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AUTHOR Brazelton, T. Berry
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ABSTRACT

Parents are prepared for their roles with the new infant during pregnancy, the anxiety and turmoil serving as a source of energy for reorienting them to their new roles. The individuality of the neonate then shapes their responses to him and essentially creates an environment which is suitable to his particular needs. Rather than being at the mercy of the environment, the kind of infants a culture produces may perpetuate the culture and its outcome. The powerful intrauterine experiences of malnutrition, infection, and uterine depletion can seriously affect the genotype as it is reflected in neonatal behavior. When the mother can respond with expectation for his recovery, and when proper nutrition can be provided in the neonatal period, the infant is more likely to live up to his genetic potential. When the extrauterine environment does not provide necessary nutrients and parents cannot respond to their psychological needs, the cycle of poverty and malnutrition must reproduce itself via infants who will be impaired somatically as well as psychologically. (Author)

Effect of Maternal Expectations on Early Infant Behavior

T. Berry Brazelton, M.D.*

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*Clinical Assistant Professor, Harvard Medical School; Research Associate, Center for Cognitive Studies, Harvard University. Address: 51 Brattle Street, Cambridge, Massachusetts 02138

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I would like to share with you some insights and some questions which have derived from cross-cultural research, and which seem to bear on the issues of infants and their parents at risk in our country. Cross-cultural work gives us an opportunity to see "natural experiments" without the constraints of manipulating people, and with an opportunity for seeing the strengths of a society as well as its differences from our own.

Having come to the study of neonates by way of pediatric practice and psychoanalytic research on mother-infant interaction at the Putnam Children's Center, I became aware of the powerful influence of the individuality of the new infant in shaping his environment. In the early fifties, when most of our research was aimed at understanding the environmental forces which produced pathology in childhood, we were struck with the importance of seeing this pathology as the result of an interaction between the child and his environment. It appeared to be vitally important to understand why parents could function well with one kind of infant, but not with another. This led me to try to understand the kinds of equipment which each member of the mother-infant dyad brought to their interaction. (I do not mean to exclude the father and other siblings, nor the extended family, for all of these people are of vital importance to the dyad of which we shall speak. But for simplicity's sake, I shall speak here of mothers and infants.) In the past three years I have had an opportunity at the

Harvard Center for Cognitive Studies with Jerome Bruner to begin a detailed analysis of the "language" of such an interaction. (Brazelton et al. 1971 A) In this process I have become even more impressed with the power of such a dyadic interaction itself, and the importance of not analyzing each member as if he were an independent actor--independent of the effects of the interaction.

I felt that the earliest observable behavior of mothers and infants might be a clue to the influence each member of the dyad might have on the other. We found in our research at Putnam Children's Center that the prenatal interviews with normal primiparas, in a psychoanalytic interview setting uncovered anxiety which often seemed to be of what appeared to be pathological proportions. (Brazelton, 1963) The unconscious material was so loaded and so distorted, so near the surface, that before delivery one felt an ominous direction for making a prediction about the woman's capacity to adjust to the role of mothering. And yet when we saw her in action as a mother, this very anxiety and the distorted unconscious material could become a force for reorganization, for readjustment to her important new role. I began to feel that much of the prenatal anxiety and distortion of fantasy could be a healthy mechanism for bringing her out of the old homeostasis which she had achieved to a new level of adjustment. The "alarm reaction" we were tapping in on was serving as a kind of "shock" treatment for reorganization to her new role. I do agree with Bowlby's concept of attachment and of the necessity for a kind of "imprinting" of the mother on the new infant. (Bowlby, 1969) I now see the shakeup in pregnancy as readying the circuits for new attachments, as preparation for the many

choices which they must be ready to make in a very short critical period, as a method of freeing her circuits for a kind of sensitivity to the infant and his individual reauirements which might not have been easily or otherwise available from her earlier adjustment. Thus, this very emotional turmoil of pregnancy and that in the neonatal period can be seen as a positive force for the mother's adjustment and for the possibility of providing a more individualized environment for the infant. (Brazelton, 1963).

