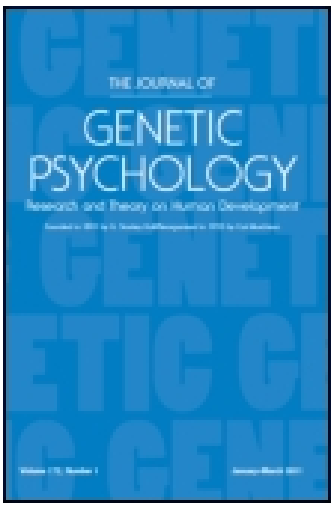

The Journal of Genetic Psychology: Research and Theory on Human Development

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/vgnt20

Preschoolers' Inhibition in Their Home: Relation to Temperament

Anja Ullrich [a] , Marjorie Carroll [b] , Joyce Prigot [a] & Jeffrey Fagen [a]

[a] Department of Psychology , St. John's University

[b] United States Military Academy , West Point

Published online: 30 Mar 2010.

To cite this article: Anja Ullrich , Marjorie Carroll , Joyce Prigot & Jeffrey Fagen (2002) Preschoolers' Inhibition in Their Home: Relation to Temperament, The Journal of Genetic Psychology: Research and Theory on Human Development, 163:3, 340-359, DOI: 10.1080/00221320209598688

To link to this article: http://dx.doi.org/10.1080/00221320209598688

The Journal of Genetic Psychology, 2002, *163*(3), 340–359

Preschoolers' Inhibition in Their Home: Relation to Temperament

ANJA ULLRICH
Department of Psychology
St. John's University

MARJORIE CARROLL
United States Military Academy, West Point

JOYCE PRIGOT
JEFFREY FAGEN
Department of Psychology
St. John's University

ABSTRACT. Researchers assessed 58 preschoolers' reactions to an unfamiliar person and unfamiliar objects in their familiar home environment. Children participated in a 30-min procedure designed to elicit behavioral inhibition, including (a) a free-play period with a stranger present, (b) a structured interaction with the stranger, and (c) uncertainty-eliciting tasks. Behaviors representing the child's reactions toward the mother, stranger, and novel objects were coded. Mothers completed a temperament scale. Preschoolers exhibited behaviors indicative of inhibition toward unfamiliar social and nonsocial stimuli; behaviors remained stable across increasingly intrusive episodes. The approach/withdrawal component of temperament was related to behavioral inhibition. Individual differences in mood did not appear to be related to differences in inhibition. Parent reported temperament was related to researcher-observed behaviors.

Key words: inhibition, preschoolers, stranger anxiety, temperament

YOUNG CHILDREN'S REACTIONS to unfamiliar people and situations have long been of interest to developmentalists. Early work in this area was primarily concerned with fear or "stranger anxiety" (e.g., Bronson, 1972; Lewis & Brooks, 1974; Scarr & Salapatek, 1970; Schaffer, 1966; Sroufe, 1977) and typically focused on the first year of life. As researchers began to recognize the variability in infants' reactions to strangers (e.g., Clarke-Stewart, 1978; Mangelsdorf, 1992; Rheingold & Eckerman, 1973), they widened their focus of study to include affiliative as well as wary tendencies, often with the goal of relating individual variation in infants' reactions toward strangers to other aspects of socioemotional development (e.g., Calkins & Fox, 1992; Clarke-Stewart, Umeh, Snow, & Ped-

erson, 1980; Kochanska & Radke-Yarrow, 1992; Stevenson & Lamb, 1979; Thompson & Lamb, 1983). In addition, many researchers began to focus on the child's 2nd and 3rd years of life, a period of rapidly developing social responsiveness as children increase in both autonomy and communicative ability.

Young children react in varying ways when confronted with an unfamiliar person, place, or object. Some children will cease their activity, become quiet, retreat to a familiar person, and perhaps cry. Other children of similar intellectual ability and social background will typically smile, approach, and spontaneously interact with an unfamiliar person or object. Kagan and his associates (e.g., Kagan, Kearsley, & Zelazo, 1978; Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984) have proposed that these disparate responses reflect two distinct temperamental categories. They have referred to the former group as *inhibited* and to the latter as *uninhibited* (Garcia-Coll, Kagan, & Reznick, 1984). In a series of longitudinal studies, Kagan and his colleagues observed that some children consistently display behavioral signs of extreme inhibition or lack of inhibition; each group has been estimated to represent approximately 10% to 15% of Caucasian children (Kagan et al., 1984). Although Kagan and his collaborators (Kagan & Snidman, 1991) have argued that these two types of children represent qualitatively different groups, other researchers have conceptualized the construct of inhibition as representing a continuous dimension that is related to sociability, introversion/extroversion, and approach/withdrawal (Broberg, Lamb, & Hwang, 1990; Rothbart, 1989). Regardless of the theoretical model of inhibition that is adopted, its relation to observed behavioral reactions and measures of temperament needs further analysis.

Observational measures of both inhibition and sociability have been associated with parental ratings of several temperament dimensions, especially scales related to how a child responds to sudden changes and novel objects, such as the Fear scale from the rationally constructed Infant Behavior Questionnaire (IBQ; Rothbart, 1981) and the Approach/Withdrawal subscale from the Toddler Temperament Scale (TTS; Fullard, McDevitt, & Carey, 1984). Several researchers have reported significant correlations ranging from .25 to .47 between observed sociability/inhibition and scores on fearfulness subscales (Broberg et al., 1990; Calkins & Fox, 1992; Reznick, Gibbons, Johnson, & McDonough, 1989; Thompson & Lamb, 1982). In their study of behavioral inhibition in a normative sample, Reznick et al. (1989) found that the "Approach/Withdrawal" subscale of the

This research was based on a portion of a dissertation by Anja Ullrich submitted to the Graduate School of St. John's University in partial fulfillment of the requirements for the PhD degree. The study was supported by Grant MH39449 from the National Institute of Mental Health to Jeffrey Fagen. We thank Karen Quintero and Donna Carbonaro for assistance with the data collection and Phyllis Ohr for comments on an earlier draft of this article.

Address correspondence to Jeffrey Fagen, Department of Psychology, St. John's University, Jamaica, NY 11439; fagenj@stjohns.edu (e-mail).

