

Babies are not What We Thought: Call for a New Paradigm*

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Full Text: Headnote ABSTRACT: Babies are not what we thought they were in the 19th century or even twenty five years ago. Abundant new findings from experimental research, psychotherapy, and anecdotal reports have rendered traditional views of human development obsolete, yet many obstetricians and psychologists continue to view babies in 19th century terms. The author summarizes this view and its failings and assembles the evidence for a new paradigm that babies, of whatever age, are aware, expressive, and affected by their interactions with others. INTRODUCTION Babies are not what we thought they were in the 19th century or even what we thought they were twenty five years ago. During the 20th century while medicine was learning more about baby bodies, psychology was learning about their minds. The results have been surprising. The findings of psychology are so revolutionary that virtually everything we believed a quarter century ago has been discredited and a new encyclopedia of knowledge has been written about the senses, perception, cognition, communication, and personality of babies, both newborn and unborn.^{1,2,3,4} The implications of this revolution are especially important for everyone who has a role in bringing babies into the world: parents, childbirth educators, midwives, nurses, neonatologists, obstetricians, and pediatricians. What concerns me deeply is that medical belief and practice has not kept pace with these psychological discoveries and, if there are no major steps ahead in the next few years, obstetrics is in danger of marching straight into the 21st century with a 19th century view of infants. THE 19TH CENTURY PARADIGM In retrospect, the 19th century view of infants was based on a maximum of speculation and minimum of research. Important theorists like Sigmund Freud and Jean Piaget had minimal contact with babies and knew almost nothing about life before birth. Scientists knew a century ago that the brains of babies were small and undeveloped; they could see how poorly coordinated the motor system was and believed that babies could not organize themselves, control behavior, or attach meaning to experience. On this basis, pain and suffering were impossible, violent reactions were only "reflexes," and smiles and other facial expressions were "artifacts." Baby cries were not genuine communication signals and were not respected. When surgery was necessary, babies were paralyzed but given no anesthesia because they could not possibly remember the experience and anesthetics might do more harm than raw surgery. Doctors counted heavily on the fact that whatever they did to babies at birth or before birth would effect their physical bodies and nothing more. When male physicians took control of birth between 1880 and 1930 they brought these 19th century ideas with them. Therefore, it is no accident that the routines invented for hospital birth turned out to be painful for babies. Even the dramatic reactions to male circumcision were dismissed as something impersonal. Doctors separated babies from their mothers no matter how hard they cried or how hungry they became; babies got bottles instead of breasts, nurses instead of mothers and fathers, and group care rather than the individual care normally given by parents. For a half century now, newborns have been greeted with painful injections, skin punctures, refrigerated air, dazzling lights, stinging eye medication, were slapped to get an Apgar score, straightened out for body measurements, and had their heels lanced for blood samples. While waiting in the birth canal, some babies had their scalps pierced with electrodes. Back when no one could see into the womb, it was considered a safe place, the placenta a magic protective barrier. Inside, the fetus was considered deaf and dumb. Outside, the newborn was considered blind and senseless, belonged in a nursery in the hospital or at home, and needed sleep more than anything else. In this old paradigm the body was everything; there was no mind. Experience did not accumulate because memory and learning were impossible, and communication to or from babies was unexpected. You will recognize that many of these 19th

century ideas are alive and well today, almost a hundred years later. Let us hope they are not carried into the 21st century. Present misunderstandings about babies are founded on both ancient myths and modern scientific prejudices. The latter, which concern me in this paper, are focused mainly on how the body and brain develop from conception to birth. In the old view, development proceeded from simple to complex forms, single systems to integrated systems. The early brain was "primitive," the later brain "sophisticated" but not yet mature at birth. Structures would have to be in place before they could function, and these structures were determined by genetics, not experience. If any of the special senses were in evidence, they would not work until "wired" into the cortex some time after birth. This was the old paradigm of human development. Over the last quarter century, research has been dismantling this rickety framework piece by piece. Briefly summarizing, development can no longer be described as progressing from simple to complex, or from single systems to integrated systems.