Prospective fathers must be going through a very similar kind of turmoil and readjustment. In an ideal situation we might be offering both of them a lot more support and fuel for their new roles than we do. So far, we in medicine have not done well in substituting for the extended family in this earliest period in our country.

As we began in the early 1950's to attempt to document and understand neonatal behavior, very powerful mechanisms seemed to dominate the neonate's behavior. (Brazelton, 1962) In the tremendous physiological realignment that the changeover from intrauterine to extrauterine existence demanded, it has always amazed me that there was any room for individualized responses, for alerting and stimulus-seeking or for behavior which indicates a kind of processing of information in the neonate. And yet there is. Despite the fact that his major job is that of achieving homeostasis in the face of enormous onslaughts from his environment, we can see precursors for affective and cognitive responses in the immediate period after delivery. The two most

exciting behavioral responses which can be observed reflect the strength of the neonate's capacity to control, and then to selectively interact with, his environment. Since he might otherwise be at the mercy of a response to every stimulus he is equipped with the capacity to shut out or habituate to repeated stimulation which is disturbing. We exposed neonates to a disturbing visual (bright operating room light) stimulus placed at a distance of 24 inches from their heads. The infants were lightly swaddled and resting quietly. The light stimulus was on for 3 seconds, off for one minute, for 20 stimuli. Monitored for cardiac, respiratory and EEG changes, we saw infants respond at first with behavioral startles which decreased rapidly after a few stimulus periods. By the tenth stimulus, no behavioral, cardiac or respiratory change could be noted. By the fifteenth stimulus, sleep spindles appeared on the EEG tracing although their occipital leads continued to demonstrate reception of the visual stimulus. After twenty stimuli, they awoke from this "induced" sleep to scream and thrash. We felt this represented the marvelous capacity of the neonate to use changing state to control responses to a disturbing stimulus. Certainly he is no longer at the mercy of the environment. Because of this capacity to shut out responses to stimuli which might otherwise overwhelm him, he can select and attend to stimuli with rather narrowly determined properties (for example, a neonate alerts and attends to a female voice in preference to a male voice) (Birns, 1965, Eisenberg, 1969; Korner, 1971) He prefers an ovoid stimulus and a human face to a distorted face, and will stare at it for surprisingly long periods immediately after delivery - long before he has had experience of mothering. (Stechler et al., 1966) He is set

up with pathways for attention and, then, complex reactions to appropriate stimuli at birth. There is evidence that individual differences affect the narrow range of stimuli which call out this attention. (Birns, 1965; Korner, 1971; White, 1968) These mechanisms set the stage for individual differences in infants--individual in their capacity to receive and shut out, and then individual in their ability to demonstrate responsive behavior to which the environment can respond with appropriate attachment behavior. Mothers who are responsive to these individualized responses shape their own reactions to account for them in their new babies. Thus, the individual infant's ability to imprint to a particular set of stimuli will set the tone of the mother-infant interaction in the neonatal period.

In order to study the effects of such an interaction, I felt the need to free myself of the white middle class judgments with which I was blinded. I found I was judging certain behavior in mother and infant as "good", others as "bad", which was leading to a self-perpetuating kind of research tool. In order to try to free myself of this kind of prejudice, I began to seek an opportunity to study the early mother-infant adjustment in other cultures.

My first opportunity was with Professor Evon Vogt and his Harvard anthropologists in Southern Mexico. We were able to study an isolated group of Mayan Indians in the Chiapas Highlands. (Vogt, 1966) This was a strong, well-balanced group called the Zinacantecos who had managed to defend themselves for six hundred years from acculturating invasions of the ladino society around them, the Catholic Church, and now modern