TTS correlated significantly with inhibition for children 14, 20, and 32 months old (r = .41, .33, and .52, respectively). When only the extremely inhibited and uninhibited children (top and bottom 15% of the sample) were considered, the correlations were even higher (r = .57, .51, and .56, respectively). This latter result is comparable with the data reported in a study by Garcia-Coll et al. (1984) in which children were selected on the basis of their classification as either extremely inhibited or uninhibited.

Although significant correlations have been found between laboratory measures of behavioral inhibition and parental ratings of temperament, within both the behavioral inhibition and temperament literatures there is considerable debate over whether parental reports provide a valid measure of a child's temperament (for review, see Kagan, 1998; Rothbart & Bates, 1998). On the one hand, some researchers have pointed to the low to moderate correlations between observational measures and parental ratings as evidence of the low validity of parental measures (Bornstein, Gaughran, & Segui, 1991; Kagan, 1998; Kagan, Reznick, & Snidman, 1986; Seifer, Sameroff, Barrett, & Krafchuk, 1994). Kagan has argued that relying on parents' judgments of their child's behavior is problematic because of issues of bias and inaccuracy (Kagen, 1998, pp. 196–198). Bias, for example, might penetrate parental judgments when observed child behavior occurs in response to parental behavior or when parental judgments are a function of parental characteristics (Rothbart & Bates).

On the other hand, researchers have emphasized the validity of parental reports of temperament (e.g., Slabach, Morrow, & Wachs, 1991). Such researchers have argued that parents are in a unique position to provide information about their child because they have had the most extensive contact with the child and, consequently, have had the opportunity to observe a wide range of behaviors in a variety of social situations and environmental contexts (Bates, 1994). Garcia-Coll et al. (1984) found that parents were capable of keeping their perceptions of their children's degree of inhibition separate from their judgments of other temperamental dimensions such as activity level, distractibility, and persistence. Also, parents are in the best position to observe "rare but important behaviors" (Rothbart & Bates, 1998, p. 120). Rothbart and Bates, therefore, suggested that the issue of the validity of parental reports be framed in terms of how much variance in parental reports can be explained by reports of independent observers (Bates & Bayles, 1984). Because observational measures typically involve the observation of a limited number of behaviors in a specific context, modest parent–observer correlations could result, in part, from the observers not seeing the behavior on which parents base their reports (Rothbart & Bates), especially if observers have not viewed children's behavior in the context of their own homes (e.g., Hagekull, Bohlin, & Lindhagen, 1984; also see Rothbart & Derryberry, 1981, for a discussion of the meaning of home assessment).

The setting for most studies of young children's reactions to unfamiliar people and objects has typically not been the home, but rather the laboratory playroom

where the child is exposed to a series of events designed to generate incrementally more uncertainty. In the lab paradigm, the novel events encompass properties that are both social (i.e., an unfamiliar adult or peer) and nonsocial (i.e., unfamiliar objects in an unfamiliar environment). In response to this confound, Kochanska (1991; Kochanska & Radke-Yarrow, 1992) proposed that a more differentiated approach to the analysis of behavioral inhibition is needed. She suggested that there are two relatively independent patterns of inhibition: inhibition to unfamiliar persons and inhibition to unfamiliar environments. In studies that have involved extremely inhibited children (e.g., Garcia-Coll et al., 1984; Kagan et al., 1984), differences in inhibition patterns have likely been obscured because children were selected based on the fact that they consistently responded with inhibition across varying situations of uncertainty. However, in studies that have not used such an extreme group method, Kochanska's finding of two inhibition patterns, one social and one contextual, suggests that the issue of situational context in the study of children's responses to the unfamiliar deserves further investigation.

The issue was further examined by Broberg et al. (1990), who used a familiar setting, the children's home, in their study of the stability and correlates of inhibition and sociability. The investigators assessed stranger sociability when children were 16, 28, and 40 months of age, using a procedure consisting of a series of eight social overtures of gradually increasing intrusiveness by an unfamiliar adult. The children's reaction to each overture was rated on a 5-point scale, and the entire session lasted about 5 or 6 min. When they assessed children at age 16 months, Broberg et al. found a significant negative correlation between the observation-based ratings of sociability and parents' ratings of their children's fearfulness, as assessed by Rothbart's IBQ. That is, children who were rated as less fearful by their parents were rated as more sociable during their interaction with the unfamiliar adult.

Although Broberg et al. (1990) provided an initial attempt to examine how young children respond to unfamiliar objects and people in a familiar surrounding, their study had several limitations, particularly in regard to their investigation of the relation between individual differences in temperament and young children's responses to unfamiliar events. First, the relation between sociability and only one dimension of temperament, fearfulness, was considered. Second, although the IBQ has been used with children older than 12 months (e.g., Thompson & Lamb, 1982), the choice of this instrument for 16- to 40-month-old children is questionable because it has not been standardized for infants older than 12 months. Furthermore, other age-appropriate temperament scales (e.g., the TTS) are readily available. Third, the procedure used by Broberg et al. was extremely brief (5–6 min), especially in comparison to the lab procedure used in several other studies (Garcia-Coll et al., 1984; Reznick et al., 1989), which lasts for approximately 30 min. Because of the brevity of this procedure, the researchers' examination of the range of behaviors a child may exhibit when confronted with an unfamiliar event might have been limited. Finally, the use of a 5-

point rating scale by Broberg et al., as opposed to the quantitative coding of various discrete behaviors (e.g., a child's latency to leave the parent), does not permit a more detailed examination of the various patterns of behavioral responding to unfamiliar events that may be observed in young children.

In the present study, we continued the investigation of young children's pattern of inhibition to unfamiliar persons. Our aim in this study was to elicit, observe, and report preschoolers' reactions to novelty in their own homes and to investigate how those reactions are related to appropriate parental measures of child temperament. Specifically, we had four major goals. The first was to see if behaviors indicative of inhibition could be reliably elicited during a home visit. We hypothesized that such behaviors could be elicited, despite the familiarity of the home environment and the presence of a parent. The homes of preschoolers should provide a more explicit context for visits (Stevenson-Hinde, 1989) because the relations would be determined between selected aspects of preschoolers' temperament and their responses to unfamiliar events in the familiar environment of their home. The use of home visits allowed us to focus attention on the preschoolers' reactions to unfamiliar adults and objects apart from their reactions to an unfamiliar setting (Broberg et al., 1990; Kochanska, 1991). We modeled the home visit procedures after those used by Kagan and other researchers (Garcia-Coll et al., 1984; Reznick et al., 1989).