^{5,6} More and more functions are found to be complex at the beginning; a growing list of behaviors are labeled innate. Early brain parts are, in fact, capable of sophisticated activity and begin to function without waiting for other parts to develop.^{7,8} Organs begin to function while still under construction (e.g. the heart). Experience can profoundly alter development, as in sexual development.^{9,10} Some special senses start functioning early in gestation and are intermodal rather than separate.^{11,12} The fetus is not deaf. Hearing is actually a primary mode of communication and learning in utero and is adult-like at birth. A baby is not a "bundle of reflexes" or born into a state of "normal autism."¹³ And-most important from a humanitarian viewpoint-the receptors for pain (nociceptors) are in place long before birth.^{14,15} In retrospect, the old paradigm was negative and discouraging; it gave us no basis to celebrate the sensitivity, emotionality, personality, or cognitive genius of babies, left no room for amazing feats or inspiring gazes. The old paradigm was cruel to infants and failed to alert parents and professionals to their surprising intelligence. THE NEW VIEW OF BABIES A new paradigm has been taking shape gradually and with typical reluctance over the last thirty years.^{16,17,18,19} If the real nature of babies is finally recognized it will be because of the explosive growth of psychology (especially into the areas of mind and consciousness) and the emergence of new technologies like intrauterine photography,²⁰ sonography,²¹ and radioimmunoassay^{7,8} which have allowed us an intimate look at human development. In an age of specialization, no single discipline has seen and described the whole infant. I do not see a new paradigm about infants being heralded in nursing, midwifery, childbirth education, obstetrics, developmental psychology, child psychiatry, or psychoanalysis. The formation of a new global vision of infancy calling for a paradigm shift may fall to those working in pre- and perinatal psychology, a broad, interdisciplinary field which gathers data from all sources.^{1,4,19} A new paradigm, in my opinion, should be firmly based on three kinds of data, each representing an important part of the whole picture: (1) rigorous experimental research^{4,22,23} (2) clinical findings^{24,25,26} (3) anecdotal records of personal experience.^{27,28,29} (Anecdotal and clinical data are at the leading edge, providing breakthroughs which are verified or clarified by systematic experimentation many years later.) In my view, abundant data from these sources permit us to confidently describe the new "baby." Different words could be used that are equally valid, of course-and I encourage you to find your own-but I would like to offer this simple statement incorporating what we now know about babies: Babies, of whatever age, are aware, expressive, and affected by their interactions with us. These traits are not mutually exclusive; they overlap and support each other. They imply an early sense of self,³⁰ which is a sharp departure from past theories which placed selfhood and mental activity "late in the second year."^{31,32} Such an idea is completely incompatible with the current literature on learning in utero and at birth.^{4,19,146} Awareness, expressiveness, and learning from interaction may not be "developmental" in the old sense because these behaviors can be noted across the whole range of development; we should probably accept them as normal aspects of human consciousness. Let me suggest, if only in sketchy form, how these qualities have been documented. Babies Are Aware Tactile sensitivity begins in the seventh week (g.a.) and steadily enlarges to include most parts of the body by seventeen weeks and all parts by thirty-two weeks.^{14,21} The sense of taste blossoms and functions around fourteen weeks^{33,34} and taste buds seem to act like microprocessors.³⁵ Hearing may begin early in the first

trimester³⁶ or as late as eighteen weeks^{37,38} opening up a primary channel for learning and communication through most of pregnancy.^{39,40} The vestibular system for orientation to space and gravity must be well advanced by twelve weeks in order to play its part in the elaborate program of physical exercise which can be seen via ultrasound at that time.⁴¹ By the time of birth, awareness has grown to include a keen sense of smell.^{42,43} The fetus is aware of light even while the eyelids are still fused (i.e., from week 10-26) and will react to lights flashed on the abdomen.^{44,45} In utero, vivid awareness is expressed in a range of emotional reactions: during parental intercourse,^{46,47} erections while thumb-sucking,⁴⁸ cries in reaction to therapeutic abortion recorded as early as twenty-one weeks¹⁴ kicking violently at loud concerts and frightening movies⁴⁹ and by "squalling in the womb" in reaction to obstetrical maneuvers close to the time of birth.^{50,51} (This view of early emotion obviously differs from the view that emotions begin sometime after birth.)⁵² Also in utero, babies react to hot or cold infusions,⁴⁵ sweet or bitter tastes,^{45,63} cease fetal breathing in reaction to vodka⁵⁴ and languish in a noisy environment.