medicine and the Harvard and Stanford anthropologists. They were a pure genotype, were well nourished (we believed), as they were seen to eat protein two or three times a week, and had achieved what appeared to be a successful way of life in which they raised their own food, still using a hand plow, maintained their own curers and midwives, had a strong patrilineal society based on extended families. Their beliefs in the "evil eye" and in their own religion and customs preserved their integrity as a culture. The emphasis in this culture was on equality, not on individuality, and all speech, dress, and ceremony was highly ritualized and structured. Overt aggression was not a factor in their lives--even a drunken adult regressed to an infantile level, not to an aggressive one. The children were expected to take adult roles in early childhood, and they learned by imitation in hunks of behavior. For example, at eight months, infants to whom we were administrating Bayley developmental scales (Bayley, 1969) watched the two red cubes which we presented to them. Their eyes, mouths, and entire bodies stretched eagerly toward the cubes, but there was no reaching for them with hands. After we demonstrated the test by reaching for a cube with one hand, reaching for the other with a second hand and banging them together, the Zinacanteco infant imitated our "hunk" of behavior precisely, then replaced the cubes without further exploration. They had absorbed our demonstration visually, had reconstructed it immediately and precisely without the exploratory experimentation which we deem necessary for skilled behavior in our infants. (Brazelton et al., 1969) The economy of such imitative learning and the lack of exploration that went into it is also exemplified by the non-existence of tantrums and rebellious behavior, and by such things as a 4 year old who could imitate his

father's hoeing in the fields for a 4 hour stretch.

We had chosen these people for the pure genotype, the lack of acculturation, the apparent protein adequacy in their diets, and, most fortunately of all, for the major asset of having an "in" through the anthropologists who knew them so well, and had worked with them for 16 years. (Vogt, 1966) Despite this latter advantage, we were only able to see their newborns (who are always the most vulnerable part of any society) because of a rather magical trigger which occurred when I was at the peak of my frustration after the first two weeks of being shut out of their households. I was attempting to play with a 5 month old baby, but the mother turned to place herself between us and to cover his face. I asked by interpreter to tell her I was a curer in our culture, to which she nodded, saying she knew that already. "And, I added, "if I have the evil eye, I know how to cure it". With that, her eyes widened, and she handed her baby over to me. My reputation as a curer rapidly spread and we were able to see deliveries and newborns, whom no one else had been able to see. This kind of magical thinking carries its own defensive protection! I learned a great deal from that experience about the importance of learning at all levels the "language" of people with whom one wants to communicate.

But what did their special kind of infants contribute to this culture? Birth was easy. No medication, no ingestion of any depressant or anesthesia was used. It was truly a natural childbirth. The neonates in Zinacantan were very different from any group we have seen. They were tiny (5 pounds), but very mature in appearance, not dysmature or post

mature. Their faces and bone structure were Oriental and the behavior I shall describe has also been found in a group of Chinese-Americans in San Francisco by the Freedmans (1969). Their movements were smooth, circular, and very mature, free in arc of movement as well as in flexor-extensor balance. There were virtually no startles, tonic neck reflexes, or Moros which interfered with this liquid motor activity. They lay for 30 minutes after delivery, undressed in front of the fire, while rituals were performed over them. In our U.S. culture, the movements would have been interspersed with jerky, startle behavior. Also, our infants would not have been able to control their body temperature while undressed; as their temperature dropped, they would have shivered or cried to raise body heat. The autonomic stability demonstrated by these infants was very strikingly different from our neonates. While the Zinacanteco infants lay exposed, they attended repeatedly to auditory cues, and followed a visual stimulus in slow 180-degree arcs, with head turning to follow, for as much as 90 seconds at a time (our infants can and will follow for as much as 30 seconds without a break). These quiet, alert babies were then swaddled, their faces covered, and wrapped up with their mothers for a month. After an initial month of being taken care of by her own extended family, the infant's mother carried him on her back in a serape all day, and slept next to him at night. He was never played with, placed out on a bed to be talked to, or given toys to jazz him up. Before he could awaken and cry for hunger, he was fed. The 30 to 40 feedings a day seemed to be aimed at keeping him quiet, as opposed to our U.S. practice of allowing for a cycle of hunger, realization of it, the infant's response of crying, being fed, and realization

that his crying had produced the response from his environment which ended with satisfaction. This cycle must produce a sense of independent mastery in an infant; that of the Zinacantecos seems to generate quiet conformity and the habit of low-grade peaks of excitement. We did not feel that the quiet infants we saw were affected by clinical anemia or malnutrition, but the size of the infants and the 30 percent infant mortality rate point to subclinical levels of protein malnutrition. We saw optimal neonatal behavior which was followed by infant development parallel in quantity to ours, but very different in its quality. (Brazelton et al., 1969) Our question, of course, was how much did these quiet, alert infants influence their culture and its child-rearing practices to allow for the kind of expectation parents demonstrated--or for a 5 year old to tell you, without ever looking up, what kind of bird flew over and in what direction he flew?