Our second goal in this study was to analyze the children's behavioral reactions to increasingly intrusive behavior. We hypothesized that the children who were initially reluctant to engage in tasks with the unfamiliar person would continue that pattern, indicating stability (McCall, 1986) of inhibition, even in a familiar environment.

Our third goal was to identify specific behaviors indicative of inhibition in preschoolers in a home context to see how such behaviors are related to relevant temperamental dimensions (Rothbart & Bates, 1998). Three temperamental dimensions indicative of inhibition (rather than only one, fearfulness, used by Broberg et al., 1990) were used in this study: approach/withdrawal, mood, and intensity. *Approach/withdrawal*, as defined by Thomas and Chess (1977), refers to the nature of a child's initial positive or negative response to a new stimulus. This dimension is conceptually similar to the construct of behavioral inhibition of Kagan et al. (1984) and is frequently included in studies concerning the association between behavioral observations of inhibition and parental ratings of temperament.

Mood and intensity represent two aspects of a child's emotionality: *Mood* refers to the amount of positive or negative affect displayed, whereas *intensity* refers to the energy level of the emotional response, irrespective of its quality. These two dimensions were of interest because researchers have repeatedly observed that children vary in their emotional responses to unfamiliar events. Plomin and Stocker (1989), for example, suggested that emotionality is a major component of behavioral inhibition. Rothbart and Mauro (1990) noted that the conceptual and operational definitions of mood proposed by Thomas and Chess

(1977) overlap with approach/withdrawal. In addition, Reznick et al. (1989) examined approach/withdrawal, mood, and intensity in their study of behavioral inhibition in a normative sample of participants, whom they tested in an unfamiliar environment with a procedure that was similar to the procedure used in the present study.

In the present study, we surmised that finding significant correlations in expected directions between specific observed behaviors and relevant temperament scales would help to clarify children's pattern of inhibition to an unfamiliar person and help to validate, in an ecologically appropriate environment, both the conceptualization of inhibition as an important temperamental dimension for young children and the temperament scales that measure it. To ensure that all relevant behaviors were recorded, we videotaped the preschoolers. We hypothesized that behaviors reflecting inhibition would be significantly related to the temperament subscales of Approach/Withdrawal, Intensity, and possibly Mood.

As a fourth and related goal we sought to examine the relation between researcher-observed preschooler behaviors and parental paper-and-pencil judgments of temperament, to determine the validity of parental reports of their young children's temperament. As discussed previously, there is a debate in the literature about the usefulness of parental paper-and-pencil temperament ratings. We hypothesized that because both parent and observer would be reporting on behaviors that were viewed in the home, significant agreement would be found between the ratings.

Method

Participants

The participants were 58 preschoolers (32 boys and 26 girls) between 25 and 39 months of age (M = 32.66 months, SD = 3.6), who were born at term without pre- or perinatal complications. They were recruited from baby-care classes at several hospitals and through published and purchased birth announcements. The sample was homogeneous with respect to the apparent good health of the mother and child. All of the parents of participants were Caucasian, married, and came from middle- to upper-middle-class communities in Queens and Nassau counties, New York. The mothers provided written informed consent before participating, and the preschoolers, when asked if they would like to help with a project and play with some toys, provided oral assent. In terms of sibling status, 13 (22%) were only children, 14 (24%) had younger siblings, 27 (47%) had older siblings, 2 (3.5%) had both younger and older siblings, and the sibling statuses of 2 (3.5%) were not determined.

Procedure

The children were videotaped during a 30-min home visit during which a Caucasian, female stranger (the experimenter) engaged each child in a variety of

activities designed to promote inhibition in children of this age. The visit consisted of three episodes: (a) free play, (b) interaction with the stranger, and (c) exposure to a series of "uncertainty" tasks. The child's mother was present throughout the session. Because we intended the three episodes to be increasingly intrusive and thereby to generate incrementally more uncertainty in the children, their order of presentation remained fixed across participants.

The mothers participating in the study were coached by phone in advance of the visit as to how to behave when the experimenter arrived at their home. They were asked during this telephone call to clear a play space in the living room, to greet the experimenter briefly with their child present, and then to remove the child from the living room while the experimenter set up the toys and video equipment. When called into the living room by the experimenter, the mothers were instructed to sit on their couch with their child and to interact with the child only in response to his or her demands; the mothers were not to initiate or direct any activity of the child. We made these requests to ensure that (a) there would not be distracting objects nearby during the procedure, (b) the objects would indeed be novel when the preschoolers were asked to interact with them, (c) there would be no time for the children to observe and "warm up to" the researcher, and (d) the mothers' interactions with their children during the procedure would be nondirective and as comparable as possible across participants.

Free play. Episode 1 consisted of a free-play period. After the mother was seated on the couch, the experimenter emptied a bag of age-appropriate toys in the middle of the living room floor and sat down near the mother. The free-play episode was designed to assess whether inhibition extends to the home (a familiar environment) in the presence of a stranger. Episode 1 lasted for 5 min and was modeled after a procedure used by Garcia-Coll et al. (1984). The dependent variables were (a) the child's latency to leave the parent, (b) whether the child retreated to the parent (specifically, leaving the toys to move within an arm's length of parent), (c) the latency to touch the first toy, (d) the latency to vocalize to the experimenter, and (e) the number of vocalizations to the experimenter. Children who did not exhibit a behavior of interest were given a latency score of 300 s.

Stranger interaction. Episode 2 involved a stranger-interaction phase. This episode was designed to assess latency to interact with a stranger in a familiar (home) environment. After the child was engaged in free play for 5 min (Episode 1), the experimenter stated, "It is time to put these toys away now." The experimenter then returned the toys to a duffel bag and sat down quietly next to the child while holding a Fisher-Price barnyard toy. Episode 2 was modeled after procedures used by Reznick et al. (1989) and comprised a sequence of events that became increasingly more interactive. If the child did not touch the barnyard toy the experimenter had taken out after 1 min, the experimenter began to play with the toy silently. If the child took no action after a second minute, the experimenter

began to describe her own play activities, without addressing the child directly. Finally, if the child did not play with the barnyard after 3 min had passed, the experimenter invited the child to play with the toy. Once the child began to handle the barnyard, she or he was given 3 min to play with it. During this episode, the following behaviors were of interest: (a) whether the child retreated to the parent, (b) the latency to touch the barnyard toy, (c) the latency to vocalize to the experimenter, and (d) the number of vocalizations to the experimenter. The children who did not exhibit a behavior of interest were given a latency score of 300 s.

