IS THERE A NONVERBAL PERIOD OF DEVELOPMENT?

That the infant lives in a nonverbal sensorimotor world is widely believed. Yet this notion is being challenged by research, in a range of fields, that depicts the young infant as actively attuned to aural speech from birth and able to process and use its sounds and meanings well before the end of the first year. Following a selective review of the research on infant speech processing between birth and age twelve months, three questions are identified that highlight the theoretical and clinical implications of this research for psychoanalytic conceptualizations of infancy, the nature of language, and clinical process. The research, it is concluded, identifies the operation of linguistic and conceptual processes in early life, processes that may intersect with the experiential and emotional processes with which psychoanalysis is already concerned. Moreover, this research raises questions about the view that the nature of infancy is essentially nonverbal.

There is a basin in the mind where words float around on thought and thought on sight and sound. Then there is a depth of thought untouched by words, and deeper still a gulf of formless feelings untouched by thought.

—ZORA NEALE HURSTON (1937, p. 24)

Zora Neale Hurston’s lyrical image of a stratified mind is consonant with the view of notable and diverse contemporary psychoanalytic thinkers that some important experiences are beyond the reach of language. Moreover, for many psychoanalysts, development explains the presence of “a depth of thought untouched by words,” in that there is a long, early, and influential period of life during which the child does not speak.

The implications of infant development for understanding subsequent modes of thought, as well as the treatment situation, have occupied

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psychoanalysts for the last few decades. Contrary to the earlier view, in which psychoanalysts envisioned the young infant as ensconced in a world of fantasy and projection (e.g., Klein 1975; Winnicott 1971), or in “a great blooming, buzzing confusion,” in the famous words of William James (1890, p. 462), we now understand that the infant is a perceptive and competent participant in the world. An important impetus for this revised view of the infant is the burgeoning field of infant observation research, which has demonstrated the infant’s impressive capacities for accurate perception of and active engagement in the environment (e.g., Stern 1985; Beebe and Lachmann 1988).

In psychoanalysis, and certainly more broadly, we envision this competent infant as learning about, interacting in, and representing the world in a primarily sensorimotor or experiential mode. Perhaps due to the profound legacy of Piaget (1952; see Litowitz 1999), we consider language, and symbolic systems more generally, to exert their organizing power on thinking after early infancy, once the two-year-old child has begun to think and communicate through words. Before that time, however, the infant is conceived as truly preverbal.

Correspondingly, when psychoanalytic infant researchers investigate the behavioral patterns of parent-infant relationships and their developmental consequences, they typically focus on the timing, mode, and intensity of each partner’s behavioral response to the other, and exclude the content of the vocalizations and verbalizations of both parent and infant. Even when those patterns are conceptualized as “dialogues” analogous to verbal conversations between adults (Jaffe et al. 2001), the semantic content of speech is not among the many variables examined. By design, then, these studies do not teach us about either the infant’s speech-processing capacities or the role of the linguistic elements of parental speech in infant development.

By contrast, research in fields such as linguistics, developmental psychology, and cognitive science reveals a young infant with impressive and diverse capacities for processing, understanding, and using the speech of others. In these fields, the view of a purely sensorimotor infant is being challenged. This research, which has received scant consideration in our literature, may move psychoanalysis toward new understandings of the development of the mind during infancy and, perhaps, assist us in addressing central questions in contemporary psychoanalytic thought, including the degree to which experiential phenomena may be accessible to language.
To that end, I offer a selective review of findings from the literature on speech processing during the first year of life. I cannot do justice to the vastness or complexity of this research here; instead I focus on well-established findings, as well as more preliminary ones, that bear on psychoanalytic interests in infancy and the nature of language (for a more detailed account, including discussion of the controversies that characterize the state of this evolving research, and elaboration of the implications for psychoanalysis, see Vivona forthcoming).

I then discuss three questions that I believe help us contemplate some of the implications of this work for psychoanalytic conceptualizations of infancy, language, and clinical process: (1) What are the contributions of parental speech to infant development? If young infants can make use of the sounds and meanings of parental speech, then a precocious linguistic and conceptual ability may shape the emotional and interpersonal developments with which psychoanalysis has always been concerned. Fonagy’s theories of attachment, mentalization, and embodied cognition provide an example through which to ponder such influences. (2) Does language move one away from the full texture of lived experience? If sensorimotor and linguistic modes of being are simultaneous, even in early infancy, then our tendency to dichotomize experiential and verbal processes may blind us to the evocative capacities of language. (3) Is there a nonverbal period of development? If the young infant understands and uses some of the meanings of aural speech, then the infant cannot be said to operate exclusively, and perhaps not even predominantly, in a nonverbal sensorimotor mode. This poses a challenge to theorists who posit an essentially nonverbal nature of infancy, which is perpetuated in a nonverbal strain of experience throughout life.

**METHODS FOR STUDYING INFANT SPEECH PROCESSING**

Researchers rely on two behaviors, sucking and looking, to assess the young infant’s ability to process others’ speech. The *high-amplitude sucking method* (Siqueland and DeLucia 1969) capitalizes on newborns’ ability to control the rate at which they suck on a pacifier and to learn that a strong (high-amplitude) suck on the pacifier causes the presentation of a stimulus. The high-amplitude sucking method is the basis for current knowledge of newborn speech discrimination abilities. The *headturn preference procedure* (HPP; Nelson et al. 1995), typically used with infants older than
three or four months, makes use of the fact that young infants look toward the source of a sound as they listen. Infants are taught that they will hear a speech sample if they turn toward a flashing light indicating its source, and that the speech sample will cease if they turn away from the light. Finally, the *intermodal preferential looking paradigm* (IPLP; Golinkoff et al. 1987) presents infants with an auditory recording of speech and multiple visible objects (usually two), and measures the time infants spend looking at each object; it is the method of choice for studying infant word learning.

There are two basic research designs in which these methods are used. One design allows assessment of infant preferences for different types of speech sounds. In such studies, infants are presented with two types of stimuli, for example, recordings of the voice of the mother and that of a female stranger. The infant’s rate of sucking or looking in response to each type of speech indicates the amount of time the infant chose to listen to it. A difference in response times associated with the speech types indicates that the infant preferred one type to the other, and thus detected the difference between them.

If the infant does not prefer one speech type to the other, this design will not reveal infants’ ability to discriminate them. Moreover, because infants prefer both novel and familiar stimuli under different and somewhat unpredictable circumstances (Gerken 2009), an absence of overall differences can be difficult to interpret.

