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## Standard Guide for Sensory Evaluation of Products by Children and Minors<sup>1</sup>

This standard is issued under the fixed designation E2299; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This guide provides a framework for understanding the issues relating to conducting sensory and market research studies with children. It recommends and provides examples for developing ethical, safe, and valid testing methods. It focuses specifically on the concerns relevant to testing with children from birth through preadolescence. The guide assumes that minors older than 15 years of age are generally capable of performing sensory tests like adults, and therefore, all standard procedures used with adult subjects apply. The one exception, however, is legal consent where parental/legal guardian permission should be obtained for anyone under 18 years of age.

1.2 This guide will take into account the wide range of children's physical, emotional, and cognitive levels of development. It will prove useful for developing tasks that are understandable to children. It recommends alternative modes for children to communicate their opinions or perceptions back to the researcher, such as appropriate scales and measures.

1.3 The ethical standard presented in this document should be viewed as a minimum requirement for testing with minors. The safety and protection of children as respondents, as well as an attitude of respect for the value of their input should be of primary concern to the researcher.

1.4 The considerations raised in this document may also be useful when testing with the elderly or with adults who have developmental handicaps.

1.5 This document is not intended to be a complete description of reliable sensory testing techniques and methodologies. It focuses instead on special considerations for the specific application of sensory techniques when testing with children. It assumes knowledge of basic sensory and statistical analysis techniques.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation and is the direct responsibility of Subcommittee E18.05 on Sensory Applications—General.

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*Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

E253 Terminology Relating to Sensory Evaluation of Materials and Products

E1958 Guide for Sensory Claim Substantiation

2.2 *ASTM Publications*:<sup>3</sup>

STP 758 Guidelines for the Selection and Training of Sensory Panel Members

### 3. Summary of Guide—Specific Applications for Testing With Children

3.1 The primary use of children in sensory studies is to measure the acceptability of foods, beverages, pharmaceutical colors and flavors, and other products designed to be marketed to, consumed by, or used by children.

3.2 In this sense, they answer many of the same questions posed by affective sensory tests with adults. Children are used to measure overall acceptance, liking, or preference between samples. The resulting information can be used to aid in formulation changes or to choose between alternative products.

3.3 Sensory testing with children can also be used to identify unique characteristics or functions of products, such as the effectiveness of childproof safety caps. Other applications include advertising research or identification of unfilled needs or wants as part of the product development process (see Guide E1958).

3.4 Finally, some organizations are using children for basic research into the effectiveness of different scaling methods or sensory testing methodologies with children of varying ages.

### 4. Significance and Use

4.1 It is necessary and useful to test with children because they represent the real end-users for many products. Some

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from ASTM International Headquarters, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959.

products are developed specifically for children, and some are dual-purpose products that are intended for adults and children. Examples include: baby foods, diapers, ready-to-eat cereal, juices, food or lunch kits, candy, toys, vitamins and other pharmaceuticals, music and videos, interactive learning tools, and packaging.

4.2 Children have influence over adults' purchase decisions and are responsible for many or some of their own purchase decisions.

4.3 Creating a product for children requires input from children because their wants and needs differ from those of adults. For example, they may differ from adults in preferences or sensory acuity, or both, for sweetness, saltiness, carbonation, and texture. It is impossible to predict the nature of these differences without actual input from the intended target audience.

## 5. Test Methods

### 5.1 Skill Development and Appropriate Testing:

5.1.1 Testing with children requires special consideration of their language development, motor skills, and social and psychological development. Every child is unique, and there is great variation within and across age groups. In developing appropriate test methodologies for children, it is more important to consider individual skill development than chronological age. **Table 1** provides a general guideline for expectations of skill level and appropriate evaluation techniques for each age group. For each age group, there is corresponding text discussing special testing considerations.

5.1.2 The researcher should keep in mind that there are many children in each age grouping who will fall below or above these skill levels. It is the responsibility of the researcher to verify the ability of the children to complete the task as planned or to modify it as required to meet the needs of the children selected for testing. For example, while some second grade children may be able to read and understand test instructions, others will need assistance with that task.