Uncertainty tasks. Episode 3 consisted of a series of uncertainty-eliciting tasks modeled after those used by Reznick et al. (1989). Five challenging situations were staged, each lasting approximately 30 s. These situations were designed to elicit and assess increasing levels of uncertainty in the children. After clearing away the barnyard toy, the experimenter withdrew five objects, one at a time, from a large opaque bag. The uncertainty tasks were staged in the same order for each child. The tasks were (a) black box: the child was invited to place his or her hand through a hole in a shoe box covered with black construction paper (inside the box was a plastic measuring cup, which rattled when the box was shaken by the experimenter); (b) mask: the child was asked whether he or she wanted to touch a somewhat frightening troll mask with wild red hair; (c) alarm clock: the experimenter removed a loudly ringing alarm clock from the bag and invited the child to hold it; (d) tongue depressor: the experimenter held a sterile tongue depressor and asked the child to open his or her mouth so that she could look inside (the depressor was not inserted for those children who complied); and (e) pick up: the experimenter asked whether she could pick up the child.

The following behavioral variables were coded from Episode 3: whether the child retreated to the parent, the number of vocalizations to the experimenter, and whether the child complied with each of the experimenter's requests. This last variable was summed to yield a single "comply score," ranging from 0 (the child did not comply with a single request) to 5 (the child complied with all requests). Finally, to conclude the session on a pleasant note for both the child and the parent, the experimenter offered the child a small present at the end of the visit. The mother was thanked, and any questions she had were answered. Within several weeks, a certificate of appreciation with the child's name on it was sent to the mother. In addition, at the completion of the study, a summary report of the findings was sent to each mother.

Temperament ratings. To investigate the relation between the observed behaviors and parental temperament ratings, we asked the mothers to complete the TTS, which is a widely used parental report measure of temperament designed to assess the nine temperament categories of the New York Longitudinal Study (Thomas & Chess, 1977). It is useful with children in their 2nd and 3rd years of life. The TTS was chosen because we thought it provided the best coverage for the present age group.

Goldsmith's (1996) Toddler Behavior Assessment Questionnaire had been considered, but it would have been appropriate for only the youngest children in the sample. Rothbart's (1981) Children's Behavior Questionnaire had also been considered, but it might have worked best for only the older children in the sample.

The TTS has been standardized on 309 children in two pediatric practices, with 1-month test–retest reliabilities ranging from .69 to .89 for the nine categories (Fullard et al., 1984). In this study, we were particularly interested in the scores on three dimensions: approach/withdrawal, intensity of reaction, and quality of mood. Fullard et al. reported alpha coefficients reflecting the internal consistency of these three categories of .85, .67, and .63, respectively, based on a sample of 2-year-olds. High scores on each dimension are indicative of *problem* behaviors (e.g., a child whose response to a new situation can be described as withdrawing or avoidant, very intense, and characterized by a negative or irritable affective state; see Fullard et al.; Matheny, Wilson, & Thoben, 1987, for more detail).

Data Reduction

Behavioral indexes. The videotapes of each session were coded by a trained observer who had knowledge neither of the purpose of the study nor of the parents' temperament ratings. A random sample of 19 of the 58 preschoolers' videotapes was coded by a second trained observer. Interrater reliabilities were computed in terms of both percent agreement and correlations (see Table 1). Percent agreement (defined as a correspondence within 0.5 s for latency measures and exact agreement for count measures) ranged from 68.4%, for both the latency to touch the first toy in Episode 1 and the latency to vocalize to the experimenter in Episode 2, to 100% for the number of vocalizations to the experimenter in Episode 1. The median percent agreement was 86.9%. Correlation coefficients, which we chose rather than kappas because of the quantitative nature of the observations, ranged from .62, for the number of retreats to the parent in Episode 2, to .99 for several variables in Episodes 1 and 2. The median correlation was .96, and 8 of 11 were above .90. Thus, the variables can be considered to have acceptable interobserver reliability.

Following Reznick et al. (1989), we pooled the behavioral dependent variables within each episode to yield an episode composite score. Because some of the variables were latencies (in seconds), some were frequencies, and a few were categorical (e.g., yes–no), a simple arithmetic mean of raw variables would have been flawed as a result of the influence of variables scaled to larger numbers. Therefore, each quantitative variable was converted to a z score and each categorical score was assigned a value of +1 or −1, roughly the range within the distribution of standard scores. Furthermore, before converting each frequency variable to a standard score, we reversed the scoring of these variables so that, consistent with the latency and categorical variables, low scores indicated uninhibited behavior and higher scores represented more inhibited behaviors. We accomplished the

TABLE 1
Interobserver Reliabilities (n = 19)

Variable	Correlation coefficient	% agreement
Episode 1: Free play		
Latency to leave parent[a]	.69	73.7
Retreats to parent[b]	.91	89.5
Latency to touch first toy[a]	.99	68.4
Latency to vocalize to experimenter[a]	.85	84.2
Vocalizations to experimenter[b]	.99	100.0
Episode 2: Stranger interaction		
Retreats to parent[b]	.62	89.5
Latency to touch farm[a]	.99	73.7
Latency to vocalize to experimenter[a]	.99	68.4
Vocalizations to experimenter[b]	.97	73.7
Episode 3: Uncertainty tasks		
Retreats to parent[b]	.96	90.9
Vocalizations to experimenter[b]	.93	89.5
Comply with requests		97.8

[a]Measured in seconds. [b]Number of times behavior was observed.

reversal by taking the inverse of each score. We then computed the composite score of each episode by taking the arithmetic mean of those scores. Cronbach alphas were .52, .72, and .32 for Episodes 1, 2, and 3, respectively.