The second design uses the habituation paradigm, in which researchers manipulate rather than investigate infant preferences. Due to their preference for novelty, infants will respond vigorously when presented with a novel stimulus, and eventually will respond less strongly; this *habituation* pattern is an indication that the infant has come to regard the novel stimulus as familiar. In habituation experiments, researchers present stimuli, such as a series of words spoken with happy affect, until infants habituate. Then they present infants with a different type of stimulus, such as the same words spoken with neutral affect. If infants perceive the new stimuli as different from the previous ones, they will resume strong responding (*dishabituation*); if the new stimuli are indiscriminable from the previous, the infants’ response levels will remain low. By comparing response rates across stimuli and experimental conditions, researchers can determine the ability of young infants to hear acoustic differences in speech, to recognize and remember speech sounds, and to categorize objects based on the types of speech they hear.
In terms of overall research design, the experiments considered here typically include appropriate control conditions, although I do not describe most of these in the presentations below. For instance, most researchers control or test for a priori infant preferences for different stimuli and present stimuli at random on the infant’s right and left sides. Also important, sample sizes for these studies tend to be too small to test individual differences such as those associated with gender. Such differences, therefore, are rarely assessed or reported.

Finally, brain imaging of various kinds is a recent addition to the infant researcher’s toolkit. Electroencephalogram (EEG), which measures electrical activity of the brain’s neurons through the scalp, is used most frequently because it is an inexpensive method with fine temporal resolution that can measure associations between brain activity and external stimuli; however, it does not provide precise information about location of activation. Use of functional magnetic resonance imaging (fMRI), which measures changes in blood flow in the brain rather than neural activity per se, is more common in studies of adults than in studies of infants and young children; it provides precise spatial resolution but less precise temporal resolution than EEG. Optical topography (which, like fMRI, measures brain blood flow) is similar to fMRI but has lower spatial resolution; its advantages relative to fMRI are portability and silence.

It is important to keep in mind that brain scanning of infants is itself in its infancy. The imaging findings reported here must be considered preliminary and descriptive; that is, they tell us something about the brain processing that accompanies speech processing. Indeed, the meaning of brain activation patterns is often not well established, even in adults. When findings of multiple studies converge, particularly when they use diverse methods, the evidence may be considered more cogent.

Speech Perception During the First Year of Life

Most infants begin to speak their first words around the time of their first birthday. Yet this important achievement does not mark the beginning of language acquisition. On the contrary, the twelve-month-old’s ability to produce words is the manifest culmination of a gradual language-learning process that is built on the infant’s ability to discern various aspects of language, beginning with phonetics (the basic acoustic units of speech associated with linguistic meaning) and prosody (the fluctuating pitch,
tones, and rhythms of speech) and progressing toward semantics (Swingley 2009), as well as to participate in verbal interactions with others (McCune 2008). Ample evidence from behavioral and brain imaging studies supports this view, as we shall see. This research suggests that infants attune to and process the speech of others from the very beginning of life, and that they use semantic meanings of others’ speech to organize their understanding of the world long before they begin to produce words themselves.

From the beginning of life, speech is a special kind of sound for the infant. The ability to perceive and process speech sounds is present before birth (Kisilevsky et al. 2003) and develops rapidly over the first weeks of life. Newborns less than a week old demonstrate a behavioral preference for human speech over other similarly complex sounds, sucking on a pacifier to maintain the sound of spoken syllables but not of non-speech sounds of similar pitch and duration (Vouloumanos and Werker 2007). Consistently, Peña and colleagues (2003) demonstrated with optical topography that distinct regions of the left hemisphere are activated when newborns are exposed to normal speech in their native language but not when exposed to backward speech, which differs from normal speech in both prosody and familiarity. This preference for speech, whether biologically given or attained in earliest development, attunes the infant to the speech of others, thereby supporting the infant’s advancing ability to understand its meanings.

In addition to discriminating speech from similar non-speech sounds, newborns can perceive, remember, and process the sounds within speech. Newborns can discriminate the phonemes, or basic speech sounds that carry linguistic meaning, that are present in all human languages (Gervain and Mehler 2010), and they can remember the acoustical patterns and rhythms of speech. For example, DeCasper and Spence (1986) demonstrated that newborns less than three days old can distinguish passages heard prenatally from passages heard only after birth. For this study, pregnant women read aloud twice a day over the final six weeks of gestation from one of three rhyming children’s stories. Following birth, the newborns were presented with the familiar passage and another passage they had not heard, both read either by their mother or by another mother in the study. The newborns sucked more to hear the passage they had heard prenatally than they did for the novel passage, whether the passages were read by their mother or by an unfamiliar woman; a control group of newborns who had not heard the passages prenatally displayed no preference for any story. The results indicate that speech perception begins before birth, and
that newborns can identify similar rhythmic and acoustic patterns in speech even when they are presented in an unfamiliar voice.

Further, evidence from both behavioral and brain imaging studies suggests that newborns can discriminate some simple patterns within spoken language. Gervain et al. (2008) used optical topography to investigate brain activations in response to different speech patterns in newborns one to six days old. They found greater neural activity in response to speech containing sequential repetition of phonemes (e.g., mu-ba-ba) compared to speech containing no phonetic repetition (e.g., mu-ba-ge); however, they detected no difference in neural response to speech containing interrupted repetition (e.g., ba-mu-ba) compared to no repetition. The researchers proposed that newborns are already sensitive to perceptual patterns that are frequent in infant-directed speech, such as mama and dada, as well as in their own first words. Further, Shi, Werker, and Morgan (1999) demonstrated with the high-amplitude sucking method in an habituation paradigm experiment that newborns just a few days old can differentiate the stress patterns and phonological characteristics associated with content words, which carry lexical meaning (e.g., ball, toy), from those associated with function words, which denote grammatical structure (e.g., the, his). Of course, newborns do not understand the meanings of words or grammatical structures. Yet they already have the capacity to discern patterns in speech that are associated with different types of words; undoubtedly, speech comprehension builds on these early perceptual skills.

