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ABSTRACT

A study explored whether socioeconomic status (SES) differences could be detected in 3-month-old infants' differential vocal responsiveness (DVR) to mothers versus strangers. The study also explored whether 3-month-olds' DVR was related to environmental variables, such as the mother's behaviors toward the infant in naturalistic conditions, the mother's statement as to whether the baby was planned or not, and the infants' exposure to excessive auditory stimulation, such as loud noise and/or television. A final objective was to explore whether SES differences existed in the environmental variables. Subjects were 34 normal, full-term, first-born American infants who were divided into two groups on the basis of their mothers' educational levels. Results showed that infants of mothers with higher education had significantly higher DVR scores than infants of mothers with lower education. Infants' DVR was associated with maternal vocal stimulation and exposure to television. A significantly higher percentage of high education than low education mothers said their baby was planned. Planned babies were exposed to television significantly less than unplanned babies. Significant SES differences in infants' exposure to television were found. Results also indicated that SES differences in cognitive processing, as measured by a vocal and language-relevant infant behavior, can be detected very early in life. Implications of the findings are briefly discussed. (RH)

THREE-MONTH OLD INFANTS' DIFFERENTIAL VOCAL RESPONSIVENESS TO MOTHER VS. STRANGER AS A FUNCTION OF MATERNAL EDUCATION.

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THREE-MONTH OLD INFANTS' DIFFERENTIAL VOCAL RESPONSIVENESS TO MOTHER VS. STRANGER AS A FUNCTION OF MATERNAL EDUCATION

Although SES differences in verbal-cognitive functioning are present in childhood and adulthood, no studies, as yet, have shown such differences in infancy. In the present study we explored whether we could detect SES differences in 3-month old infants' differential vocal responsiveness to mother vs. stranger (DVR), a behavior that has previously been found to correlate with later verbal-cognitive and academic functioning (Roe, 1978; Roe, McClure & Roe, 1982).

Another objective of the study was to explore whether 3-month old infants 'DVR relates to any environmental variables such as the mother's behaviors towards the infant during naturalistic conditions, the mother's statement as to whether the baby was planned or not and the infant's exposure to excessive auditory stimulation such as loud radio and/or TV. Finally, a secondary objective of the study was to explore whether there are SES differences in the above environmental variables.

The subjects were 34 normal, full-term, first-born American infants whose parents came from a wide range of socio-economic background. The subjects were divided into two groups, depending on the educational level of the mothers. Thirteen of the subjects, whose mothers' had at least 14 years of education, constituted the "High Education Group" while the 21 remaining subjects whose mothers had less than 13 years of education constituted the "Low Education Group". The parents of 27 subjects were white while the parents of 7 subjects (all

belonging to the Low Education Group) were black. Twenty-seven of the subjects came from married parents whereas 7 subjects (6 belonging to the Low Education Group and 1 to the High Education Group) ame from unmarried mothers.

When the subjects were three months old a female experimenter visited them in their home where the mother and then the stranger each talked to the baby for three minutes in a face-to-face fashion. The infants' vocal responses during these sessions were tape-recorded and subsequently an independent coder listened to the tapes and assigned a DVR score to each infant by subtracting the time that it spent in non-distress vocalizing during the three-minute interaction with the stranger from the time that it spent in non-distress vocalizing during the three-minute interaction with the mother. Subsequently the mother and the infant were observed during 30 minutes of naturalistic conditions. During this time the following mother-infant behaviors were recorded every 10-second intervals: mother-infant eye-contact; mother-infant mutual smiling; mother touching infant affectionately; mother kissing infant; mother rocking infant; mother offering toy to infant and mother holding infant. All sounds occuring during this time were also tape-recorded and subsequently an independent coder listened to the tape-recorded sounds and coded the amount of time that the mother spent talking to her infant and whether the TV or radio was on during the 30-minute naturalistic session. Finally, the mother was asked if her baby was planned or not.