Instead of using an aggregate measure across the three episodes, as is often done in studies of behavioral inhibition, we decided to examine the three episodes of the session separately for two reasons. First, we suspected that the episodes might assess different aspects of the preschoolers' reactions to uncertainty. In the first episode, although each child was exposed to an unfamiliar person and various unfamiliar objects, no direct interaction was initiated by the experimenter. Therefore, even though the first episode was procedurally similar to laboratory studies of inhibition, the fact that the setting was familiar to the participants of this study distinguished it from the laboratory paradigm. Specifically, although the experimenter was unknown to the child, the experience of having a stranger come into the house most likely was not. In the second episode, the experimenter sought to engage the child in play, although she avoided making any direct requests of the child until the final minute. In contrast, during the third episode, the experimenter directly addressed the preschooler during each of the five challenging situations. As such, in addition to providing a measure of how the children reacted to uncertainty, Episode 3 might have also tapped how responsive the children were to the requests of adult strangers, at least in the presence of a parent. Second, given the debate within the literature regarding the usefulness of

parental ratings, we decided to form episode composites because they permitted a comparison of the intramethod relations of the composite measures of inhibition with the intermethod relations between maternally rated approach/withdrawal and researcher-observed inhibition.

Parental reports. We analyzed the mothers' responses on the 97 items of the TTS using the procedure outlined by Fullard et al. (1984). Scores were derived from each parental questionnaire for the following three temperament dimensions: approach/withdrawal, mood, and intensity.

Results

Several of the variables collected during the home visit were positively skewed, and all analyses were conducted on both the raw and log-transformed data. In each case, however, the results were essentially the same, and therefore only the analyses conducted on the nontransformed data are presented. Preliminary analyses (t tests) indicated that there were no gender differences on any of the variables. In addition, none of the variables were correlated with the preschoolers' age. Only one variable (latency to touch the first toy, Episode 1) was related to sibling status ($r = .36$, $p < .01$): the preschoolers with older siblings, compared with those who had no siblings and with those who had younger siblings, took significantly longer to touch the first toy, $F(2, 53) = 3.93$, $p = .03$.

Hypothesis 1: Behaviors Reflecting Inhibition Could Be Reliably Elicited in the Home Environment

We conducted a series of correlational analyses on the data to determine the intercorrelations among the behavioral dependent measures taken during the home visit. The intercorrelations among the 12 behaviors recorded during the three episodes of the home visit are shown in Table 2. Of the 66 correlations, 26 were significant at the $p < .05$ level and 17 were significant at the $p < .01$ level. Probability information for correlations significant at the $p < .05$ level is provided throughout the text for the readers' information; however, to protect against Type I error, we emphasize the correlations significant at the $p < .01$ level.

Hypothesis 2: Behavioral Inhibition Patterns Would Remain Stable Across Episodes

Of particular interest are the intercorrelations between identical variables across episodes, because they reflect stability of behavior. The number of retreats to the parent, although not correlated from Episode 1 to 2, was correlated between Episodes 1 and 3 ($r = .30$, $p < .05$) and Episodes 2 and 3 ($r = .26$, $p < .05$). Both the latency to touch the toy and the latency to vocalize to the experimenter were

TABLE 2
Intercorrelations Among Behavioral Dependent Variables (N = 58)

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Episode 1: Free play												
1. Latency to leave parent	—	.19	.33*	.25	−.16	.09	.29*	.39**	−.30*	.00	−.18	−.49**
2. Retreats to parent		—	.13	.10	−.13	.25	.07	.00	−.07	.28*	−.16	−.03
3. Latency to touch first toy			—	.12	−.06	.05	.53**	.22	−.23	−.12	−.18	−.32*
4. Latency to vocalize to experimenter				—	−.70**	.09	.38**	.50**	−.56**	.09	−.44**	−.13
5. Vocalizations to experimenter					—	−.16	−.24	−.38**	.52**	−.20	.59**	.07
Episode 2: Stranger interaction												
6. Retreats to parent						—	−.03	.29*	−.29*	.26*	−.25	−.34**
7. Latency to touch farm							—	.48**	−.50**	−.10	−.31*	−.20
8. Latency to vocalize to experimenter								—	−.79**	.14	−.50**	−.24
9. Vocalizations to experimenter									—	−.09	.59**	.19
Episode 3: Uncertainty tasks												
10. Retreats to parent										—	−.24	−.04
11. Vocalizations to experimenter											—	.12
12. Comply score												—

*p < .05, two-tailed. **p < .01, two-tailed.

stable from Episode 1 to 2 ($r = .53$, $p < .01$, and $r = .50$, $p < .01$, respectively). The number of vocalizations to the experimenter was stable across all three episodes ($r = .52$, .59, and .59 for Episodes 1–2, 1–3, and 2–3, respectively, $p < .01$ for all). Finally, as would be expected, significant negative correlations were obtained between the latency to vocalize to the experimenter and the number of vocalizations to the experimenter in Episodes 1 ($r = -.70$, $p < .01$) and 2 ($r = -.79$, $p < .01$).

Hypotheses 3 and 4: Children's Behaviors Would Be Related to Parent-Reported Temperament Dimensions in Predictable Ways

The correlations between each of the home-visit behavioral variables and the three parent-reported TTS temperament dimensions of approach/withdrawal, intensity, and mood are shown in Table 3. Approach/withdrawal was significantly correlated at the $p < .01$ level with 2 of the 12 behaviors and at the $p < .05$ level with 6 of the 12 behaviors. During Episode 1/free play, the preschoolers rated by their mothers as being generally avoidant of new stimuli were slow to leave their parent and to make their first vocalization to the experimenter. They also made fewer vocalizations to the experimenter than those preschoolers who were rated as more readily willing to approach new situations. Similar results were obtained

TABLE 3
Pearson Correlations Between Observed Behaviors and Parent-Reported Temperament Dimensions

	Toddler temperament dimension		
Behavior during home visit	Approach/ withdrawal	Mood	Intensity
Episode 1: Free play			
Latency to leave parent[a]	.30*	.01	−.08
Retreats to parent[b]	−.15	−.11	−.08
Latency to touch first toy[a]	.21	.16	−.22
Latency to vocalize to experimenter[a]	.37**	−.13	−.41**
Vocalizations to experimenter[b]	−.27*	.08	.30*
Episode 2: Stranger interaction			
Retreats to parent[b]	.20	.20	.07
Latency to touch farm[a]	−.27*	−.27*	−.46**
Latency to vocalize to experimenter[a]	−.05	−.05	−.13
Vocalizations to experimenter[b]	.11	.12	.19
Episode 3: Uncertainty tasks			
Retreats to parent[b]	.08	−.03	−.05
Vocalizations to experimenter[b]	−.36**	−.04	.03
Comply with requests	−.30*	−.03	.10

[a]Measured in seconds. [b]Number of times behavior was observed (62–72 times).
*$p < .05$, two-tailed. **$p < .01$, two-tailed.

in Episode 2/stranger interaction for which the preschoolers rated as more avoidant also had a longer latency to touch the barnyard toy. By Episode 3/uncertainty tasks, those preschoolers no longer made more retreats to their parent, but they continued to make fewer vocalizations to the experimenter. Furthermore, they complied with fewer of the experimenter's requests to engage in the five tasks (black box, mask, alarm clock, tongue depressor, being picked up).