The newborn’s capacities to perceive speech sounds are shaped by the repeated experience of hearing language. Over time, the infant’s perceptual powers become trained on features that highlight meaningful discriminations in the speech the infant hears, and away from discriminations that are not meaningful. Specifically, the newborn’s capacity to discern phonemes that are not present in ambient language diminishes over the first year, so that the ten-month-old hears speech not as he originally did but more like mature members of his language community do (Gervain and Mehler 2010; Kuhl and Rivera-Gaxiola 2008). Infants accomplish this development by creating phonetic categories from the acoustics of speech. Once those categories are well established, the ten-month-old perceives native phonemes more accurately and has more difficulty perceiving non-native phonemes for which he has no phonetic category (Werker and Tees 2005).

Not surprisingly, mastery of the native-language phonology is associated with subsequent language acquisition. Specifically, phonemic perception skill at seven months predicts a range of language abilities over the
next two years, including the ability to understand words and phrases and to produce words (Kuhl 2009). Moreover, advancing phonological skill allows infants to recognize a range of common words by the end of the first year. Thierry and Vihman (2008) used both the HPP and EEG to assess recognition of 33 common and 33 rare words in a cross-sectional study of infants nine to twelve months old. They found that monolingual English-learning eleven-month-olds showed word recognition in the HPP by looking longer toward the source of common words than that of rare words. EEG activation patterns differentiated common from rare words even earlier, beginning at ten months. Interestingly, the twelve-month-olds displayed no preference for common words, suggesting that their attention to new words now rivals their attention to familiar ones.

An equally important differentiation the infant must learn is between speech sounds that are consistent across different vocalizations of the same word and speech sounds that are associated with a particular occurrence of speech. The former are associated with linguistic meaning proper. The latter, known as indexical or nonlinguistic speech sounds, carry meaning linked to a particular speaker (e.g., the unique sound of an individual’s voice) or interpersonal or emotional context (e.g., an excited or calming tone). Clearly, both types of meaning are often present simultaneously in speech, and some specific speech sounds carry both types of meaning. Research indicates that the capacity to process indexical features of speech, like the capacity to process linguistic features, is present in early life and develops over the first year.

A few studies have examined newborn voice recognition, one indicator of indexical processing abilities. An early, widely cited study using the high-amplitude sucking method demonstrated that newborns within three days of birth prefer to hear their mothers, rather than unknown women, read from an unfamiliar Dr. Seuss story (DeCasper and Fifer 1980). More recently, Kisilevsky and colleagues (2003) used measures of fetal heart rate to demonstrate that the ability to identify the maternal voice is present before birth; heart rate increased when a fetus heard the mother reading a poem, and decreased when a fetus heard a female stranger (another pregnant woman in the study) reading the same poem. Using fMRI, Dehaene-Lambertz and colleagues (2010) demonstrated activations within the left hemisphere of two-month-olds in response to the mother’s voice different from those occasioned by that of a female stranger; behavioral studies indicate that infants as young as two months of age can differentiate among unfamiliar male and female voices (Jusczyk, Pisoni, and
Mullennix 1992). The age at which infants begin to prefer the paternal voice is unknown.

In addition to recognizing individual voices, young infants also recognize distinct emotional tones in speech. The pioneering work of Anne Fernald (1989) demonstrated that adults speak to infants using distinct prosodic patterns in different emotional contexts, and she conjectured that infants comprehend the adult’s meaning based on these prosodic “melodies.” In support, she used the HPP to show that five-month-olds differentiated approving from prohibiting affect in both familiar and unfamiliar languages, and that their spontaneous facial expressions were consistent with the emotional tone of the speech they heard (Fernald 1993).

More recently, Spence and Moore (2003) used the HPP to demonstrate that six-month-olds recognize a consistent emotional tone in speech even when the content of speech is varied. This study used the HPP in an habituation paradigm. Eight women were recorded as they spoke to their young infants in an “approving” tone (indicating approval as the infant reached for an object) and in a “comforting” tone (speaking to the infant as though he or she was distressed); the content of the speech was not controlled. Each infant heard seven samples of speech from one of the two emotion categories, and then was tested on an eighth sample. Infants looked longer toward the source of the test sample when it came from the different emotion category than from the same emotion category, demonstrating that they discerned the differences between the two positive affect tones.

On the other hand, infants can recognize words despite changes in their indexical presentation, which is essential for distinguishing words in different spoken contexts. For instance, HPP studies have shown that by ten and a half months, and perhaps earlier (Singh 2008), infants recognize words as the same whether spoken by a man or a woman (Houston and Jusczyk 2000) or in a happy or a neutral tone (Singh, Morgan, and White 2004). Yet even ten-and-a-half-month-olds cannot remember words after a one-day delay if the speaker is varied from familiarization to test (Houston and Jusczyk 2003). Indeed, both older children and adults process speech more slowly and remember it less accurately when the presentation differs between the familiarization and test phases of an experiment (Houston and Jusczyk 2003), suggesting that memories of speech retain a confluence of phonetic and indexical features. This phenomenon raises interesting questions regarding the nature of word representations as abstract prototypes, as they are often characterized, rather than as exemplars of experience (Hintzman 1986).
Given these many similarities, it is not surprising that infants’ neural speech processing is similar to that of adults. For instance, during exposure to speech, brain lateralization (the relative strength of activation of the left and right hemispheres) is similar in infants and adults, with processing of perceptual and semantic features of language stronger in the left hemisphere and processing of prosody, or the rhythms and tones of speech, stronger in the right hemisphere (Gervain and Mehler 2010).

Moreover, processing within the left hemisphere is similar in infants and adults. The left hemisphere contains two regions involved in language processing: Wernicke’s area in the superior temporal gyrus and Broca’s area in the inferior frontal gyrus. Using fMRI, Dehaene-Lambertz and colleagues (2006) measured activations of left hemisphere regions, including Wernicke’s and Broca’s areas, in the brains of three- and four-month-olds as they listened to sentences from a children’s book read by an unfamiliar woman in infant-directed speech. Although infant brains processed the recordings more slowly than adult brains, neural processing in the infants was similar to that observed in adults in terms of the activated regions and the temporal sequence of activation, with Broca’s area activated toward the end of the sequence. Because there was no comparison condition, the results do not indicate whether these activations are unique to speech. In a follow-up study designed to address this question, Dehaene-Lambertz and colleagues (2010) found overall greater left hemisphere asymmetry as two-month-olds listened to speech than when the stimuli were phrases from a Mozart piano sonata chosen for similarity to speech in phrasing and complexity.