Table 1 shows the means and standard deviations of the

infants' vocal responses in seconds during the baseline observations and during their interactions with their mother and the stranger as well as the mean and standard deviation of their DVR scores. As can be seen, infants of mothers with higher education had significantly higher DVR scores than infants of mothers with lower education (t = 2.26, df = 32, $p < .02$). This significant difference remained robust even when the DVR scores of the 7 black infants were excluded from the analysis (t = 2.24, df = 25, $p < .02$). Finally, there was no difference between the DVR scores of the black subjects from the DVR scores of the Low Education white subjects.

There was no difference between the mother-infant interactions of the high vs. the low education mothers during the naturalistic conditions and neither was there any relationship between infants' DVR and maternal behaviors except maternal vocal stimulation. This was found to relate with DVR in a curvilinear fashion (χ^2 = 5.90, df = 2, $p < .05$), in that low DVR was associated with both too little and too much maternal vocal stimulation whereas high DVR was associated with a moderate amount of maternal vocal stimulation (Roe, Roe, Drivas & Bronstein, 1986).

Regarding infants' exposure to T.V., there were significant SES differences ($p < .02$). While only one high education mother had TV on (8% of the high education sample), 10 low education mothers (45% of the sample) had it on loudly during the 30-minute naturalistic session. Furthermore, there was a striking relationship between infants' DVR scores and exposure to TV. Infants were classified as to whether they had positive DVR

(talking more in response to the mother than the stranger) or negative DVR (talking the same amount to both mother and stranger or talking more to the stranger). When a 2 X 2 chi square test was computed where one of the factors was the infants' positive vs. negative DVR and the other factor was T.V. on vs.T.V. off, it yielded a χ^2 = 17.72, df = 1, p < .001, T.V. on being associated with lower DVR scores.This association remained significant even when we used only the subjects of the low education group (χ^2 = 3.83, p < .05).

Comparing the responses of the high vs. the low education mothers as to whether their baby was planned or not, it became apparent that a significantly higher percentage of high education than low education mothers said their baby was planned (85% for high vs. 32% for low education), p < .01, and while there was no significant association between infants' DVR and "planned" status, there was a significant association between "planned" status and whether the mothers had TV on during the naturalistic sessions. Planned babies were exposed significantly less to TV than unplanned babies (χ^2 = 6.58, df = 1, p < .02). This finding remained significant even when we used only the low education subjects (χ^2 = 3.23, df = 1, p < .06). Finally, it was found that planned babies had mothers who talked to them a moderate amount whereas unplanned babies had mothers who either talked to them too much or too little (χ^2 = 3.75, df = 1, p < .06.

The results show that SES differences in cognitive processing, as measured by a vocal and language- relevant infant behavior, can be detected very early in life. It has previously

been shown (Roe, Drivas, Karagellis & Roe, 1984) that 3-month olds' DVR is influenced by early environmental factors. The present findings of the association of DVR with maternal vocal stimulation and with exposure to T.V. support this notion. Yet, it is unclear at this point whether the critical variable for DVR is quantity of stimulation or the quality of the mother-infant relationship. The finding that only mothers with "unplanned", low DVR, infants expose their babies to excessive T.V., suggests that maternal feelings towards the baby certainly play an important role. The most plausible exlanation of the SES differences in DVR is that low SES mothers, not having their babies planned, do not have as positive a relationship with their infants as high SES mothers. If this is so, these mothers may not be as sensitive towards their infants' needs as high SES mothers. As a result, they either ignore their infants (talk to them too little), or expose them to noxious stimulation such as excessive talking or excessive exposure to T.V., either of which may affect their cognitive processing.

Another possible explanation of the SES differences in DVR is that low SES mothers do not have as positive a relationship with their infants as high SES mothers and this subtly permeates all mother-infant interactions and behaviors and also affects the infants' DVR. If this is the case, the association between DVR and maternal vocal stimulation and exposure to excessive T.V. is not the cause in itself of the low DVR but rather a sign of the quality of the mother-infant relationship.

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TABLE 1

Infant Vocal Output in Seconds

	Infants of High Education Mothers			Infants of Low Education Mothers		
Condition	n	M	SD	n	M	SD
	13			22		
Baseline		13.7	18.2		8.5	12.9
Stimulated by mother		28.7	27.1		20.1	20.0
Stimulated by stranger		16.0	14.2		19.4	21.8
DVR		12.7*	18.4		0.7*	14.2

*$p < .02$