For mood, only the correlation with latency to touch the barnyard toy in Episode 2/stranger interaction was significant, and that correlation was negative ($r = -.27$, $p < .05$), indicating that the preschoolers rated as irritable had shorter latencies to touch the toy. The preschoolers rated by their mothers on the TTS Intensity subscale as having a more intense degree of response had shorter latencies to vocalize to the experimenter ($r = -.41$, $p < .01$) and more vocalizations ($r = .30$, $p < .05$) in Episode 1/free play but not in Episode 2/stranger interaction. They also had shorter latencies to touch the toy during Episode 2/stranger interaction ($r = -.46$, $p < .01$) but not during Episode 1/free play.

To further analyze the relations among behavioral and temperament ratings for both the full sample and the sample extremes (top and bottom 15% of the sample), we pooled the behavioral variables within each episode to yield an episode composite score (Reznick et al., 1989). We accomplished this by converting each variable to a z score and then taking the mean of the z scores within each episode. For the full sample (see Table 4), the correlations between the episode composite scores and the three temperament dimensions paralleled the univariate corre-

TABLE 4
Behavior–Temperament Correlations for the Full Sample and the Sample Extremes

Behavior during home visit	Toddler temperament dimension		
	Approach/ withdrawal	Mood	Intensity
Episode 1: Free play			
Episode composite (full sample)	.41**	−.08	−.38**
Episode composite (15% extremes)	.61**	−.23	−.64**
Episode 2: Stranger interaction			
Episode composite (full sample)	.49**	−.18	−.28*
Episode composite (15% extremes)	.77**	−.38	−.67**
Episode 3: Uncertainty tasks			
Episode composite (full sample)	.43**	.02	−.10
Episode composite (15% extremes)	.82**	−.14	−.66**
Session composite (full sample)	.53**	−.10	−.28*
Session composite (15% extremes)	.77**	−.27	−.70**

Note. $N = 58$ for all full-sample correlations; $n = 17$ for all correlations based on sample extremes. *$p < .05$, two-tailed. **$p < .01$, two-tailed.

TABLE 5
Intercorrelations Among All Episodes (N = 58)

Episode	1	2	3
Episode 1: Free play	—	.61**	.52**
Episode 2: Stranger interaction		—	.53**
Episode 3: Uncertainty tasks			—

**$p < .01$, two-tailed.

lational analyses. The correlations for the 15% extremes were always higher. This was especially true for intensity and Episode 1/free play, for which the correlation for the full sample was –.38 ($p < .01$); but for the 15% extremes of the sample the correlation was –.64 ($p < .01$).

Finally, the full sample episode composite scores were intercorrelated. All episodes were significantly correlated with one another at the $p < .01$ level, as shown in Table 5.

Discussion

Researchers who are interested in how children react to unfamiliar people and objects invariably bring the children to a university playroom to expose them to unfamiliar social and/or nonsocial stimuli. Although the playroom offers a degree of control over social situations that cannot be achieved outside the laboratory, it has its drawbacks. Chief among these is the fact that children's behavior toward unfamiliar persons and objects in the laboratory playroom may be influenced by their reaction to being in a novel environment. Conversely, children's reactions in a familiar place, such as the home, may be affected by the "secure base" provided by the home setting. In the present study, we avoided the potential confound of the laboratory setting by exposing the preschoolers to an unfamiliar person and unfamiliar objects while they were in the familiar context of their own living rooms with their mothers present.

The half-hour home visit method used in this study was designed to elicit components of behavioral inhibition in the home during a free-play period with a stranger present and during interactions with the stranger. The latter condition consisted of a play period with the stranger and compliance by the preschooler with the stranger's requests. Variations of these tasks have been used by other researchers in the laboratory (e.g., Garcia-Coll et al., 1984; Reznick et al., 1989). In each episode, the preschoolers' behaviors in relation to the parent, the stranger, and the objects brought by the stranger were recorded. Measures of interobserver reliability indicated that the behaviors of interest could be accurately and reliably scored from videotapes of the sessions. In addition, although several of the

observed behaviors were intercorrelated, none were so highly related as to be considered redundant, and we could cluster several of the behaviors together to form composite measures of inhibition.

Having established that behaviors indicative of inhibition could be reliably obtained from the home visit, we next sought to determine if individual differences in the preschoolers' reactions to the home episode could be explained, in part, by individual differences in selected aspects of their temperament. Consistent with the findings of Reznick et al. (1989), individual differences in 6 of the 12 behaviors thought to assess inhibition were strongly related to the TTS Approach/Withdrawal subscale score. In addition, the correlations among the three episode composite scores and approach/withdrawal were stronger for the 15% extremes of the sample as compared with the entire sample. Those relations indicate that the children who responded with a great deal of inhibition during each episode were rated by their mothers as children who, in the past, have been observed to withdraw from or avoid new situations. On the other hand, the children who were very interactive with the stranger and her toys were rated by their mothers as children whose initial response to a new stimulus or situation was positive.

The convergence between our behavioral measures of inhibition and the approach/withdrawal construct from the TTS is not surprising given that the questions on the TTS that make up this dimension ask the mother to rate how the child reacts to unfamiliar persons and events. Furthermore, as indicated previously, the approach/withdrawal dimension of temperament is conceptually similar to Kagan and colleagues' (1984) construct of behavioral inhibition. Thus, our results provide convergent validity between two different methods of observing behavioral inhibition: direct observation in the home and paper-and-pencil maternal report. It is important to note, however, that behavioral inhibition and approach/withdrawal are not identical. Of the full sample, only 28% of the variance was shared by those measures. Even when one considers the 15% extremes, approximately 59% of the variance was shared by those measures in this study. As noted by Rothbart (1989), approach/withdrawal as measured by the TTS refers to the child's active withdrawal from new situations, whereas behavioral inhibition, as defined by Kagan and colleagues (e.g., Kagan et al., 1986) and in the present study, includes behaviors indicative of both withdrawal and passive nonapproach.