⁵⁵ Out of the womb, but still premature, they notice and react differently⁵⁶ to their bedding. Babies seem to know when they are unwanted. Longitudinal studies in Europe of children born to parents who were denied abortions illustrate how profoundly and consistently these children were damaged.⁶⁷ A recent longitudinal study in Sweden traces the ill effects of being the "wrong" sex.⁶⁸ Both of these are familiar themes in psychotherapy. Awareness is required for the discriminative learning which takes place in utero, for example, the learning of music,^{59,60} stories,^{40,61} and language.^{36,39} Beyond language and voice recognition, some infants demonstrate telepathic^{82,63} awareness of their mother's thoughts and feelings. After birth, evidence of awareness is much easier to obtain and is abundant. Newborns are fully sensitive and sentient. A mature sense of smell^{42,43} joins the already developed faculties of taste and hearing. In addition, new visual resources permit the newborn to focus on objects in close range, scan the environment day and night,⁶⁴ detect patterns, track movement, and see in color.⁶⁵ Babies have depth-perception,^{66,67} reach out with intention,^{68,69} and demonstrate visual recognition memory, a benchmark of intelligence.^{70,71} Discriminative awareness is seen in the rapid learning of mother's face,^{72,73} voice,^{40,61} odors,^{74,75} body contours,⁷⁶ and day/night cycles.⁷⁷ Similarly, newborns listen differentially to various cry sounds, favoring human cries of babies their own age.^{78,79} Clear recognition of their own personal cries is evidence of self-awareness.⁸⁰ Babies Are Expressive People often complain that babies have no language and cannot participate in meaningful communication. This overlooks the fact that babies speak a number of "universal" languages about as well as we do.⁴ These include especially body language in the form of movement, facial expressions, hand and finger signals, leg kicks, and a full range of vocal signals. Newborns are famous for their noises, screams, whimpers, whistles, whines, burps, coughs, sneezes, and grunts. You can also hear pleasurable coos, hums, sighs, and on rare occasions, a laugh. Movements and sounds carry information. Modern ultrasound shows us how soon the fetus goes into action moving all parts of the body in a voluntary (not reactive), spontaneous (not stereotyped), and graceful (not reflexive) way.^{41,81} This is a continuous form of body language with rolls, head-turning, waving, kicking, flexing the back, neck, and feet for up to seven minutes at a stretch. This self-initiated activity continues, with brief rest periods and as space permits, from the twelfth week on through gestation.⁸² Fingers (which will play such a big part in communication later) are busy playing with the mouth and umbilical cord.⁸³ Hand positions at birth are revealing, especially the clenched fist.⁸⁴ By twenty-six weeks the fetus has accomplished a ballet-like longitudinal roll.⁴⁵ This trick is added to somersaults and other kinesthetic activities learned in the aquatic environment. When it comes to kicking and squirming it may express a preference for the music that is playing,^{49,86,86} resentment of a bright light aimed at the womb,^{44,46} or be a perfectly friendly response to a "Kick Game" being encouraged by parents.⁸⁷ Probably the first evidence of emotion can be seen in squinting and scowling around twelve weeks (g.a.) and a sneer-like dissatisfaction at fourteen weeks.¹⁴ After birth, of course, we have many more opportunities to observe facial expressions. Mothers and fathers have reported seeing these expressions: interest and joy (noted by 95%), anger (78%), distress (65%), surprise (68%), sadness and disgust (40%).^{88,89} Emotion is another one of the

baby's "universal" languages. Researchers have filmed babies going from pleasure to rage in 30 seconds.⁹⁰ Baby faces can instantly mimic adult emotional faces expressing sadness, happiness, and surprise.^{91,92} Another time to see a range of baby feelings is while they are asleep and dreaming.⁹³ Observers report seeing looks of perplexity, disdain, and fright along with writhing movements of the torso, limbs, and digits as if having bad dreams. They also see smiles and looks of mild amusement, as in pleasant dreams. Premature babies dream more than anybody else and show the most smiles in their dreams, along with frowns, writhing finger movements, neck stretches, mouth movements, and vocalizations.⁹⁴ We have learned from ultrasound that the beginning of REM/dreaming activity is at twenty-three weeks,⁹⁶ meaning that this form of creative expression continues for up to seventeen weeks in utero. (Note that dreaming is creative, cognitive activity generated at an unconscious level and probably incorporates elements of fetal experience to date.) Baby faces tell us that their reactions to tastes and smells are about the same as ours.^{42,43,96} The expressions babies are most famous for are their cries, which begin much earlier than expected, in fact whenever air is available to the larynx.⁹⁷ As noted previously, audible distress cries have been recorded by at least twenty-one weeks g.a.