Dehaene-Lambertz and colleagues (2006) were surprised to find activation of Broca’s area, associated traditionally with speech production and more recently with syntactic processing, action perception, and working memory (Grodzinsky and Santi 2008). By comparison, Imada and colleagues (2006) found activation of Broca’s area when six-month-olds but not newborns heard spoken syllables, and suggested that activation of Broca’s area may indicate development of speech perception abilities. Dehaene-Lambertz and colleagues speculated that Broca’s area may facilitate the integration of perceptual cues and motor programs necessary for speech, perhaps using processes of the mirror neuron system (see also Imada et al. 2006), or that it may support language processing by building verbal memory necessary to integrate phonological, semantic, and syntactic aspects of speech (see also Hagoort 2005). In these views, activation...
of Broca’s area may indicate neural preparation for speech that is not observable in infant behavior.

The similarities between infant and adult neural speech processing are certainly intriguing. Yet we must keep in mind the obvious and important differences between infants and adults in the ability to comprehend and produce speech. In light of these differences, the similarity of brain processing in infants and adults warrants explanation. In addition to illuminating our understanding of infant speech processing, the findings may foreground our incomplete understanding of the neural processing of adult language, since the undeniable differences in language capacities of infants and adults are not explained by the brain imaging data in these experiments.

WORD COMPREHENSION IN THE FIRST YEAR OF LIFE

To comprehend language, the infant must process the stream of speech, discern discrete words within it, and understand what those words refer to. The research described above suggests that the first two of these three capacities are evident by the middle of the first year. Regarding the third capacity, there are relatively few systematic studies of the extent to which the young infant attaches semantic meaning to word forms during the first year (Swingley 2009). However, parents consistently report that many infants begin to understand words in the second half of their first year. According to Fagan (2009), for instance, most parents of eight-month-olds report that their children understand the meaning of at least a few words, and some believe their young infants comprehend twenty words or more.

Not surprisingly, the infant’s first forays into semantics appear to involve words with strong personal relevance. Infants can recognize their own names as early as four and a half months (Mandel, Jusczyk, and Pisoni 1995). An IPLP study demonstrated that seven-month-olds associate the words Mommy and Daddy with their respective parents, and not with women and men generally (Tincoff and Jusczyk 1999). Moreover, the infant’s understanding of semantics is not limited to words with a single, highly personal meaning. Indeed, most studies of word comprehension in the first year of life examine infants’ ability to associate novel words with novel objects. These studies using the IPLP (reviewed in Gogate 2010) indicate that infants seven to ten months old can learn names for novel objects in the laboratory, even after hearing the words only a few times; whether they remember these names over time is often not assessed, however.
This important achievement notwithstanding, most words refer not to single entities but to a range of objects, properties, or events. Such words are fully learned only when the child demonstrates understanding that they denote categories of objects or attributes that share an important property and can apply a word correctly to novel instances of the relevant category. There is some evidence that these capacities are present, in rudimentary form at least, as early as the middle of the first year. For instance, Tincoff and Jusczyk (2000) used the IPLP to test six-month-olds’ recognition that familiar words can refer to novel exemplars. They selected the categories hand and feet, reasoning that both the categories and the words denoting them would be familiar to infants at six months. Indeed, the six-month-olds looked longer at videos of an unknown adult female’s hand while hearing “hand,” spoken in an unfamiliar voice, and of her feet while hearing “feet” in the same unfamiliar voice. Using a similar design, Bergelson and Swingley (2010; Bergelson, personal communication) assessed comprehension of words for eight eating-related objects (e.g., bottle, apple) and eight body parts (e.g., mouth, nose) in infants six to nine months old. Color photographs of one item of each type were presented simultaneously as the infant heard his mother say, “Look at the [object name].” Even the youngest infants typically looked longer at the photographs that matched the words they heard, suggesting that they comprehended the generalizable meaning of these sixteen familiar words.

These studies suggest that young infants can successfully map words to categories, evidence of their emerging conceptual and linguistic abilities. Moreover, extensive research by Waxman (2009) demonstrates that the infant creates categories of the objects, properties, and events of experience in response to the content of adult speech. Creation of a category then enables the infant to generalize word meanings to novel situations; thus, speech processing yields both conceptual and linguistic benefits.

In one pair of habituation studies using the IPLP (Ferry, Hespos, and Waxman 2010; Fulkerson and Waxman 2007), Waxman and colleagues showed a series of colored line drawings of different dinosaurs to infants of three, four, six, and twelve months of age. One group of infants heard a spoken statement containing an unfamiliar verbal label, such as, “Look at the toma,” each time a new image was presented. Another group of infants heard a series of tones, acoustically matched to the spoken statement in timing, duration, and volume, each time a new image was presented. After several such pairings of image and sound, all infants saw two new line drawings, one a new dinosaur, the other a fish; no verbal
statement or tone was presented. Infants who had heard the verbal label in the previous trials attended to the two images differently; the four-, six-, and twelve-month-olds looked longer at the fish, consistent with the novelty preference, whereas the three-month-olds looked longer at the dinosaur, consistent with the familiarity preference. By contrast, infants of all ages who had heard the tone sequence looked equally at the two drawings. The difference in looking behavior between the two groups suggests two notable effects that hearing verbal labels has on infant thinking. First, the infants who heard the adult speech appeared to consider all the dinosaurs—including the final one, which was not paired with the verbal label—to be members of a single category; thus, after seeing several dinosaurs, the four-, six-, and twelve-month-olds were ready to look at something new—in this case, the fish. By contrast, the group who heard the tone sequence did not treat the final dinosaur as any less novel than the fish, suggesting that they did not place the dinosaurs into a single category. Second, the infants who heard the verbal statement had associated a consistent set of speech sounds with each of the different dinosaurs; this association is a prerequisite, at least, for understanding most words. By contrast, the group who heard the consistent tone sequence did not associate the tonal sounds with the objects in the same way. Thus, infants as young as three months treat different objects as belonging to the same category when those objects are paired with a consistent speech sound, but not when the same objects are paired with another type of sound. However, when non-speech sounds are embedded in a communicative context, infants are likely to treat those sounds as referential symbols akin to words (Campbell and Namy 2003; Robinson and Sloutsky 2007).

