

# A Controlled Assessment of Fetal Sonic Stimulation Comparing Music and Cardiac Progressions, 1992–2001

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**Abstract:** To evaluate developmental outcomes from sonic stimulation upon the fetus, the author supervised a controlled study of maternal singing and recorded classical music contrasted with accelerated cardiac rhythms; an analysis of neonatal, infant, and academic achievement shows that both methods produce significant gains for receptive and expressive language, suggesting enhanced cognitive maturation which continues into the elementary school years.

**Zusammenfassung:** *Eine kontrollierte Einschätzung der Auswirkung fötaler akustischer Stimulation im Vergleich von Musik mit Sequenzen von Herztonrhythmen.* Zur Einschätzung der entwicklungspsychologischen Auswirkungen akustischer Stimulation auf den Fötus leitete der Autor eine kontrollierte Vergleichsstudie zwischen mütterlichem Singen und Anhören klassischer Musik mit einem Programm beschleunigter Herztonrhythmen; eine Überprüfung der Leistungen der Kinder als Säuglinge, Kleinkinder und Schulkinder zeigt, daß beide Methoden zu signifikanten Fortschritten in rezeptiver und expressiver sprachlicher Fähigkeiten führen und die kognitive Reifung bis ins Schulalter hinein zu fördern scheinen.

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## **Background**

For 20 years the author has investigated the psychophysical impact of music, particularly singing, upon child development, applying his approach in prenatal facilities, daycare centers, and public elementary schools throughout Russia and the United States. Over approximately the same period other sonic methods have

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appeared, and to evaluate the fetal effects of his program compared with an alternative system intended to provide similar benefits a controlled study was undertaken in 1992, the first such clinical measurement ever conducted; its results were presented in a 1994 British television documentary, "Brave New Babies," which has aired throughout many countries.

## **Description**

The author's Sonatal program [1] draws upon the system genesis concepts of P. K. Anokhin [2], which include sound as a vibrational, physiological, and psychological means for enhancing development. Pregnant mothers engage in singing, breathing, and physical movements designed to facilitate fetal responsiveness; the songs as well as music were composed by the author. In addition to consistently positive neonatal, infant, and child observations by clinicians, the Sonatal method has lowered the infant death rate by 8 per 1000 in the locales where practiced.

The technology employed for comparison was developed by Brent Logan, Director of Prenatal Institute in Seattle. His BabyPlus prenatal enrichment system [3,4,5,6,7] utilizes digitized adaptations from the in utero maternal blood pulse, both accelerated and with tonal variation over 16 sequences, in effect a fetal sonic curriculum whose effects are based upon three principles: imprinting [8,9], auditory driving [10], and standard brain cell death at the end of full-term pregnancy [11]. The theory [12] proposes that because the imprinting window concludes shortly after normative gestation is complete, and the at-rest maternal cardiac rhythm is the only detectable pattern to so register, progressions from this indigenous baseline will sonically lead the fetal brainwave rate to higher levels, thereby enhancing memoric and synaptic functions where neuronal apoptosis will be mitigated, resulting in a more mature cognitive structure at birth. This concept appeared congruent with data from a 1987 pilot study [13] employing 36 sequences advancing from 1 to 3 cycles per second, although it was neither comparative nor independently administered.

Both approaches presume fetal responsiveness – whether due to auditory development or vibratory sensitivity – which they initiate as observable limb movement, changes of in utero breath rate where amniotic fluid is ingested, and proto-alpha brainwave rate.

## **Method**

Three facilities sponsored the project, beginning in 1992 with the Children's Rehabilitation Center in Moscow where the author served as Director until 1995, continuing for three years at the Moscow Postgraduate Institute for Teachers, the author its Health Sciences Laboratory Chief, and since then at the Center for Rehabilitative Medicine, Russian Ministry of Health, where the author is Chief of the Children's Health Laboratory.

The 41 mothers, primagravidae as well as those with previous children, came from middle or lower socioeconomic backgrounds, with no family record of giftedness; individuals who had a history of smoking, alcohol, or drug use were excluded. Maternal ages ranged from 20 to 34, the average 25. While inclusion in the study

was voluntary, no inducements to participate were provided, nor were any subjects informed about possible advantages of stimulation, only that sonic stimulation was not harmful to either the mother or her unborn child. Subjects were divided into three groups: A (BabyPlus), 11; B (Sonatal), 11; and C (control), 9.

Stimulation of one hour twice daily, morning and evening, began at midterm continuing for 16 weeks. While the Sonatal protocol specified 90 percent maternal singing, for playing classical music both it and the BabyPlus program (16 cardiac progressions of 1 to 4.75 cycles per second) utilized identical audiocassette players, twin speakers, and fabric belts worn at midlevel on the abdomen, with speakers situated in like positions, as did the control group, which was exposed to classical music alone (approximating that form of sonic stimuli which an average prenatate would receive from a contemporary mother's normal environment).

Following neonatal observations, the primary instrument for monitoring cognitive achievement through receptive and expressive language skills over the first postnatal year was the Clinical Linguistic and Auditory Milestone Scale (CLAMS), developed in 1986 at Johns Hopkins University under Arnold Capute [14].

## Results

Babyplus neonatal characteristics were detected an average of 37 percent more than those of the control group, with the infant milestones for key linguistic areas reflecting maturity of neural processing at an average of 35 percent greater prevalence; Sonatal newborn average features were seen 11 percent more than those of the control babies, with a 16 percent average infant gain over the same baseline.

	Group A	Group B	Group C
Relaxed body at birth:	75.0%	57.2%	44.5%
Hands open at birth:	66.7%	57.2%	33.4%
Eyes open at birth:	91.7%	71.4%	85.7%
Facial stares at birth:	66.6%	57.2%	55.5%
First infant speech:	1.5 weeks	3 weeks	4 weeks
First sound reaction:	11 weeks	35 weeks	27 weeks
First maternal voice response:	5 weeks	7 weeks	9 weeks
First playing:	4 months	5 months	7 months
First gesture fulfillment:	7.5 months	8.5 months	10 months
First verbal request fulfillment:	8.8 months	9 months	12 months
First points to body parts on request:	10 months	12 months	15 months
Average academic scores:	4.6	4.5	4.1

Elementary school scores were obtained in September 2001 for 7 each from the three groups (Russian family mobility prevented location of all 31 subjects), the averages for the first three years of public education measured on a 5-point maximum scale against a 4.1 norm in the Moscow system.

## Conclusions

Following commencement of the above study, success of both approaches has been considerable: The BabyPlus prenatal system replaced its audiocassette version with microchip technology featuring an accelerated tempo to 6.5 cycles per second, resulting in 100,000 stimulated children born worldwide since 1987; from its 1983 inception, there are now 6000 youth who have experienced the Sonatal program fetally.

While this Russian project was limited in scope and substance due to budgetary constraints during a time of profound political upheaval, the results achieved statistical significance in important areas, reinforcing earlier pilot work by both the author and Brent Logan. Future subject populations and the number of evaluatory instruments should be increased, with all trials randomized in selection and independent of researchers involved in the tested modalities; already, several major assessments meeting these criteria have either begun or are planned. Additionally, new theoretical models and applied discoveries from relevant sciences are supporting the corresponding components of a developmental enrichment phenomenon which addresses human cognitive, social, and behavioral needs in an increasingly challenged time.

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