### 5.2 Infants (Birth to 18 Months) and Toddlers (18 Months to 3 Years):

#### 5.2.1 Recommended Evaluation Techniques and Types of Information:

5.2.1.1 Information may be gathered from behavioral observations, diaries, or records from an adult experimenter who may be a trained evaluator, or the child's primary caregiver. It is the adult who interprets infant or toddler responses. With toddlers, some verbal responses may also be obtained. When the primary caregiver is involved, having an unbiased observer watch the interaction between the child and adult is beneficial. Video taping the test allows greater flexibility and opportunity for additional review.

5.2.1.2 Information may include observations recorded before, during, or after product use in either a clinical environment or more natural usage situation (such as the home or a group child care environment). Behavioral observations may include hand and eye movement, facial expressions, time spent playing, amount and time of consumption, or interaction with the product. Diaries or records can be used to track intake or

consumption, frequency and duration of use, length of attention span, or the condition of the product before, during and after use. In addition, an adult can fill out a simple questionnaire with facial scales as a way to mimic the child's response and aid in interpretation.

#### 5.2.2 Cautions:

5.2.2.1 Due to the limited language, attention span, and motor skills, the length of the testing session and number of products evaluated must be limited. Input from the parent/primary caregiver as to the amount and length of exposure is critical. Consideration may be given to exposing the caregiver to the products prior to the test as a way to screen and eliminate a large number of samples. This technique also allows the caregiver to increase their comfort level about exposing their child to the product.

5.2.2.2 Caution should be used when the caregiver is asked to make a subjective judgement for the young child. Primary caregivers, especially parents, may respond from personal preferences, interpreting for the child their own personal opinion. At other times, primary caregivers or parents may unknowingly establish a pattern of responses that they believe would present their child in a positive manner to the evaluator. An option to reduce potential biases includes providing an environment that fosters honest responses (for example, fielding through a third party agency or non-company identified facility, indicating the importance of the data, or how the data will be used, or both). Another option is to have the parent/primary caregiver feed the child first, record the child's response and then the parent/primary caregiver may be instructed to taste and record their own response.

5.2.2.3 Whether the observer is the primary caregiver, an experimenter or trained evaluator, adult interpretation of observational responses are subjective and may be affected by factors unrelated to the product in question. For example, physical discomfort on the part of the child, such as tiredness or illness, may result in behaviors such as refusing to eat or pushing products away with hands. An unbiased observer or videotaping the session, or both, in conjunction with parental/primary caregiver input can aid in cases where interpretation of a response is unclear. Multiple exposures and repeated evaluations may also be helpful.

### 5.3 Pre-school (Age 3 to 5 Years Old):

#### 5.3.1 Recommended Evaluation Techniques and Types of Information:

5.3.1.1 Behavioral observations and the diaries used with infants and toddlers are also appropriate with children 3 to 5 years old. In addition, preschool children can begin using verbal skills to communicate their responses about the products. One-on-one interviews in the presence of a primary caregiver, paired comparisons, or limited use of sorting and matching techniques using pictures are appropriate.

5.3.1.2 Keeping in mind individual differences, many children in this age group can perform simple tasks that provide quantitative results. Suggested quantitative methods for preschool children include using facial scales to measure liking, paired preference, and preference ranking techniques.