Because there was only one verbal condition in these studies, the results do not indicate that verbal labels per se assist infants in categorizing objects, as Waxman hypothesizes. Perhaps speech with any content would have the same effect. In a series of studies with infants eleven to fourteen months of age, Waxman and Markow (1995) tested the specific effects of verbal labels by contrasting infants’ responses to verbal statements that contained labels in the form of nouns and adjectives, with responses to verbal statements that contained no labels. The infants were allowed to interact with four different objects, such as toy cars, one at a time. Infants in the Verbal Label condition heard the experimenter label each car with the unfamiliar noun *auto* as she presented it to the infant in phrases such as “See the auto?” and “Do you like the auto?” Infants in the No Label condition heard the experimenter make statements such as “See here?” and “Do you like that one?” that did not contain verbal labels.
After interacting with each object, the infants were presented with two new objects, one from the familiar category and one from a novel category, while the experimenter said, “See what I have?” As in the looking studies described above, the behavior of the infants differed depending on whether they had heard the experimenter label the objects. Infants in the Verbal Label condition played longer with the novel object, suggesting that they categorized the previously presented objects and extended that category to the new object of the same type. By contrast, infants in the No Label condition played equally with the two new objects, and showed no evidence of having created a category. The same effects were demonstrated when the verbal label was an adjective, as in “See the auto-ish one?” Thus, eleven-month-olds group discrete objects into categories when adults refer to the objects using the same word. However, they do not yet differentiate the types of commonalities associated with nouns versus adjectives; at fourteen months, this differentiation begins to occur.

Waxman tested infants’ abilities to apply unfamiliar words, such as auto, to familiar objects, such as cars, and concluded that the presence of a verbal label causes the infant to form a category when the objects are given the same label, but not when the objects are presented with tones or with phrases that do not contain labels. She concluded that “words serve as invitations to form categories” (Waxman 2009, p. 103). However, because familiar objects were used in the experiments, the studies do not establish that the infants created a new category in response to the novel word; they may have accomplished the simpler task of learning a new label (auto) for an existing category (car) and they may have formed the category previously without the assistance of words. Moreover, the studies do not identify the mechanism of the categorization effect: Is the provision of the label itself essential for categorization, or does the presence of the label encourage the infant to attend more closely to the object, with categorization resulting from increased attention rather than from labeling per se?

In a series of experiments designed to address these questions, Plunkett, Hu, and Cohen (2008) determined that ten-month-olds indeed use verbal labels, nouns in this case, to form novel categories of visually dissimilar objects, supporting Waxman’s assertion. In addition, they demonstrated that verbal labels can also disrupt categorization. That is, when visually similar objects, which infants typically categorize based on appearance, are paired with different verbal labels, ten-month-olds do not group them into a single category; thus, the presence of verbal labels

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can override categorization based on perceptual similarities. This raises the possibility that young infants may be able to categorize objects according to conceptual processing associated with the inferred meaning of shared labels. However, such effects may be explained by perceptual processing alone (see, e.g., Gliozzi et al. 2009); that is, the sound of a consistent label increases the multimodal perceptual similarity of the labeled objects. Indeed, this issue is far from settled. Regarding the mechanism of the effect, Plunkett and colleagues determined that verbal labels both enhance infant attention and facilitate the creation of categories beyond the attention-focusing mechanisms.

Thus, perhaps as early as the middle of the first year, words function as labels for concepts the infant already has but also help the infant construct concepts. The infant’s understanding of objects and events in the world is influenced by the presence, absence, and content of the words he or she hears; the categories created in response to those words help the infant attend to similarities that might otherwise escape notice and, conversely, deemphasize discriminations that might otherwise be made. Moreover, those categories support the infant’s lexical development, enriching the conceptual store to which words can be mapped. The effects of language and thinking, then, are bidirectional: verbal labels influence the formation of concepts, and the presence of concepts supports the full comprehension of word meanings.

THE INTERPERSONAL CONTEXT OF WORD LEARNING IN THE FIRST YEAR

Waxman’s assertion that “words serve as invitations to form categories” hints at the importance of the interpersonal context for learning language. With words, mature speakers invite infants to share in the wider world and to think about that world in new ways. Although it is clear that the language development of a child deprived of contact with mature speakers will be impaired significantly (Kuhl 2004), there are relatively few investigations that examine interpersonal mechanisms of semantic development during early infancy. In fact, most studies of infant speech processing, including those described above, control rather than examine interpersonal processes; the naturalistic situations in which infants learn language are complex and thus difficult to replicate in the laboratory (Werker and Curtin 2005).
As we have seen, laboratory studies of word learning in the first year demonstrate that infants can learn words for objects in impersonal settings when a small number of objects are presented. In the complex naturalistic world, by contrast, the infant must determine the object, event, or property being named by the adult. The adult’s social cues, including gaze direction and pointing gestures, provide important clues. The ability to follow adult head turns and to shift gaze between a speaking person and a nearby object has been demonstrated in infants as young as three months (Perra and Gattis 2010). At six to eight months, an infant can learn names for objects in the laboratory when the adult moves the object while naming it, as he typically does, as long as the infant switches his gaze between the adult and the object as the adult produces the name (Gogate, Bolzani, and Betancourt 2006). Not surprisingly, then, infant gaze following predicts subsequent productive vocabulary (Meltzoff and Brooks 2009; Morales, Mundy, and Rojas 1998; Morales et al. 2000). However, the young infant’s ability to use gaze direction in object-naming situations is fragile, and particularly vulnerable to the allure of perceptual novelty. For instance, Pruden and colleagues (2006) demonstrated that if ten-month-olds are looking at a particularly captivating object, they may fail to follow an adult’s gaze toward a less interesting object. If the adult gaze direction indicates the adult’s intention to name the less interesting object, the infant will erroneously associate the name with the interesting object instead.

Infants take a leap forward in their ability to pair others’ spoken words with objects when they become able to discern the speaker’s communicative intent, a capacity that builds on gaze following and other shared attention abilities. Between nine and twelve months (Tomasello and Rakoczy 2003), the infant begins to understand people as intentional agents, whose behaviors are self-directed and intentional. Consequently, by the end of the first year, the infant appreciates that the speaking adult has something in mind to communicate, and that the adult’s gestures and speech are referential indicators of that intention. Understanding of communicative intent is essential for true linguistic processing of others’ speech; before this develops, infants may treat communicative actions, including speech and gestures, as any other action.

