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# Web Supplement to Holowka, S. and Petitto\*, L. A. (2002).

Left Hemisphere Cerebral Specialization For Babies While Babbling. *SCIENCE*. (August 30, 2002)

\*To Whom Correspondence Should be Addressed



## Summary

### BABY BABBLING LINKED TO BRAIN'S LANGUAGE CENTER, NOT MOTOR SKILLS CENTER

HANOVER, N.H. Whether baby babbling is fundamentally linguistic (absorbing the elements of language) or just exercising motor activity (practicing the mechanics of mouth movement) has never been effectively addressed. Until now. A team of researchers based at Dartmouth has discovered a strong link between baby babbling and the language processing centers in the brain.

Laura Ann Petitto, Professor in Dartmouth's Department of Psychological and Brain Sciences and Department of Education, and graduate student, Siobhan Holowka at McGill University in Montreal, Quebec, report their findings in the August 30, 2002, issue of *Science*.

This discovery is the first to demonstrate left hemisphere cerebral specialization for babies' production of language, just like we see in adults, says Petitto. This suggests that language functions specialize in the brain at a very early age.

The researchers found that babies babble with a greater mouth opening on the right sides of their mouths, indicating left brain hemisphere activity. They conclude that babbling engages the language processing centers in the left hemisphere of the brain.

Right mouth asymmetry is the phrase used to describe the fact that the right side of your mouth opens a tad wider than the left while talking. Human eyesight (or how the brain perceives this act) corrects for this disparity, so it is virtually unnoticeable. Researchers have studied right mouth asymmetry in adults to understand the language control centers in the brain's left hemisphere; a method proven useful to detect brain damage after heart attacks or strokes. These studies produce a Laterality Index, which is a measure of the asymmetry. Holowka and Petitto are the first to apply this measure to study language in babies.

We were trying to find a way to further study language development in babies, but we needed a technique that would not be invasive or upsetting, explains Petitto. The Laterality Index was our answer.

The researchers studied video tapes of 10 babies between the ages of five and 12 months. Taking into consideration any language-specific bias, five babies were

learning English, and five were learning French. On the videos, two independent coders who were unaware of the study's goals scored randomly selected segments using the Laterality Index. They focused on three different kinds of mouth activity: babbles (sounds with consonant-vowel repetition), non-babbles (vocalizations without consonant-vowel content or repetition), and smiles (mouth movements with a known meaning or significance, generally indicating enjoyment, and often accompanied by contractions around the left eye). By slowing down the video recordings, the coders could calculate, using the Laterality Index, the size and nature of the babies' mouth openings for each of the different kinds of mouth activity.

◆ We found that all the babies, both English and French, had right mouth asymmetry when babbling, equal mouth opening for non-babbling, and left mouth asymmetry for smiles, ◆ says Petitto.

Not only do their findings link babbling to the language centers in the left side of the brain, the results also suggest that a basic expression of emotion, such as smiling, is linked to the right hemisphere's emotional centers in the brain, just like adults. Again, this suggests that sections of the human brain begin to specialize at a very early age.

◆ We are currently exploring whether this baby-friendly research method could also be used as a diagnostic tool to determine if there are linguistic or developmental problems even before a baby can utter its first word, ◆ says Petitto. ◆ The sooner parents and pediatricians recognize these problems, the sooner they can begin to treat them. ◆

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<p><b>Movies</b></p> <p>Click on the pictures to see a QuickTime movie of Babble, Non-Babble, or Smile. Note these files are around 6mb. <a href="#">Back to Top.</a></p>			
	<p><a href="#">Babble Movie</a></p>	<p><a href="#">Non-Babble Movie</a></p>	<p><a href="#">Smile Movie</a></p>

Still Photos	72dpi (5.29X4.02 cm) jpg files	72dpi (21.24X16.19 cm) tiff files	300dpi (21.24X16.19 cm) jpg files	300dpi (21.24X16.19 cm) zipped tiff files
Babble	<a href="#">96 KB jpg</a>	<a href="#">888 KB tif</a>	<a href="#">1.4 MB jpg</a>	<a href="#">6.8 MB zip</a>
Non-Babble	<a href="#">104 KB jpg</a>	<a href="#">802 KB tif</a>	<a href="#">1.4 MB jpg</a>	<a href="#">6.8 MB zip</a>
Smile	<a href="#">104 KB jpg</a>	<a href="#">900 KB tif</a>	<a href="#">1.6 MB jpg</a>	<a href="#">8 MB zip</a>

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Babble



Non-Babble



Smile