#### 5.3.2 Cautions:



**TABLE 1 Summary of Skills and Behaviors of Children and Teens<sup>4</sup>**

Skill/Behavior	Infant Birth to 18 Months	Toddler 18 Months to 3 Years	Pre-school 3 to 5 Years	Beginning Readers 5 to 8 Years Kindergarten-2 <sup>nd</sup> Grade	Pre-teen 8 to 12 Years 2 <sup>nd</sup> Grade-6 <sup>th</sup> Grade	Teenage 12 to 15 Years 6 <sup>th</sup> Grade-12 <sup>th</sup> Grade
Language—Verbal, Reading/ Written Language, Vocabulary	Pre-verbal. Rely on facial expressions. Cannot read. Cannot write. Use sounds, very few words.	Beginning to vocalize, adult interpretation still required. Cannot read. Cannot write. Early word usage developing.	Early language development. Can observe facial expressions, respond to questions and pictures. Generally reading and writing skills are not present.	Moderately developed verbal and vocabulary skills; cognitive skills increase. Early reading and writing skills vary greatly at this age. Adult assistance is advised.	Increasingly verbal—self-expression improves. Reading and written language skills increase rapidly and are sufficient for most self-administered tasks at the upper limits of this age group.	Generally strong language and vocabulary skills. Reading and written language skills continue to increase. Adult level in most respects.
Attention Span	Gauged by eye contact and bodily movement. Bright colors, sound, and movements capture attention.	Gauged by eye contact or involvement with task, bodily movement. Bright colors, sound, and movements capture attention.	Limited, but increasing. Bright colors, movement are effective.	Limited by understanding of task and interest level, challenge. Limit tasks to <15 min.	Attention span is increasing, but holding interest is critical and sometimes difficult. Taking tests is a familiar activity.	Similar to adults, involvement and interest subject to peer pressure.
Reasoning	Limited to pain and pleasure.	Limited, but concept of “no” becoming a factor. Definite preferences begin to emerge.	Limited, but beginning to be able to verbalize what is liked and what is not.	Developing with increased learning, cause/effect concepts.	Full ability for understanding and reasoning, capable of decision making.	Reasoning skills are fully developed and similar to adults.
Decision Making	Do not make complex decisions.	Do not make complex decisions, but “yes”/“no” can be decisive. Ability to choose begins.	Limited, but concepts of what is liked and what is not strengthen. Able to choose one thing over another.	Ability to decide is increasing, but influence of adult approval is evident.	Capable of complex decisions, peer influences a factor.	Fully capable of adult decision processes, subject to peer influences.
Understanding Scales	Do not understand scales.	Do not understand scales.	Understanding of simple scales beginning, sorting or identification tasks more effective.	Scale understanding increasing, simple is best, use easy vocabulary.	Capable of understanding scaling concepts with adequate instruction.	Similar to adults.
Motor Skills	Possess some gross motor skills, no fine motor skills	Rapid gains in gross motor skills, fine motor skills still limited.	Development of gross and fine motor skills increasing.	Gross motor skills developed, fine skills becoming more refined.	Hand to eye and other fine motor skills developed.	Similar to adults.
Recommended Evaluation Techniques	Behavioral Observations Diaries Consumption or duration measurements		Previous, plus: Paired Comparison Sorting and Matching Limited Preference Ranking One-on-one interviews	Previous, plus: Simple attribute ratings Liking scales—pictorial (such as star scale) or simple word scales. Group discussions Concept testing	Previous, plus more abstract reasoning tasks. Hedonic scales. Simple attribute scaling and ratings.	Capable of all adult evaluation techniques.
Adult Involvement	Primary Caregiver Trained Observer Experimenter			Experimenter or interviewer. administered tasks.	Generally able to handle self-administered tasks.	Adult participation not required, unless appropriate to evaluation technique.

<sup>4</sup> These chronological ages are rough guidelines; a child’s development age may not be the same as his/her chronological age. Researchers should pilot their test procedure with several respondents at the youngest age target to ensure that the child can do the required task and meaningful data can be collected.

5.3.2.1 Children 3 to 5 years old exhibit a wide range of developmental skills. This age group has relatively limited fine motor skills, attention span, verbal and cognitive skills. These characteristics, combined with possible emotional dependence, require that testing protocols be kept simple and non-threatening.

5.3.2.2 Careful consideration must be given to testing location. Suggested options include testing in central location, educational, play or social settings. Familiar settings such as preschools, churches, synagogues, or home settings may be ideal. Both controlled and relaxed environments offer advantages and disadvantages that the researcher must consider. Generally, a relaxed atmosphere encourages more typical behavior when testing products with young children than a clinical setting, although a controlled setting may sometimes be necessary for test specific reasons.

5.3.2.3 Some children in this age group are uncomfortable with unfamiliar adults. A suggestion to ease their apprehension may be to include a warm-up period to introduce the child to the researcher and task in the presence of their parents/primary caregivers.

#### 5.4 *Beginning Readers (Approximately 5 to 8 Years Old):*

##### 5.4.1 *Recommended Evaluation Techniques and Types of Information:*

5.4.1.1 Children in this age group should be capable of completing any tasks that are used for testing with younger children. This age group usually has moderately developed verbal skills, an expanding vocabulary, increased cognitive abilities, and increased fine motor skills. Scale understanding is increasing, but limited word scales, facial scales, and paired preference are appropriate.