We went to East Africa in the summer of 1970 to attempt to evaluate neonates at what we thought might be the other end of a spectrum of behavior. We had been influenced in our thinking by Geber and Dean (1959) who pointed to motor precocity in Ugandan neonates. We were not able to assess the sensory, cognitive responses in neonates from their work, nor obtain from any African neonatal studies any clues as to the range of their cognitive or affective responses at birth. We were able to see neonates in Lusaka, Zambia, in a lying-in hospital setting. (Brazelton et al., 1971) These infants were the offspring of a group of urbanizing Blacks who were coming to Lusaka from the surrounding bush, or escaping from South Africa. In the process of urbanizing, they not only were forced to live in slum-like cities all

around the prosperous city of Lusaka, but they gave up old protective taboos for new ones which created poor conditions for the infants we saw. In the bush, the grandmother passed on the customs and advised her pregnant daughter to eat protein. In the city, although protein is not expensive or particularly difficult to come by, the young father prefers to have his money for beer and he says, "If you eat meat, your baby will bleed. If you eat an egg, he'll be bald. If you eat fish, he will drown." (Goldberg, 1971) In the bush, the husband has several wives, and it is the custom to sleep with one who is not pregnant or nursing her new baby. In Lusaka, he can afford but one wife, and she has a pregnancy every twelve months on the average (though fortunately not all of them are viable). Her uterus quickly becomes depleted. The neonates we saw were all less than 24 hours old when we examined them, since a mother will not stay in the hospital longer than that. They were not at all what we expected from reports we had read. Their births were "natural" also, without medication or anesthesia. They were 6 pounds at birth, 19 inches in length; they were not immature, but did show evidence of dysmaturity--dry scaling skin, poor subcutaneous fat stores, yellowing cord stumps--all pointing to some recent intrauterine depletion (as if the placenta had been inadequate in the last month). They were limp, poorly responsive, fragile-appearing neonates. We handled them with great care, and were stunned by their physiological state and their psychological unresponsiveness. The mothers breast fed them frequently and tended them in the nursery from the first. They came in to take them home within 24 hours after delivery. A mother would pick up the limp, wobbly infant, set him on her hips to sit upright,

wind a dashiki around hers and the infant's waists, leaving the infant's shoulders and head unsupported. The floppy infant would respond by adjusting his head, and straightening his back and shoulders to her body, as she walked off to her village with him upright on her hip. By her expectation of his capacity to respond, she had changed him from a floppy, fragile neonate to one who was effectively supporting his shoulders and head as she walked along. By the time we made home visits at 5 days, her milk had come in. The infant was hydrated, his skin no longer dry, and his subcutaneous tissue stores were restored, and upon testing he had the vigor and alertness we see in control infants in our own culture at 5 days. By 10 days these neonates were ahead of our controls in visual responses, in alerting to voice and handling, in motor adjustments, in maintaining alert states, and were demonstrating an exciting quality of motor response which we have labeled "directed" for want of a better term. We saw two 5 month old infants who took several steps without support. This 5 month walking was in response to their grandmothers' stimulating their walk reflexes and propelling them forward to a reflex walking response. Ainsworth (1967) describes the kind of constant motor and postural interaction that Ugandan mothers provide for their infants. The infants' experiences were certainly different from those we had seen in Mexico. Their faces were always uncovered, usually they were carried where they could look up at their mothers from her hip, or placed on her back to look around, and they were played with by every member of the extended family. Their early experiences were surely shaping them in a different direction from our Mayan infants.