Recent evidence suggests that young infants recognize a speaker’s communicative intent based on behavioral cues. Yoon, Johnson, and Csibra (2008) demonstrated that nine-month-olds can differentiate communicative from noncommunicative behaviors of others, and that they process information differently in the context of each. The researchers
showed infants a series of prerecorded videos of two types. One type showed a communicative action in which an adult addressed the infant using eye contact and verbal greeting and then pointed to an object. The other type showed a noncommunicative action in which an adult reached for an object without looking at the infant or otherwise indicating an intention to communicate. Analysis of infants’ looking times indicated that when infants observed a communicative action, they remembered perceptual features of the target object that they did not recall in the context of a noncommunicative action. This suggests that the infants discerned the adult’s intent to communicate about the object in the context of the social cues and pointing gesture; in that context only, infants invested their processing resources in remembering features of the object. Yoon and colleagues conclude that the adult’s use of ostensive cues scaffolds the infant’s ability to learn about the world in an inherently interpersonal process.

More direct evidence of infants’ recognition of the referential significance of gestures and words comes from a study of thirteen-month-olds (Gliga and Csibra 2009). The researchers reasoned that if infants understand the referential meaning of pointing and object labeling, they would expect the two types of cues to refer to the same object when they are presented by the same person but not when presented by different people. One group of infants saw a video of a woman who pointed toward an object, hidden from view by a screen, while saying the name of a familiar object. The other group saw a video of a man who pointed silently toward a hidden object while the voice of an unseen woman said the name of a familiar object. Both groups then saw one of two outcome videos in which the screen was lifted to reveal two familiar objects, one of which matched the word they had heard previously. In the consistent outcome video, the named object was in the location to which the actor had pointed; in the inconsistent outcome video, the named object was in the other location.

Analysis of looking times revealed that infants who observed the woman speaking and pointing looked longer at the inconsistent outcome, whereas infants who observed the man pointing and heard the woman speaking looked longer at the consistent outcome. Because infants are known to look longer at outcomes that violate their expectations, this difference suggests that only infants who observed the object label and pointing gesture emitted by a single person expected those indicators to refer to the same object. Thus, when a person simultaneously presents both kinds of cue, infants infer that the person has a single object in mind. Finally, the infants developed specific expectations about the location and
identity of the hidden objects, indicating that thirteen-month-olds have some grasp of the symbolic nature of words and gestures.

Infants are not only passive recipients of social cues. They also use such cues in their own communications with others. Tomasello and colleagues demonstrated that infants of twelve to fourteen months of age adjust their use of communicative gestures based on the other person’s prior knowledge and experience (Liebal et al. 2009; Liszkowski, Carpenter, and Tomasello 2008). Infants’ use of gestures thus reflects their understanding of crucial communication processes by which conversational partners must take account of the other’s knowledge if they are to be understood. That said, infants at the cusp of the second year of life are just beginning to make use of potent interpersonal cues. The contributions of such cues to word learning increase between twelve and twenty months (Cohen and Brunt 2009; Pruden et al. 2006).

Thus, infants in the first year of life have considerable competencies for using the potent behavioral cues of interpersonal interactions to support their understanding of the meanings of adult communications. Moreover, infants not only gain knowledge of the world through their interactions with adults; they also learn how to engage another in a communicative exchange, how to alert the other to the important components of the exchange, and, perhaps most important, what it means to communicate. Indeed, infants at the end of the first year of life are able to learn from other minds about the shared knowledge of the culture and also to learn about other minds (Gergely, Egyed, and Király 2007), including how to connect to those minds through speech.

**IMPLICATIONS FOR PSYCHOANALYTIC UNDERSTANDINGS OF INFANCY**

Before discussing some potential implications of this research for psychoanalytic theories of infancy, I think it important to acknowledge the different contexts from which knowledge is generated in laboratory-based studies and in the clinical contexts within which psychoanalysts work. Language researchers examine infant capacities under controlled and, often, intentionally impersonal conditions. An important goal is identification of patterns that are common across infants, with individual variations often viewed as contributing to error rather than effect. The focus is a developmental process with striking similarities across culture, socioeconomic status, gender, and other factors that typically
influence development, and whose outcome is the ability to use language as others do. By contrast, psychoanalysts engage the individual in all his idiographic glory. Because each child learns language within particular emotional relationships, both words and the process of speaking are imbued with idiosyncratic meanings and functions, which the clinical situation is designed to reveal. If language is the confluence of the personal and the transpersonal, psychoanalysis is perfectly positioned to advance our knowledge of its personal aspects; this is a position we need not relinquish as we learn from laboratory studies of language.

With this in mind, I discuss the research literature with respect to each of the three questions I posed at the outset, in hopes of stimulating our thinking around the linguistic capacities of infants, on the one hand, and the nature of language on the other. This is by no means a definitive or complete statement of the implications of infant language processing research for psychoanalysis. It is more a sketch of ideas, possibilities, questions, and speculations inspired by the research, a sketch that others might help fill in and revise.

What Are the Contributions of Parental Speech to Infant Development?

Psychoanalysts representing diverse perspectives have elaborated the mechanisms by which the child gains a sense of self (Winnicott 1971), security (Bowlby 1969), and subjectivity (Benjamin 1995) from and within his primary relationships. The contributions of parental speech to these developments have been conceived primarily in terms of emotional and experiential mechanisms, rather than semantic ones. That is, the prosody or emotional tone of early parent-infant dialogues, as well as the behavioral routines in which they are embedded, are thought to imbue the infant’s mind in terms of object relations (Rizzuto 2004), internalized self-other dialogues (Litowitz 2007), or the embodied foundation of cognition (Fonagy and Target 2007), to give a few examples. Infant observation research in the traditions of Daniel Stern (e.g., 1985) and Beatrice Beebe (e.g., Jaffe et al. 2001) has enhanced our understanding of the profound influence of these interpersonal behavioral routines on the infant’s mind.

In addition to the undoubtedly important nonlinguistic developments, the infant speech processing research demonstrates that infants use their abilities to discern the patterns and prosodies of adult speech in the development of both thought and vocabulary. In the music of parents’ speech, the infant derives meaning from tune and lyrics. Indeed, infants in the second half of the first year already understand the semantic meanings of some
of their parents’ words, particularly those with strong experiential groundings, and they recognize the emotional tones conveyed in speech prosody. Moreover, they use their parents’ words to make meaning of the world in new ways. The semantic meanings of the parent’s words to the young infant have received little attention in our literature, with Loewald (1978) a notable exception.