5.4.1.2 Although the early readers' ability to make decisions are increasing, choices should be limited and testing tasks should be simplistic. Appropriate techniques include using one-on-one interviews, short affective tests, or brief group discussions to accommodate the limited attention spans inherent to this age group.

5.4.1.3 Some children in this group are better able to convey more details about their likes and dislikes, preference ratings, product liking, and acceptance decisions than their younger counterparts, but not all have that capability. At this stage, since everything they do is so dependent on skill level, very simple tasks yield the best opportunities for success. Additional life experience and exposure to product advertising can lead to a better understanding of impressions about products and the development of more personal preferences. Children in this age group can certainly identify what they like, but not necessarily why they like it. Many do not understand the difference between sweet and sour, thick and thin, etc. Some children in this group, however, are able to understand and use just-about-right (JAR) scales, but only with very simple vocabulary.

##### 5.4.2 *Cautions:*

5.4.2.1 Scale understanding and use is still limited for this group. Facial scales or one-on-one interviews are likely to be more effective than word-only scales that may not be completely understood. Simple, basic vocabulary is key. At best, children in this group can indicate if they like "how something looks," but not if they like its "appearance." They can indicate

if they like the "taste" of a product, but not its "flavor." They can respond to "how it feels in your mouth," but not to "texture." Simple vocabulary is necessary. Adult intervention may be required for clarification of test instructions or assistance with reading tasks, but the researcher must be aware of potential parental influence or a desire on the part of the child to please the adult interviewer.

5.4.2.2 At this age, most children can participate in short interviews without the presence of their parents/primary caregivers. For some children, emotional maturity and shyness may interfere with their ability to adequately complete the task and may result in a complete lack of response. The researcher is faced with a decision on how to handle children who have difficulties, and must determine whether or not their data should be eliminated, or if the child should be replaced through additional recruiting.

5.4.2.3 As mentioned with the previous age groups, simplicity is key. The researcher who keeps the task simple and gives clear, concise verbal directions will improve the likelihood of a successful test.

#### 5.5 *Pre-Teen (8 to 12 Years Old):*

##### 5.5.1 *Recommended Evaluation Techniques and Types of Information:*

5.5.1.1 Children in this age group should be capable of completing any tasks that are used for testing with younger children. Many children in this age group are also able to complete more challenging tasks and understand increasingly complex wording, which allows for greater flexibility in questionnaire design. Self-administered tests are usually appropriate for this age group. However, diversity in skill level can be especially pronounced in this age category. The researcher must continuously be aware of differences in skill levels, and be prepared for some children in this group to overlap with the early reader skill level. Sometimes, even basic reading skills are not fully developed until 11 to 12 years of age, and therefore, some children may require adult assistance in order to read the questionnaire or to complete self-administered questionnaires.

5.5.1.2 Quantitative techniques that are effective for this group are paired comparison or paired preference choices, ranking tasks, basic attribute and JAR scales (for example, sweet), and hedonic scaling (facial expressions may be more suitable than word anchors for the younger portion of the age group) (see Terminology E253 for definitions of terms). One-on-one interviews are still appropriate for this age group. At this age, children can be expected to participate in short interviews without the presence of their parents/primary caregivers. Responses to open-ended questions may be quite limited, and some younger children in this group may have difficulty with answering any open-ended questions, except in an interview format.

5.5.1.3 Qualitative techniques such as focus group discussions are useful with this age group to address qualitative objectives, including concept testing. Depending on the testing situation, consider testing older children in this age group separately by gender.

5.5.1.4 In general, this age group is increasingly able to handle abstract ideas and complex decisions. Children in this



age group have definitive ideas about their likes and dislikes, which may be quite different from adults. As verbal skills increase, they can provide increasingly informative descriptions about their impressions of products.

#### 5.5.2 Cautions:

5.5.2.1 At this stage in development, interactions between boys and girls have increasing potential to interfere with concentration and attention to the task at hand. To aid in obtaining clearly individual responses and to avoid the bias that comes with peer interaction, it may be necessary to separate children who are friends. This usually applies when testing in a group setting such as school or camp. This is similar to the concerns previously expressed regarding parent/primary caregiver-child interactions, or problems encountered when testing with adults who are acquainted. The desire and pressure to agree with one's peer group can be a powerful influence that may bias sensory test results, and good sensory practice dictates that the sensory professional anticipate potential sources of bias and protect against them as much as possible in structuring the test.