Parental ratings of their preschoolers' quality of mood—that is, whether they are generally pleasant, happy, and friendly versus unpleasant, irritable, and unfriendly—were unrelated to what the preschoolers did during any part of the structured home visit. Reznick et al. (1989) also did not find a composite measure of inhibition in the laboratory to be related to scores on the mood dimension of the TTS at 14, 20, or 32 months of age. Mood was, however, related to the occurrence of negative affect (crying and fretting) during our procedure. Taken together, our findings and those of Reznick et al. suggest that, contrary to the proposition of Plomin and Stocker (1989), the mood component of emotionality may not be related to behavioral inhibition either in the laboratory or in the home. In addition, we

did not find the mothers' ratings on the Mood subscale to be correlated with their ratings on the Approach/Withdrawal subscale ($r = -.04$). Thus, contrary to the suggestion of Rothbart and Mauro (1990), it appears that mood and approach/withdrawal are independent components of young children's temperament.

Finally, the mothers' ratings of their preschooler's intensity were related to several of the home-observation variables, especially during the free-play episode. The children rated as intense, that is, those whose mothers said they characteristically display a high energy level of reaction, interacted with the toys and experimenter more quickly than did those toddlers who were rated as being generally less intense. That finding is not surprising given that behavioral inhibition has been conceptualized to include an arousal component (Plomin & Stocker, 1989). However, the finding is different from that of Reznick et al. (1989), who did not find any significant correlations between intensity and inhibition at 14, 20, or 32 months of age. Within an unfamiliar environment, such as the laboratory playroom, preschoolers' range of reactions may be more constricted than within the familiar and safe environment of their home (Harris, 2000). Thus, preschoolers' intensity of reaction may not influence their behavior when in a strange environment, but may have an effect on their reaction to novelty in the home.

We emphasize that although there is some overlap between the concepts of activity level and intensity (see, for example, Sanson, Prior, Garino, Oberklaid, & Sewell, 1987), and these two temperament dimensions were highly correlated in the present study ($r = .58$, $p < .001$; see also Matheny et al., 1987), activity level per se did not lead to the obtained relation between TTS intensity and behavior toward the novel toys. This conclusion is based on the finding that the significance of the correlations between intensity and the home observation variables did not change when activity level scores were partialed out. Intensity of reaction is, therefore, an independent component of behavioral inhibition, which is probably related to one or more components of behavioral arousal (see Plomin & Stocker, 1989), reactivity (see Sanson et al., 1987), or both.

It should be noted that not all possible characteristics of the participant families that might have influenced the parental temperament ratings or the children's behaviors were measured. For example, we did not consider parental ability to keep the home organized, parental marital relationship, parenting skills, or parental anxiety levels, nor did we consider the children's level of intellectual ability, their attachment styles, or other aspects of their social functioning. Some of those dimensions might moderate or even mediate the relation between behavioral inhibition and temperament ratings. Furthermore, Wachs (1999, p. 23) has eloquently pointed out that temperament is "part of a linked system of multiple influences and outcomes" of which our data could only capture a small portion.

An extension of this study would involve investigators studying parent–child dyads in both their home and in laboratory settings to disentangle reactions to different aspects of novelty, inhibition to novel people, and inhibition to novel loca-

tions. If such a study were done at two time periods, stability of inhibition and temperament could be analyzed not only across novelty situations, but also across time (Wachs, 1999).

The results of the present study extend our understanding of behavioral inhibition in several ways. First, we found that preschoolers exhibit behaviors indicative of inhibition toward unfamiliar social and nonsocial stimuli even when they are at home and with their mothers. That finding is consistent with the thinking of Kagan and colleagues (e.g., Kagan, Reznick, Snidman, Gibbons, & Johnson, 1988) who have emphasized that inhibition is a stable characteristic of children that manifests itself whenever and wherever the child is faced with unfamiliar events. Second, the children's behaviors remained stable across increasingly intrusive episodes with the stranger. Third, the approach/withdrawal component of temperament is related to behavioral inhibition in the home setting, just as it is in other, less familiar, settings. Also, individual differences in mood do not appear to be strongly related to differences in inhibition, either in the lab or in the home. Finally, parent-reported temperament information was found to be significantly related to researcher-observed behavioral measures in the home, indicating the validity of paper-and-pencil parental measures of temperament.

REFERENCES

Bates, J. E., (1994). Parents as scientific observers of their children's development. In S. L. Friedman & H. C. Haywood (Eds.), *Developmental follow-up: Concepts, domains, and methods* (pp. 197–216). New York: Academic.

Bates, J. E., & Bayles, K. (1984). Objective and subjective components in mothers' perceptions of their children from age 6 months to 3 years. *Merrill-Palmer Quarterly, 30,* 111–132.

Bornstein, M. H., Gaughran, J. M., & Segui, D. (1991). Multivariate assessment of infant temperament. *International Journal of Behavioral Development, 14,* 131–151.

Broberg, A., Lamb, M. E., & Hwang, P. (1990). Inhibition: Its stability and correlates in sixteen- to forty-month-old children. *Child Development, 61,* 1153–1163.

Bronson, G. W. (1972). Infant's reactions to unfamiliar persons and novel objects. *Monographs of the Society for Research in Child Development, 37*(3, Serial No. 148).

Calkins, S. D., & Fox, N. A. (1992). The relations among infant temperament, security of attachment, and behavioral inhibition at twenty-four months. *Child Development, 63,* 1456–1472.

Clarke-Stewart, K. A. (1978). Recasting the lone strangers. In J. Glick & K. A. Clarke-Stewart (Eds.), *The development of social understanding* (pp. 109–176). New York: Gardner.

Clarke-Stewart, K. A., Umeh, B. J., Snow, M. E., & Pederson, J. A. (1980). Development and prediction of children's sociability from 1 to 2½ years. *Developmental Psychology, 16,* 290–302.

Fullard, W., McDevitt, S. C., & Carey, W. B. (1984). Assessing temperament in one- to three-year-old children. *Journal of Pediatric Psychology, 9,* 205–217.

Hagekull, B., Bohlin, G., & Lindhagen, K. (1984). Validity of parental reports. *Infant Behavior and Development, 7,* 77–92.