We felt we had seen neonatal behavior which was powerfully shaped by

intrauterine experience--from depleted uteri, from protein and caloric malnutrition, from intrauterine infection. But the expectation of their mothers generated responses which we had not dared to produce in these depleted neonates. This expectation, coupled with their inborn potential, served to produce the exciting sensory and motor precocity which surfaced with adequate breast milk and rehydration. In our neonatal evaluation, there were nine of twenty behaviors which were significantly different from a U.S. control group by 10 days - social interest in examiner, alertness, visual following - all were higher; tempo of movement, rapidity of build-up, irritability, amount of activity were lower; quieting with intervention, and self-consolability were also better in the African infants.

Figure 1

Mean Scores on Measures for African & American Infants

(9 point scale)

	Africans			Americans		
Neonatal Days	1	5	10	1	5	10
Alertness	3.4	6.3	7.4	4.2	4.8	4.3
Social Interest	4.2	6.2	6.7	4.2	5.0	3.6
Visual Tracking	2.4	4.6	4.6	4.7	4.7	5.0
Tempo	3.2	5.9	4.4	5.3	5.8	6.3
Activity	3.0	5.8	4.6	5.1	5.6	5.8
Rapidity of Buildup	3.2	5.6	3.5	5.7	4.8	5.7
Irritability	2.5	4.4	3.8	5.0	5.5	5.0
Self-quieting	6.3	4.8	5.5	4.3	4.1	4.5
Quiet with Intervention	6.6	5.0	6.2	5.1	4.3	3.6

The motor and sensory precocity we saw persisted throughout the first year, and was present in the older infants we observed.

The lesson to me from these observations in Africa was that in a place where mothers still had enough physical energy for the kind of interaction and expectation that we saw in the Zambian mothers, infants could and did respond. The black mothers in Lusaka were straight, dignified, and caring about themselves in a depressing set of surroundings. They were able to convey this to their depleted infants, who responded with postural and motor response with the vigor that was necessary to perpetuate the interaction. To contrast this group, we have studied a group of nutritionally stressed ladinos in Guatemala, with INCAP.* This group produces neonates who are immature, short in length, and dysmature at full term gestation. These infants reflect chronic malnutrition of the mothers and intrauterine protein-calorie deprivation of the fetuses throughout pregnancy. The behavior of the neonates was similar to the Mexican-Mayan group, and their genotype is probably comparable, but their intrauterine conditions are not. In addition, these Guatemalan infants enter a depleted environment with a mother who is too stressed, too nutritionally depleted herself to be able to rise to an expectation for recovery in her baby. The cycle of maternal malnutrition, physiological depletion and CNS depression in the infant, with less recovery in physiological or psychological parameters in the infant, makes for a much more hopeless situation for infancy in Guatemala.

* Institute de Nutrition de Centro America y Panama, Guatemala City, Guatemala

That there are only a small proportion of infants who end up with clinical maramus and qwashiorkor is the miracle. It seems possible now to predict from neonatal evaluations (Brazelton, 1971 B) which infant of an overstressed household is predilected for these devastating diseases--the quiet, poorly responsive neonate (whose intrauterine depletion has contributed to such behavior).

Poverty reproduces itself with hopelessness from one generation to another. In Africa in the face of a potential for a hopeless cycle, the excitement which became obvious to us as a mother and her infant interacted with each other is self-perpetuating. We felt that there is a kind of reparability in the excitement from this relationship which can surmount tremendous obstacles--even those of poverty and ignorance.

Summary

Parents are prepared for their roles with the new infant during pregnancy, the anxiety and turmoil serving as a source of energy for reorienting them to their new roles. The individuality of the neonate then shapes their responses to him and essentially creates an environment which is suitable to his particular needs. Rather than being at the mercy of the environment, the kind of infants a culture produces may perpetuate the culture and its outcome. But the powerful intrauterine experiences of malnutrition, infection, and uterine depletion can seriously affect the genotype as it is reflected in neonatal behavior. When the mother can respond with expectation for his recovery, and when proper nutrition can be provided in the neonatal period, the infant is more likely to

live up to his genetic potential. When the extrauterine environment does not provide necessary nutrients and parents cannot respond to their psychological needs, the cycle of poverty and malnutrition must reproduce itself via infants who will be impaired - somatically, as well as psychologically.

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