¹⁴ and squalling in the womb itself, usually provoked by obstetrical maneuvers, can be heard before birth.^{50,61} The range of cries uttered after birth reveal many things including fear, hunger, boredom, malnutrition, and a variety of drug-effects and diseases.^{98,99,100,101} Pain cries are dramatic expressions of feeling.^{15,102,103} Babies Are Affected By Their Interactions with Us One of the stubborn myths about babies is that they live in isolated splendor, preoccupied with themselves, and unaffected by experience. In the age of drugs, toxic materials and pollutants we have been forced to recognize that babies in the womb are not only suffering physically from their interactions with us but they are interacting emotionally and mentally as well.¹⁰⁴ And they learn from this interaction. (1) Prenatal Interactions Remarkably, by 7 weeks, beta endorphins (a prime resource for dealing with environmental stress) are already in production.⁸ The rapid development of the vestibular system enables the early fetus to balance and orient itself to the reality of gravity. The burst of physical movement which occurs by twelve weeks is a self-regulated interaction; moves are perfected over time.⁴¹ After fourteen weeks the fetus controls the frequency of swallowing amniotic fluid, a selective (perhaps preferential) process.⁵³ Later, the breathing of amniotic fluid is lowered or halted when alcohol or the toxins associated with cigarette smoking are detected in the blood stream.⁵⁴ These adjustments seem intelligent. Prenates react to medical interventions with accelerated heart activity, turning, or moving away. If any air is available, they may protest from inside or outside the womb.^{50,51} Reactions to amniocentesis are especially revealing: a burst of body movement when struck by the needle,¹⁰⁵ repeatedly striking the needle barrel after being hit (this with eye lids still fused),¹⁰⁶ loss of beat-to-beat variability in heart rate four minutes after puncture and lasting for two minutes,¹⁰⁶ babies motionless for two minutes,¹⁰⁷ breathing significantly slower for two days and in four days still not back to the previous breathing rate.¹⁰⁸ Psychiatric problems have been traced back to a needle hit during amniocentesis.¹ Babies learn from other threatening encounters with us. Abortion attempts, not known by the children, led to annual (anniversary) suicide attempts by several teenagers at the same time of year the abortions had been attempted.¹⁰⁹ A baby born following sexual intercourse immediately developed a "pain complex" requiring psychiatric care.¹¹⁰ Therapists are discovering more cases of the "vanishing twin," where psychological problems trace back to the experience of loss (consciously forgotten) of a twin in utero.¹¹¹ In the womb, interactions are constant and relationships are everything. Babies and mothers eat, sleep, exercise, smoke, get sick, and take drugs together resulting in an intense rapport. If a mother is shot, yet unharmed, the baby may die.¹¹² If a psychotic husband goes on a rampage, the baby and pregnant mother end in distress.¹¹³ Babies inside pregnant mothers going through an earthquake in Southern Italy showed (via ultrasound) intense hyperkinesia which lasted 2-8 hours; their movements were numerous, disordered, and vigorous.¹¹⁴ Mother's emotions of fright even from watching a video can upset babies measurably.¹¹⁵ A mother's chronic depression may have long-term consequences for the baby after birth.¹¹⁶ When babies are awaiting ultrasound for amniocentesis they are more active than when waiting for routine ultrasound.¹¹⁷ A three-year-old child having

spontaneous recall of life in the womb, said he didn't like his mother singing "those low notes" in her folk songs.²⁹ He had protested the sound with increased activity but she misinterpreted his response and did it more! Parents have taught their prenatals to play kicking games with them. One couple found their baby could learn to kick in a circle.⁸⁷ A Canadian father who said "Hoo, hoo!" next to the womb each night found his child pushing with a foot into his cheek on whichever side he called; this happened in the twenty-fifth week of pregnancy.²⁸ Father and baby played this game for fifteen weeks until the pregnancy ended. His next baby was able to learn this same game. In formal experiments prenatals have demonstrated learning by classical conditioning.^{118,119} More often, in experiments using the habituation paradigm prenatals show learning by distinguishing between novel and familiar stimuli.^{120,121,122} (2) Newborns Are Interacting Also Newborns are well-equipped for engagement with depth-perception,⁶⁶ coordination of eye and hand⁶⁹ mouth and hand,¹²³ and sucking-grasping;¹²⁴ they have full tactile sensitivity, and the senses are coordinated and ready for interaction. They will retreat from bright lights, obnoxious odors, unpleasant tastes, and can detect the slightest differences in temperature of things touching the skin.¹²⁵ Babies interact by scanning the environment, tracking slowly moving objects, showing special interest in faces, and attempting to reach, contact, and grasp things of interest. In a hostile environment, newborns will defend themselves: The opposite leg will come up to defend another being pricked by a pin,¹²⁶ arms are raised to strike and push away pressure on the chin.