#### 5.6 Teen (12 to 15 Years):

##### 5.6.1 Recommended Evaluation Techniques:

5.6.1.1 Teens are capable of completing all types of tests described for preteens. In addition, they are able to complete more complex questionnaires requiring multiple decisions. Their abilities are similar to those of adults, and they are able to participate in discrimination testing if they are trained to perform the task.

5.6.1.2 Evaluators between 12 and 15 years of age are increasingly verbal and can provide detailed descriptions of their likes and dislikes of products, as well as the reasons for those attitudes. JAR scales should pose no difficulty as long as the attributes in question are understood. Teens are able to use attribute scales and provide intensity ratings for product attributes.

5.6.2 Cautions—Consider the cautions described in 5.5.2.1. Again, it is important to emphasize that during group discussions, the researcher should consider separating males and females in order to limit distractions. Peer influence is important to teens and should be considered to assure unbiased responses.

## 6. Procedures—Test Design and Protocol

### 6.1 Test Types:

6.1.1 The standard formats used when testing with adults are also used with children, for example, home use, or central location tests, with modifications for the special circumstances that arise with children as subjects. Pretesting is recommended to determine the appropriate ratio of adults or administrators to children necessary for effective execution of the test. In addition, pretesting is necessary to determine the appropriateness of the questionnaire and the test method being used.

6.1.2 Computers are used effectively with children, depending on their experience and exposure. When using computers, the basics regarding skill-appropriate questionnaire design should be applied, using pictures and scales appropriate to children. When conducting tests outside the home, facilities should be structured to be user-friendly and safe for children.

### 6.2 Criteria for Using Children as Subjects—Recruitment and Screeners:

6.2.1 Parental/legal guardian consent is strongly recommended, and may be required by law. Consult your legal professional for additional guidance regarding parental/legal guardian consent (Fig. 1). In addition, having the participating child assent to testing, while non-binding, may help to impress the child with the importance of his/her participation.

6.2.2 Children can be recruited from a wide variety of sources, with advantages and disadvantages to each (see case studies for examples of various recruitment scenarios). Over-recruiting is helpful with children as well as adults. Additionally, the behavior of the potential participants may be observed in the waiting room to eliminate those who may be too shy, nonverbal, or disruptive.

6.2.3 The number of children for the study will vary based on the objective, the test design, and the scope of information desired, in the same way as testing with adults. When testing with children, recruiting a somewhat larger assessor base is recommended because of the potential for unusable data, or dismissal of children prior to the study due to variation in children's ability to respond because of basic skill level.

6.2.4 Many youth groups, sports groups, community-based groups, etc. may be a source of children for testing. Whenever possible, it is recommended that children from more than one group be recruited. This will help the researcher avoid potential biases due to homogeneity of children in terms of ethnic origin, religion, parent's social background, etc.

6.2.5 Standard techniques such as shopping mall recruiting, newspaper advertising, and organizational recruiting are also used.

6.2.6 Regardless of the source of recruiting, screening is necessary to obtain the proper sample of children to meet the test objective. Screeners should be administered first to the parent/primary caregiver, and then to the child participating, depending on their age. While skill level is an important factor in all aspects of sensory testing with children, skill level is not the most important factor during screening. The test design can be adapted to be appropriate for the ability of your desired target audience. Current usage of the product within the category is often a criterion for selection of participants, as well as the age and gender of the audience for whom the product is intended. In the case of new products, a willingness to try the product or an interest in the concept may be the most appropriate criterion.

6.2.7 When determining secondary screening qualifications, developmental factors such as comprehension and verbal communication skills must be considered. With young children, visual response techniques are sometimes employed for screening. Verbal screening is suggested for children up to age 7 or 8, because it has been observed that younger children may have difficulty completing a written questionnaire without assistance. The researcher may find it necessary to recruit a category user group as an initial step, and follow up with additional screening to accommodate those children who have not yet developed the skill set necessary to complete the task required.

Parental/Legal Guardian Consent Form and Confidentiality Agreement  
CHILDREN’S TESTING ASTM

Dear Respondent:

Thank you for allowing your child’s participation in our product research project. We are conducting this study to provide manufacturers with consumer input about the product(s).

