

Parents' perceptions of infant temperament:

Commonalities and differences for China, the United States of America, and Spain

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Temperament approaches to the development of personality, on the surface, may seem incompatible with the cross-cultural orientation to the study of behavior.

Temperament research tends to emphasize common biological underpinnings of individual differences in temperament characteristics. For example, the psychobiological approach proposed by Rothbart and Derryberry (1981) has conceptualized temperament as constitutionally based individual differences in reactivity and self-regulation, influenced by heredity, maturation, and experience. In so far as these biologically-based reactive and regulatory factors are influenced by experience, cultural differences can be anticipated.

Cross-cultural temperament research has not been widespread, especially during the infancy period, and longitudinal studies have been lacking. Most longitudinal investigations of temperament in infancy have been conducted with North-American samples, producing a number of important findings. Briefly summarized, Activity Level shows a dramatic increase during infancy, in connection with the maturation of CNS regions responsible for motor processes, such as near-distal and cephalo-caudal areas. On another hand, the expression of pleasure shows a smaller, more gradual increase during the first year of life, which supports the notion that positive emotionality is established very early in life (Rothbart, Ahadi, & Hershey, 1994). For Fear, also called Behavioral Inhibition (Kagan, 1994), a dramatic acceleration during the second half of the first year of life has been demonstrated. This developmental pattern was supported by Rothbart's (1988) findings, based on confronting children with familiar versus unfamiliar, highly stimulating toys. A U tendency seems to account for the development of anger responses during the first year of life (e.g., Rothbart, 1981), with changes in distress responses being associated with gains in cognitive abilities. For example, the decrease in anger occurring between 2 and 6 months of age has been linked with the development of

orienting attention, and greater flexibility in attention shifting (Johnson, Posner, & Rothbart, 1991). Duration of Orienting, or duration of looking in interaction with objects, shows a U-shaped curve during the first year of life (see Ruff & Rothbart, 1996 for a review) that could be explained by the influence of two different systems. Children habituate faster to objects in familiar contexts, due to the maturation of the Orienting Attentional Network in the first months of life, leading to a decrease in duration of looking at objects. Close to the first birthday, the emergence of an Executive Attentional Network (Posner & Rothbart, 1991), linked to the goal-oriented, planned behavior, permits the child to engage and persist longer in playing with objects. Thus, individual differences in duration of looking during this developmental period may reflect cognitive skills developed in interaction with objects. The developmental patterns described above have been demonstrated for North-American samples, however, their generalizability to other cultures remains an open empirical question.

### **The aim of this work**

To investigate the commonalities as well as the idiosyncratic aspects of early development of temperament in three different cultures: China, the U.S., and Spain, through a longitudinal design from 3 to 9 months of age. The selection of these countries offers the chance to address Eastern-Western comparisons.

## *Method*

### **Participants**

Culture	PRC	U.S.	Spain
Sample Size	N=59	N=66	N=60
Place of Residence	Shanghai	Eugene-Springfield, OR	Murcia

- ♥ Broad range of socio-economic characteristics
- ♥ Parent-report obtained when infants were 3, 6, and 9 months of age

### **Measures**

The Infant Behavior Questionnaire (IBQ; Rothbart, 1981) is composed of 94 items rated on a seven-point scale (ranging from "never" to "always") by caregivers who assess the frequency of children's behaviors in everyday life situations. The IBQ yields a temperament profile composed of Activity level, Distress to Limitations, Fear, Duration of Orienting and Smiling and Laughter. Mean item-scale correlations for the IBQ have ranged from .41 to .77, with coefficient Alpha's ranging from .67 to .84 (median=.79). Moderate correlations (between .45 and .69) were also reported for pairs of adults (N=24) that shared caregiving responsibilities for a particular infant (Rothbart, 1981). This measure has been translated into Spanish and Chinese languages.

### **Procedure**

All of the participating parents agreed to take part in longitudinal evaluations. They were asked to complete the IBQ when their infants were 3, 6, and 9 months of age. The completion of this paper-and-pencil measure generally takes about 30 minutes. Participating parents were contacted by telephone in the United States, whereas they were

approached while receiving services at medical centers for the Spanish and the PRC samples.

### **Analytic Strategy**

Main effects and culture-by-age interactions. Mean differences between the three cultures (U.S., Spain, and PRC), as well as culture-by-age interactions, were evaluated in the context of three-way mixed design ANOVA's. These 3x3x2 ANOVA's included one within factor (age - 3, 6, and 9 months of age), and two between factors (culture - U.S., Spain, PRC; gender - male, female), and addressed the IBQ scales as dependent variables. Each significant age-by-culture interaction was followed-up with a trend analysis, conducted separately for each of the three cultures. Pairwise comparisons were subsequently conducted to determine significant differences between the three assessment periods (3, 6, and 9 months of age) for each culture.