¹²⁷ Predictably, infants cry in response to needle pricks and electric shocks^{127,128} and within one second will protest being pinched on the arm.¹²⁹ Heel lancing, which is a deeper wound, provokes facial expressions of hurt, anger, and shock, and an elevated heart rate.^{102,130} When subjected to repeated lancing, newborns quickly learn to pull their foot away when someone tries to touch it.⁴⁶ If things get worse, newborns know how to retreat and calm themselves using sleep,¹³¹ suckling,¹³² and by going into a trance.^{133,134,135} Newborns have a strong attraction to people, faces, and voices, especially those of their parents. They are born already having learned their mother's voice and to an extent her "mother tongue" both of which they seem to prefer.^{39,61} It takes only minutes of exposure for newborns to learn their mother's face.^{73,137,138} Within minutes of birth, babies can recognize and imitate manual and facial gestures¹³⁹ and emotional expressions.⁹¹ In just three days of rooming-in newborns can learn the mother's sleep/wake cycle;⁷⁷ within two weeks can identify their mother's body contours in the dark⁷⁶ and in the first week will react sharply if she wears a mask and is silent while breastfeeding.⁷² Babies are capable of rapt attention: fingers and toes aim right at the target, a behavior which can be seen in the 8-week embryo as well as the neonate.^{104,140} Out of the womb, infants continue to synchronize their own behavior with adult behavior, as can be seen when breastfeeding, when making contact by gaze and touch with parents;¹⁴¹ while listening to human speech;^{142,143,144} and in using up movements to judge which voices and faces go together.¹⁴⁶ Synchronous behavior is a complex interactive skill requiring interest, keen perception, and self control. Formal demonstrations of newborn learning and memory are abundant^{146,147} including classical conditioning^{148,149,150} operant learning,^{151,152} and habituation learning.^{153,154,155} In addition, one can point to evidence of visual memory,^{71,156} language memory^{157,158,159} and procedural memory.¹⁶⁰ Babies born with a cord wrapped perilously around the neck often develop anxiety about wearing clothing or jewelry in that location; they usually don't know why, but their anxiety is an indelible mark of memory. A baby born at 29 weeks and shunted for hydrocephalus without painkillers, learned from this experience to be phobic about medical procedures.¹⁶¹ At the mere sight of a hospital he would tremble, scream, struggle and vomit; he was still reacting this way at age ten. Finally, perhaps the most striking example of how babies learn from experience is how they remember their own birth. This display of cognition is conclusively validated by innocent children just learning to talk.^{4,27} Their spontaneous memories are accurate, cogent, and intelligently critical of how things were done at birth; they demonstrate understanding of human relationships and character, precocious comprehension of language, and reveal that babies use altered states of consciousness much as we do. None of this was expected. Perhaps for all the above reasons, experts around the world have begun to describe infants in new terms: they possess a "rational"

mind,¹⁶² are "socially attuned,"^{13,163} "talented,"¹⁶⁴ "an extremely competent learning organism,"¹⁶⁵ "precocious,"¹⁶⁶ and "amazing."³ CONCLUSIONS AND RECOMMENDATIONS 1. The truth about infants is not told by their size, age, and motor abilities; these factors have actually obscured their real complexity and sophistication. Because their true identity is revealed by awareness and expressiveness, let us speak of sentience rather than age and physical handicaps. 2. In medicine and psychology, preoccupation with the size and function of the brain has postponed discovery of infant capabilities for a hundred years. False ideas about the brain are still the principal justification for cruel and abusive treatment. In the future, let us speak of their intelligence, rather than their brains. 3. Because babies, like other humans, are always sensitive and have personal preferences and feelings, we should no longer condone or routinize their pain. Let us speak of feelings, not "reflexes" and make it a goal to eliminate medically-caused pain from birth. 4. Because infants of all ages manifest intelligence and are learning from their experiences with us, providers of physical care should always consider the effect of a procedure on the baby's emotions and mind. Let us think mind, not just body. 5. In closing, infants are much more than we thought. Nineteenth century science was materialistic in viewing the baby as body, brain, and reflex material. The 21st century view of babies will, I believe, focus on their sensations, emotions, sense of self, personality, communication ability, mind, and consciousness. This major paradigm shift is urgently needed. Footnote * This paper was presented by invitation to the 10th World Congress of Prenatal and Perinatal Psychology and Medicine, Cracow, Poland, May 15th, 1992. It was originally published in the International Journal of Prenatal and Perinatal Studies Vol. 4 (3 and 4), 1-17 (1992).

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