During the course of this study, your child may discuss ideas and see products that may not be available to the general public. Accordingly, by signing this document, you agree to keep subject matter of this study **strictly confidential**. All discussions including creative ideas and suggestions resulting from this study shall be the property of the sponsoring company.

You agree not to disclose any information relating to this study to any third party, and not to use this information and knowledge for any purpose other than for the performance of this study. You must agree not to sketch, photograph or make images of the products your child is testing.

Your child’s safety is most important to us. If your child has any kind of food allergy or any kind of food sensitivity, we require that your child not participate in this test. Additionally, if your child is suffering from a cold or allergy, has any condition that would prevent your child from smelling or tasting the products, again we require that your child not participate in this test. Please check one of the boxes below.

- My child does NOT have any known allergies or sensitivities to any food or food ingredients.
- My child does HAVE a food allergy, sensitivity, or other dietary restrictions.

Your child has the right to stop participation at any time during the test.

By signing below, I acknowledge that I have read and understand the information presented above and that my child will maintain the products and all product information in confidence.

**PRINT NAME OF CHILD:** \_\_\_\_\_

**PRINT NAME OF PARENT/LEGAL GUARDIAN:** \_\_\_\_\_

**SIGNATURE OF PARENT/LEGAL GUARDIAN:** \_\_\_\_\_

**RELATIONSHIP TO CHILD:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

**WITNESS:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

FIG. 1 Example of Informed Consent Form Used for Testing With Children

6.2.8 Consideration of allergies is especially important with children, making informed parental/legal guardian consent a necessity for participation. In most cases, it is prudent to eliminate children that have any allergies to food, skin or fragrance ingredients. However, there may be cases where a child with an allergy may be important to the product being tested. An example is a soy butter that is used as a substitute for peanut butter, where children with peanut allergies are recruited so they can evaluate this product. In this case, a list of ingredients contained in the test products must be provided for informed parental/legal guardian consent. It may be necessary to note that products are manufactured in a facility that also processes other potential allergens. Consult your legal professional for additional guidance and risk assessment regarding evaluation of food or personal care products by children with allergies.

6.2.9 Creating a safe testing environment must be a primary consideration, even if it requires planning for physical limitations at a given developmental stage, such as testing very sticky or chewy products with young children that may have

loose teeth, or for teens with braces. Please consult your legal department and refer to Section 8, Legal and Safety Issues, for additional screening considerations.

6.3 *Number of Subjects*—In a Central Location Test, when the number of children required is large, testing with smaller subgroups can make the task easier to manage. The number of administrators present should be proportional to the complexity of the task and taking into consideration the age of children in the study.

6.4 *Description of the Task:*

6.4.1 Children can participate in sensory tests concerning taste, visual appeal, or texture of food, for personal care products and toys, or pharmaceutical products. Visual tests of a product’s eye appeal are also effective with children. Visual tests are often used with packaging, advertising issues, or with items such as toys. Home-use tests or one-on-one studies are useful for testing non food items such as disposable diapers. In-home testing may also be appropriate when the child is intended to be involved with the actual use of the product over

time, such as making their own peanut butter and jelly sandwiches, or using ready-to-eat cereals on multiple occasions.

6.4.2 Depending on their skill level, children are capable of performing a variety of tasks. They can tell the researcher if a product is liked or disliked, and in some cases to what degree it is liked or disliked. They can rank products in order of their preference, and some are capable of answering simple and well-defined attribute questions. Use of a trained interviewer is essential with young children, and with older children, a trained interviewer allows a means of assessing how well the child understands the questions being asked. In a self-administered test, the child should be able to comprehend the questions being asked. Certain inherent biases exist when products are tested at home. Therefore, care should be exercised when determining the appropriateness for home-use tests that can be influenced by parents/primary caregivers.

### 6.5 Time to Complete Task:

6.5.1 The key to successful testing with children is to keep the task short and to the point and to do the same with the length of the test session. Expectations should be set at the onset of the study. The time required for task completion is largely dependent on the test design, objective, and execution plan. Taste tests should be kept short due to fatigue, but other tasks can be longer if evaluative tools are entertaining. It is essential to have the task completed before the child loses interest, and attention wanders. If there are breaks between samples, provide activity books with word games for children to help occupy their time.