Cross-cultural differences in the stability of temperament. Stability coefficients for the six IBQ scales were computed for each cultural group, between 3 and 6, 6 and 9, as well as 3 and 9 months of age (Table 1). Cross-cultural comparisons of these coefficients were subsequently performed, via the Fisher  $r$  to  $z$  transformations.

Differences in the structure of temperament. Potential differences in the interrelations between the domains of temperament represented by the IBQ scales were evaluated for the three cultural groups included in this study. Correlations between the IBQ scales were computed for the U.S., Spanish, and the PRC samples (Table 2). These correlation matrices were subsequently compared using Structural Equation Modeling software – LISREL (Joreskog & Sorbom, 1993), following the guidelines provided by Green (1992). Models of equivalent patterns of correlations across two matrices (i.e.,

matrices based on the data from two of the cultural groups), were evaluated (Green, 1992) for all pairs resulting from comparing the three cultural groups. Three temperament assessments (at 3, 6, and 9 months of age) were conducted for each of these samples, therefore three separate matrix comparison procedures were performed to address each of the cultural contrasts (e.g., U.S. vs. Spain, and U.S. vs. PRC). Thus, a total of nine matrix comparisons were performed, so that each pair of cultures could be compared for each of the three assessment periods.

### *Results*

#### **Main effects of culture**

Significant main effects of culture were observed for Activity Level ( $F=7.05$ ;  $df=2, 189$ ;  $p<.01$ ), Distress to Limitations ( $F=5.90$ ;  $df=2, 189$ ;  $p<.01$ ), Fear ( $F=3.47$ ;  $df=2, 189$ ;  $p<.05$ ), Soothability ( $F=8.80$ ;  $df=2, 189$ ;  $p<.01$ ), and Duration of Orienting ( $F=6.32$ ;  $df=2, 189$ ;  $p<.01$ ; Table 1). For Activity Level, significant differences between the U.S. and PRC samples, and Spanish and PRC samples, were observed at follow-up, with a higher level of activity being demonstrated for the PRC cultural group. Significant differences were noted for the U.S. and PRC samples, as well as for Spain and PRC, for the Distress to Limitations domain. The PRC infants were described as exhibiting the highest levels of Distress to Limitations. A significant main effect of culture was also noted for the Fear scale, with the PRC infants being described as significantly more fearful than the infants from the U.S. Results of the ANOVA addressing the Duration of Orienting scale indicated a significant main effect of culture, with parents from the PRC reporting the highest level of this temperament characteristic for their infants, relative to parents from the U.S. and Spain. Similar results were obtained for the analysis of the

Soothability scale, with the PRC parents reporting higher levels of Soothability than the U.S. or the Spanish participants.

### **Culture-by-age interactions**

Trend analysis was conducted for each of the cultural groups, after demonstrating significant culture-by-age interactions (Figure 1). Linear and quadratic trends for Smiling and Laughter scores computed for U.S. (linear:  $F=24.66$ ;  $df=1, 65$ ;  $p<.01$ ; quadratic:  $F=34.76$ ;  $df=1, 65$ ;  $p<.01$ ) and PRC (linear:  $F=46.10$ ;  $df=1, 68$ ;  $p<.01$ ; quadratic:  $F=31.67$ ;  $df=1, 68$ ;  $p<.01$ ) were significant, however, only a linear trend was significant in explaining the developmental trajectory of Smiling and Laughter for Spain ( $F=11.15$ ;  $df=1, 59$ ;  $p<.01$ ; Figure 1). Distress to Limitations scale scores across time were consistent with a quadratic trend for U.S. ( $F=33.80$ ;  $df=1, 65$ ;  $p<.01$ ) and Spain ( $F=28.10$ ;  $df=1, 59$ ;  $p<.01$ ), however, only a linear trend was significant in explaining PRC longitudinal data ( $F=35.66$ ;  $df=1, 68$ ;  $p<.01$ ; Figure 2). Whereas significant linear and quadratic trends were noted for Duration of Orienting of the U.S. sample (linear:  $F=6.92$ ;  $df=1, 65$ ;  $p<.05$ ; quadratic:  $F=9.21$ ;  $df=1, 65$ ;  $p<.01$ ), only a linear trend reached statistical significance for Spain ( $F=5.00$ ;  $df=1, 59$ ;  $p<.05$ ) and PRC ( $F=23.18$ ;  $df=1, 68$ ;  $p<.01$ ; Figure 3). Activity Level was associated with significant linear and quadratic trends for U.S. (linear:  $F=96.41$ ;  $df=1, 65$ ;  $p<.01$ ; quadratic:  $F=10.79$ ;  $df=1, 65$ ;  $p<.01$ ), Spain (linear:  $F=71.31$ ;  $df=1, 59$ ;  $p<.01$ ; quadratic:  $F=10.35$ ;  $df=1, 59$ ;  $p<.01$ ), and PRC (linear:  $F=18.07$ ;  $df=1, 68$ ;  $p<.01$ ; quadratic:  $F=17.02$ ;  $df=1, 68$ ;  $p<.01$ ; Figure 4). Linear trend explained the developmental trajectory of Fear for U.S. ( $F=32.17$ ;  $df=1, 65$ ;  $p<.01$ ), Spain, and ( $F=13.01$ ;  $df=1, 59$ ;  $p<.01$ ) PRC ( $F=23.18$ ;  $df=1, 68$ ;  $p<.01$ ).