Harris, J. (2000). Context-specific learning, personality, and birth order. *Current Direc-*

tions in Psychological Science, 9, 174–177.
Garcia-Coll, C., Kagan, J., & Reznick, J. S. (1984). Behavioral inhibition in young children. *Child Development, 55,* 1005–1019.
Goldsmith, H. (1996). Studying temperament via construction of the Toddler Behavior Assessment Questionnaire. *Child Development, 67,* 218–235.
Kagan, J. (1998). Biology and the child. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 177–235). New York: Wiley.
Kagan, J., Kearsley, R., & Zelazo, P. (1978). *Infancy: Its place in human development.* Cambridge, MA: Harvard University Press.
Kagan, J., Reznick, J. S., Clarke, C., Snidman, N., & Garcia-Coll, C. (1984). Behavioral inhibition to the unfamiliar. *Child Development, 55,* 2212–2225.
Kagan, J., Reznick, J. S., & Snidman, N. (1986). Temperamental inhibition in early childhood. In R. Plomin & J. Dunn (Eds.), *The study of temperament: Changes, continuities, and challenges* (pp. 53–67). Hillsdale, NJ: Erlbaum.
Kagan, J., Reznick, J. S., Snidman, N., Gibbons, J., & Johnson, M. O. (1988). Childhood derivatives of inhibition and lack of inhibition to the unfamiliar. *Child Development, 59,* 1580–1589.
Kagan, J., & Snidman, N. (1991). Temperamental factors in human development. *American Psychologist, 46,* 856–862.
Kochanska, G. (1991). Patterns of inhibition to the unfamiliar in children of normal and affectively ill mothers. *Child Development, 62,* 250–263.
Kochanska, G., & Radke-Yarrow, M. (1992). Inhibition in toddlerhood and the dynamics of the child's interaction with an unfamiliar peer at age five. *Child Development, 63,* 325–335.
Lewis, M., & Brooks, J. (1974). Self, other and fear: Infants' reactions to people. In M. Lewis & L. A. Rosenblum (Eds.), *The origins of fear* (pp. 195–227). New York: Wiley.
Mangelsdorf, S. C. (1992). Developmental changes in infant–stranger interaction. *Infant Behavior and Development, 15,* 191–208.
Matheny, A. P., Wilson, R. S., & Thoben, A. S. (1987). Home and mother: Relations with infant temperament. *Developmental Psychology, 23,* 323–331.
McCall, R. (1986). Issues of stability and continuity in temperament research. In R. Plomin & J. Dunn (Eds.), *The study of temperament* (pp. 13–26). Hillsdale, NJ: Erlbaum.
Plomin, R., & Stocker, C. (1989). Behavioral genetics and emotionality. In J. S. Reznick (Ed.), *Perspectives on behavioral inhibition* (pp. 219–237). Chicago: University of Chicago Press.
Reznick, J. S., Gibbons, J. L., Johnson, M. O., & McDonough, P. M. (1989). Behavioral inhibition in a normative sample. In J. S. Reznick (Ed.), *Perspectives on behavioral inhibition* (pp. 25–49). Chicago: University of Chicago Press.
Rheingold, H., & Eckerman, C. (1973). Fear of the stranger: A critical examination. In H. Reese (Ed.), *Advances in child development and behavior* (Vol. 8, pp. 185–222). New York: Academic Press.
Rothbart, M. K. (1981). Measurement of temperament in infancy. *Child Development, 52,* 569–578.
Rothbart, M. K. (1989). Behavioral approach and inhibition. In J. S. Reznick (Ed.), *Perspectives on behavioral inhibition* (pp. 139–157). Chicago: University of Chicago Press.
Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 105–176). New York: Wiley.
Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. L. Brown (Eds.), *Advances in developmental psycholo-*

gy (Vol. 1, pp. 37–86). Hillsdale, NJ: Erlbaum.
Rothbart, M. K., & Mauro, J. K. (1990). Questionnaire approaches to the study of infant temperament. In J. Colombo & J. Fagen (Eds.), *Individual differences in infancy: Reliability, stability, prediction* (pp. 411–429). Hillsdale, NJ: Erlbaum.
Sanson, A. V., Prior, M., Garino, E., Oberklaid, F., & Sewell, J. (1987). The structure of infant temperament: Factor analysis of the Revised Infant Temperament Questionnaire. *Infant Behavior and Development, 10,* 97–104.
Scarr, S., & Salapatek, P. (1970). Patterns of fear development during infancy. *Merrill-Palmer Quarterly, 16,* 53–90.
Schaffer, H. R. (1966). The onset of fear of strangers and the incongruity hypothesis. *Journal of Child Psychology and Psychiatry, 7,* 95–106.
Seifer, R., Sameroff, A. J., Barrett, L. C., & Krafchuk, E. (1994). Infant temperament measured by multiple observations and mother report. *Child Development, 65,* 1478–1490.
Slabach, E., Morrow, J., & Wachs, T. (1991). Questionnaire measurement of infant and child temperament. In J. Strelau & A. Angleitner (Eds.), *Exploration of temperament* (pp. 205–234). New York: Plenum.
Sroufe, L. A. (1977). Wariness of strangers and the study of infant development. *Child Development, 48,* 731–746.
Stevenson, M. B., & Lamb, M. E. (1979). Effects of infant sociability and the caretaking environment on infant cognitive performance. *Child Development, 50,* 340–349.
Stevenson-Hinde, J. (1989). Behavioral inhibition: Issues of context. In J. S. Reznick (Ed.), *Perspectives on behavioral inhibition* (pp. 125–138). Chicago: University of Chicago Press.
Thomas, A., & Chess, S. (1977). *Temperament and development.* New York: Brunner/Mazel.
Thompson, R. A., & Lamb, M. E. (1982). Stranger sociability and its relationships to temperament and social experience during the second year. *Infant Behavior and Development, 5,* 277–287.
Thompson, R. A., & Lamb, M. E. (1983). Security of attachment and stranger sociability in infancy. *Developmental Psychology, 19,* 184–191.
Wachs, T. (1999). The what, why, and how of temperament: A piece of the action. In L. Balter & C. S. Tamis-LeMonda (Eds.), *Child psychology: A handbook of contemporary issues* (pp. 23–44). Philadelphia: Psychology Press.

Received September 6, 2001