### 6.6 Questionnaires:

6.6.1 Depending on the age and developmental level of the children being tested, hedonic scales, star scales, intensity scales, and just about right scales have been used successfully. Multiple point children's language hedonic scales (that is, super good—super bad) may be used with ages 6 to 12, as can traditional multiple point hedonic scale, provided all the children can read or, more importantly, can understand the meaning of words, or both.<sup>4,5</sup> Prior to testing, an appropriate orientation is important to ensure that children have an understanding of the scale and the rating task. Facial scales, which use cartoon-like faces to express like and dislike and were developed for those with limited reading nor comprehension skills. They have been in use for a long time when testing with children. However, new cultural issues have been brought to light that may make this scale less optimal and facial scales have not been shown to provide advantages over verbal scales when used in consumer research. On the contrary, facial scales introduce their own complications. For example, children may respond by selecting a "happy" face because they like that face rather than because it represents their opinion about the product they are evaluating. For children, the cognitive task of match-

ing an emotion expressed by a face to their reaction to a product may require more abstract thinking than a response on a verbal scale. Another potential distraction for children is that the faces may not reflect the child's racial or ethnic identity<sup>6</sup> and that the meaning of facial expressions is far from universal across culture. For these reasons, facial scales are not recommended until more positive evidence is available that supports their use.

6.6.1.1 For children ages 3 to 5, choice questions are best. To obtain liking, you can first ask the child if they feel the product is good or bad. Depending on their response, they are then asked if the sample is "really good" (really bad) or "just a little good" (just a little bad). If in the first choice the child is not able to specify good or bad, their response is coded as neither, and the subsequent questions are not asked.

6.6.1.2 *Use of Intensity and JAR Scales*—Children ages 8 and higher are capable of using intensity scales. Since children in consumer studies often receive only a brief orientation to their rating task, it is important that the attribute whose intensity they are scaling be easy to understand; such comprehension, if in doubt, should be verified by pre-testing the questionnaire. Children can easily perform ratings of appearance, including size or visual amount. Other attributes, such as sweetness or hardness (of food products), are also easy for children to understand. In the case of more complex flavor or texture characteristics, the assumption that children understand the meaning of the attribute is likely not warranted.

6.6.1.3 Just-about-right scales used with children usually take the form of a three-point scale (not enough, just right, too much). JAR scales can give meaningful results with children, although as in the case of intensity scales, careful consideration must be given to the choice of attribute. Appearance attributes, basic tastes such as sweetness or sourness, and simple food texture attributes may be appropriate for this age.

6.6.2 **Table 2** and **Fig. 2** give an example of scales. Scale terminology needs to be validated for appropriateness to the children being tested. The questionnaire should be pretested to be sure the questions are understandable, the instructions can be followed, and the tasks can be completed independently. Pretesting also gives a sense of the average length of time needed for children to complete the testing tasks. It is recommended that a warm-up exercise be used to familiarize the children with the scale(s) and give them confidence before proceeding with the actual product evaluation.

6.6.3 When using self-administered questionnaires rather than one-on-one interviewing techniques, the questionnaire should be uncluttered, simple, and easy to read. Large type fonts and plenty of white space, as well as brief, clear instructions may help clarify the task of answering questions without adult assistance. Because of possible limitations with regard to their experience level, precautions should be used in terms of selection of attributes to be measured. Simplicity is the rule.

6.7 *Incentives*—The incentives offered vary as much as the sources of children for sensory testing. Gift certificates for both

<sup>4</sup> Popper, R. and Kroll, J. J., "Issues and Viewpoints: Conducting Sensory Research with Children," *Journal of Sensory Studies*, Vol 20, 2005, pp. 75–87.

<sup>5</sup> Spaeth, E. E., Chambers, E., IV, and Schwenke, J. R., "A Comparison of Acceptability Scaling Methods for Use with Children," *Product Testing with Consumers for Research Guidance: Special Consumer Groups, Second Volume. ASTM STP 1155*, Wu, L. S. and Gelinias, A. D., Eds., ASTM International, 1992, pp. 65–77.

<sup>6</sup> Cooper, H. R., Holway, A., and Arsan, M. "Cross Cultural Research—Should Stimuli be Psychologically Pure or Culturally Relevant?" *Marketing Research Today*, Vol 26, No. 1, 1998, pp. 67–72.