An important conclusion from this research is that linguistic and conceptual development begin earlier than we have realized. If this is so, linguistic and conceptual processes are available to interact with the early emotional and interpersonal processes of the parental relationship with which psychoanalysis is already concerned. We have not paid sufficient attention to these developments, yet they have two broad implications for our understanding of parental contributions to infant development.

First, the infant’s ability to comprehend both the content of speech and the nature of speech as a communicative act shapes the ways in which he understands himself and internalizes his primary relationships. Toward the end of the first year, the infant makes inferences about the contents of others’ minds based on his observation of their behavior, present and past, and these inferences are available to be internalized in enduring attachment schemas. He can connect words and phrases, such as “good boy,” to the events and actions he shares with his parents, and the related memories may infuse the meanings of those words as well as his understanding of himself in relation to them, their good boy. The manner in which his parents respond to his communications, whether in words or otherwise, whether with understanding or otherwise, is internalized as well.

Second, the parental relationship is an important vehicle through which the infant gains knowledge of the world. That is, the research reminds us that the infant learns about the world, including its manifestly abstract entities such as categories and words, through and within his relationships with others, including his parents. The parent’s interest, communicated through speech, gaze, and gesture, not only draws the infant’s attention to entities in the world but also conveys an attitude about those entities that the infant can discern and share: This is interesting. That is dangerous. This is good; that is bad. This is for me; that is not. Ideas about the world are intermixed with the attitudes of the one who presents those ideas. Indeed, because infant-directed speech is characterized by exaggerated emotional contours, those early ideas may have a particular emotional charge. For the infant, at least, there may be no neutral world.
The work of Fonagy and colleagues (Fonagy, Gergely, and Target 2007; Fonagy and Target 2007; Fonagy et al. 2002) provides an example through which to consider these implications of a linguistic infant for current understandings of infant development. Their work is consistent with some important conclusions of the research on infant speech processing, yet does not take account of the young infant’s linguistic competence.

Fonagy and colleagues theorize that parent-infant interactions over the first year of life shape development of three interrelated capacities: attachment, embodied cognition, and mentalization (Fonagy, Gergely, and Target 2007; Fonagy and Target 2007). Specifically, cognition is embodied by attachment experiences such that “the very nature of thought, the very nature of adult symbolic processes, will be influenced by characteristics of the primary object relation” (Fonagy and Target 2007, p. 432). Simultaneously, interactions with parents spur the infant’s emerging capacity to mentalize, that is, to interpret actions of self and others as driven by mental states such as feelings, desires, and beliefs (Fonagy et al. 2002).

Although these theorists originally conceptualized attachment as a precursor to mentalization (Fonagy and Target 2008), they have revised their view in light of research that demonstrates the young infant’s rudimentary capacity to infer the specific content of the other’s mind. They now consider attachment and mentalization to arise simultaneously from experiences of the parental relationship over the first year of development (Fonagy, Gergely, and Target 2007). It may be that emerging mentalization abilities influence the quality of the attachment that develops over the first year, as the infant’s understanding of the parent as a person with a mind shapes his interpretations of her interactions with him.

Fonagy’s conceptualization of early cognitive processes and modes as the foundation for later developmental attainments is consistent with findings of speech-processing studies that document both the rudiments of symbolic processes and the interaction of perceptual and conceptual processing during the first year of life. In Fonagy’s view, however, attachment is the specific mechanism by which sensorimotor experiences of infancy imbue symbolic processing subsequently. Yet the research suggests contributions to infant conceptual development of interpersonal interactions that are not patently attachment-related; that is, the learning takes place within the attachment relationship, but it is about other things. Moreover, although Fonagy views attachment experiences as a profound basis of cognition and, by extension, language, he has not theorized the meaning of the parents’ words to the infant during the first year. It may be that
embodied attachment-related phenomena, such as the experiential quality of the relationship with the mother, are available as concepts that can be linked to words such as “Mommy” and “love.” Put another way, it may be that semantics as well as cognition is embodied by such experiences (see related discussion in Vivona 2009).

In the current model, Fonagy and colleagues (2007) highlight the crucial role of language in fostering mentalization, as conversations with others confront the child with the different knowledge and beliefs associated with other minds. Not surprisingly, they consider the semantics of speech to be important only after language acquisition proper. Before that, the infant is thought to learn about the minds of self and other primarily through the parents’ behavior, such as their use of facial expressions, behavioral marking, and the communicative cues described above to teach the infant about his affect states (Fonagy, Gergely, and Target 2007).

Yet the confluence of the young infant’s abilities to process emotional tones in speech, to discern discrete words, and to categorize elements of experience based on the presence of consistent verbal labels suggests that the content of adult speech may contribute to the infant’s ability to learn about the affective experience of self and other from the parent. Indeed, toward the end of the first year of life, words serve as cues to assist the infant in discerning which and whose feeling the parent intends to mark. It may be that words help infants differentiate affect states as they help them differentiate object categories, even before a full grasp of semantic meanings has been attained. It may be that parents’ words help infants disentangle who did what to whom, as when parents articulate such meanings in utterances like “You did it!” and “I see you!” That said, no study of early infant comprehension of pronouns or affect words, against which these speculations could be tested, has been reported in the literature.

The point is not merely that existing theories may need adjustment in light of new data. The more pressing point is that a fuller appreciation of the young infant’s linguistic and conceptual capacities may recast our view of the infant, particularly as we consider ways in which these processes interact with the emotional and interpersonal developments with which we are already familiar. To be sure, our relative neglect of linguistic processes during the first year of life has blinded us to important developments and, to some degree at least, has skewed our understanding of this period of life. Perhaps the tendency in psychoanalysis to dichotomize verbal and experiential modes of thought and being has impeded our ability to consider fully the complex interweaving of these different modes, in
infancy and later in life. Ironically, this holds even for our understanding of parental contributions to early development, to the extent that it has been channeled through the lens of the nonverbal infant. Conversely, to the extent that we conceptualize experiential processes in adulthood to be vestiges of infancy, we may underestimate their potential maturity and meanings as well.

Does Language Move One away from the Full Texture of Lived Experience?

