behaviors and enhance engagement for individuals with ASD (Neely et al. 2013) and that computer-administered assessments may be a useful tool with this population (Skwerer et al. 2016). The recent availability of digital assessment tools (Noland 2017) may prove to be useful for the population of individuals with ASD, though more research is needed in this area and with this specific population.

Repetitive and restricted behaviors associated with ASD, such as hand flapping or verbal scripting, can also significantly interfere with the standardized assessment process (Gargiulo and Bouck 2018). The AA may need to wait for the examinee to finish a self-stimulating behavior or complete a verbal script before he or she is ready to move on to the next part of the assessment. The AA should make sure to record and measure a true response to the question, rather than a scripted verbal response that is off topic. Therefore, the AA must allow ample time for testing, with significant breaks, and may consider breaking an assessment into multiple sessions (Perry et al. 2002).

The use of applied behavioral analysis (ABA) techniques may enhance engagement in the testing process for individuals with ASD (Hyman and Levy 2013). The AA should survey the caregivers of the examinee ahead of time, making sure to note any current behavior plans and preferred reinforcement items (e.g., stickers, activities, toys, and snacks). Then, the AA can set up a similar behavior plan for the assessment session, using a token economy system to reinforce desirable behaviors and reduce off-task and undesirable behaviors. Whenever possible, the AA should use planned ignoring for inappropriate behaviors related to ASD (Perry et al. 2002).

Finally, it is important to note some families and self-advocates with ASD may prefer identity-first language to person-first language (Dunn and Andrews 2015). For instance, the term "autistic" may be preferred to the person-first version "individual with ASD" because identity-first language affirms that a disability is a unique aspect of an individual's "diverse cultural and sociopolitical experience and identity" and should be emphasized rather than diminished (Dunn and Andrews 2015, p. 259). Therefore, the AA can discuss this ahead of time with the individual with ASD and his or her family, making sure to inquire about the family's

preferred language when referring to the ASD diagnosis. The reporting phase of the assessment should reflect the family's preferences in this regard.

Future Directions

There is a need for researchers, clinicians, and educators to conduct valid standardized assessments with individuals with ID. Assessment results can be used to develop comprehensive treatment and intervention plans, make important placement decisions in the schools or in the community, and further our understanding of ID through research. Understanding the basic etiology, phenotype, and developmental trajectory of an individual with ID is necessary in order to evaluate the efficacy of specific assessment tools, medical procedures, and educational interventions. However, there are specific attributes associated with ID (as well as the FXS, DS, and ASD phenotypes) that can interfere with assessment processes and render results invalid or less accurate. Optimizing the assessment process through evidence-based changes in test selection and administration can serve to decrease the number of children and families who receive reports with inaccurate or inadequate information. With this proposed cyclical model for assessment, based on recommended practices from professional organizations and an emerging body of evidence-based practice, school psychologists are equipped to assess many individuals who have previously been considered "untestable." Future research should specifically investigate the validity of the proposed model for assessment. Although this model has been used effectively in a research setting to enhance feasibility and validity of assessments with individuals with ID (Hessl et al. 2016), the model itself has not been tested empirically. Determining its efficacy and face validity will ensure the use of best practices in both research and clinical settings, thereby producing more useful data for critical decision-making with individuals with ID.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that there are no conflicts of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Institutional Review Boards of UC Davis (#681782) and the University of Denver (#698133).

Informed Consent All participants or their legal guardians gave written consent to participate in the research, and capable participants gave their written consent or assent as determined by the IRBs.

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