### **Cross-cultural differences in the stability of temperament**

Stability coefficients for the six IBQ scales were computed for each cultural group, between 3 and 6, 6 and 9, as well as 3 and 9 months of age (Table 1). Cross-cultural comparisons of these coefficients were subsequently performed, via the Fisher  $r$  to  $z$  transformation. Thus, three U.S. stability coefficients were compared to those computed for the Spanish and the PRC samples, which were also compared to each other. Significant differences emerged for the U.S. vs. Spain comparison, with U.S. infants demonstrating higher levels of stability for the Smiling/Laughter dimension of temperament between 6 and 9 ( $z=2.37$ ;  $p<.05$ ), and 3 and 9 months of age ( $z=1.97$ ;  $p<.05$ ). The U.S. and PRC comparison also yielded significant differences for the Distress to Limitations and Duration of Orienting dimensions of the IBQ, with the U.S. sample demonstrating greater stability between 3 and 9 months of age for the former ( $z=-2.07$ ;  $p<.05$ ), and between 3 and 6 months of age for the latter ( $z=-2.45$ ;  $p<.05$ ). One other significant difference for the Fear scale was detected in the comparison of the Spanish and the PRC samples, with PRC parents reporting greater stability between 3 and 9 months of age for their infants ( $z=2.15$ ;  $p<.05$ ).

### **Cross-cultural differences in the structure of temperament: Matrix comparisons**

Correlation matrices, including the intercorrelations between the IBQ scales (Activity Level, Smiling and Laughter, Fear, Distress to Limitations, Soothability, and Duration of Orienting) were compared for the U.S., Spanish, and PRC samples, for each assessment period (i.e., based on the data collected at 3, 6, and 9 months of age) (Table 2). Thus, the U.S. correlation matrix was compared to the matrix based on the data from the Spanish sample, and then with the PRC correlation matrix, for each of the 3 assessment periods. The three correlation matrices for the Spanish sample (one for each

assessment period) were also compared with those based on the data from the PRC, resulting in a total of 9 matrix comparison procedures. Significant differences emerged in the comparisons of the U.S. and Spanish matrices at 3 months ( $\underline{\Pi}^2 = 26.27$ ,  $p < .05$ ; GFI=.94) and 6 months of age ( $\underline{\Pi}^2 = 35.39$ ,  $p < .01$ ; GFI=.92), and between Spanish and PRC matrices at 9 months of age ( $\underline{\Pi}^2 = 36.09$ ,  $p < .01$ ; GFI=.92).

### *Discussion*

Significant culture-by-age interactions were explored in the context of this study. Follow-up trend analyses indicated different patterns of developmental changes for U.S., Spain, and PRC, for a number of temperament dimensions evaluated in this study. Developmental trajectory differences between the three cultures were demonstrated via trend analysis for Smiling and Laughter, Distress to Limitations, and Duration of Orienting. Whereas, significant main effects observed in this study demonstrated greater differences between U.S. and PRC, Spain and PRC, along with more similarities for U.S. and Spain, results of the trend analyses did not yield a consistent pattern of differences.

Results of this study are generally consistent with previous findings, indicating an increase in the levels of activity and fear in the first year of life (Gonzales, Carranza, & Ato, 1999; Rothbart, 1986, 1988), however, they also provide preliminary evidence for cross-cultural differences in developmental trajectories of temperament characteristics in infancy. If these findings are replicated, they would suggest that the timing of developmental changes in temperament are not completely determined by the biological processes related to the maturation of the Central Nervous System (CSN). Rather, the unfolding of these processes appears to be open to experience, as evidenced by the cross-cultural differences in developmental trajectories of temperament characteristics observed

in this study. However, analyses addressing the culture-by-age interaction effects should be considered exploratory.

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