The infant research has important implications for our understanding of the nature and functions of language. Many theorists conceptualize language as a mechanism of abstraction, to the extent that it moves one beyond the rich details of current experience and toward generalities (see discussion of this view in Vivona 2009); this is both the power and the limitation of language. Consistent with this view, the research suggests that, even in early infancy, hearing speech promotes thinking based on deriving general principles (e.g., how are these sounds or objects alike?), which channels perceptual experience and may even override it, as when infants consider different-looking objects to be “the same” in some sense because they have the same name. Thus, words channel both thinking and perceiving in powerful ways, and from earlier in life than we once believed. This may suggest that the abstraction wrought by language acquisition, which according to Stern (1985) “drives a wedge between two simultaneous forms of interpersonal experience: as it is lived and as it is verbally represented” (p. 162), occurs even before the second or third year of life.

However, it may well be that we have envisioned a greater divide between linguistic and nonlinguistic processing than exists in reality. That is, we see from the research that categorization is a vigorous and flexible process that operates from the first days of life; for instance, newborns categorize the speech sounds they hear along various dimensions. Categorization of the elements of perceptual experience is not only a consequence of language acquisition, but an essential foundation of it. Language makes use of processes that precede it developmentally, rather than only instituting new ways of thinking. This suggests some degree of continuity between earlier and later modes, in terms of both experiencing and processing. Moreover, it seems that conceptualizing categorization as force of abstraction considers only one side of the coin. That is, categorization may highlight important features that perception otherwise overlooks, in this way augmenting perception rather than occluding it. Likewise, we may under-
stand the world in more nuanced ways as our means of articulating its characteristics and meanings advance.

What is language, then, if not a mechanism of abstraction? The research on the processing of indexical features of speech in infants, as well as in adults, has prompted some linguists to propose that words are not purely abstract entities, disconnected from the experiential contexts in which they are learned and used, but rather that they are memories retaining vestiges of lived experience (see Hintzman 1986). To the extent that this is so, the hegemony of a word’s consensual, dictionary-based meaning over its experiential sense (see, e.g., Olds 2000) starts to break down. Indeed, in the history of speech, the dictionary is a relative latecomer, introduced to the child after several years of language production and to the species after more than a hundred thousand years. Interestingly, research on embodied language (see Vivona 2009) converges on a similar conclusion: that sensorimotor and linguistic representations may be inexorably linked in that language evokes a dim sensorimotor memory, at least some of the time. Together, these separate bodies of research intimate that words may be more entwined with experience, even a more fundamental aspect of it, than we have appreciated, both during infancy and subsequently.

Is There a Nonverbal Period of Development?

That the infant lives in a sensorimotor world, untouched by semantics, is widely believed. Within psychoanalysis, clinical implications of this construction have been emphatically articulated by Daniel Stern (e.g., 1985, 2008), who views the young infant’s mode of thought as encoded in nonlinguistic, nonsymbolic sensorimotor representations, rather than in abstract symbols accessible to words. “By default, the baby’s world is nonverbal” (Stern 2008, p. 177). For Stern, language acquisition grants the child powerful new capacities at the expense of continued access to the nonverbal, experiential layer of being, which becomes submerged and remote beneath the verbal layer. Yet, Stern believes, the baby’s original nonverbal nature persists as a distinct and separate implicit layer of being that informs relational experiences throughout life (Stern 2008). Stern has voiced particular concerns about the limits of language for expressing experiential truths of the implicit domain; with the Boston Change Process Group (2005; Stern et al. 1998), he has offered a model of therapeutic action that emphasizes experiential rather than verbal mechanisms of change (for a critique, see Vivona 2006).
The research on infant speech processing poses a challenge to the notion that even the young infant operates in a purely sensorimotor mode “by default.” To the contrary, Fernald, McRoberts, and Swingley (2001) pronounced a decade ago that to consider infants under ten months to be “prelinguistic” is “downright disrespectful” (p. 100). Current research depicts an infant who is actively oriented to speech from the beginning of life and whose competencies to understand that speech, including its meanings, develop early and rapidly. We discover in this research a young infant who not only understands something of the meaning of the speech she hears, but who also uses that speech to organize both her perception and her conceptualization of the world, perhaps beginning as early as three months of age, with the perceptual and conceptual processes informing, as well as sometimes competing with, one another (see also Mandler 2004). These capacities are all the more striking given that they emerge during the first year of life, before language acquisition proper, including the dramatic language production spurt of the second year.

Certainly the young infant’s speech-processing skills are primitive, and full linguistic capacity is many months in the future. Importantly, young infants cannot express in words their understanding of others’ speech. Even researchers who find the evidence for early linguistic and conceptual capacities compelling (e.g., Waxman and Gelman 2009; Fernald, McRoberts, and Swingley 2001) do not presume those capacities to be infallible or complete. Similarly, I do not mean to suggest that all experience is essentially or potentially verbal, during infancy or subsequently. Indeed, both infants and adults engage in vigorous sensorimotor processing of the world, and derive meaning from the world in this way. That said, to my surprise I could find no research to support the view that infants are at any age impervious to the content of the speech directed toward them or that their processing of the world is unaffected by such speech. The reported studies demonstrate that infants are more attentive to the sounds of speech than to other sounds and are affected by its various meanings (e.g., phonetic, semantic) even when they do not grasp them completely or correctly. Aural speech, when present, affects how infants process the world, especially when that speech is part of an interaction with another person, as it typically is.

Moreover, most of the substantial research on infant development in nonverbal realms, including Stern’s widely cited studies and others (e.g., Stern 1985; Beebe and Lachmann 1988; Jaffe et al. 2001), does not provide evidence that the nonverbal mode predominates over the verbal mode,
precisely because that research does not assess the verbal mode. Only recently have researchers begun to compare verbal and sensorimotor modes of learning throughout life (e.g., Hahn and Gershkoff-Stowe 2010). Such studies are necessary to demonstrate the conditions under which nonverbal or verbal experience predominates, and the ways in which these modes interact. Of course, absence of evidence does not disprove. Yet I believe we can safely conclude from the available research that the nonverbal mode is not the young infant’s sole mode of being, and this raises the possibility that it is not the infant’s default mode of being. To me, the research indicates that a pure or predominant sensorimotor mode of infancy cannot be assumed and instead must be demonstrated.

The available evidence is not consistent with the view that the nature of infancy is essentially or predominantly nonverbal or that language begins to shape experience after age two, and then as an obfuscating cloak. The young infant is preverbal in that she is moving toward producing her own speech, and she is verbal to the extent that she has begun to amass a vocabulary of acoustic word forms, to associate meaning to those word forms, to apply word forms reliably in novel contexts, to think differently about her world in response to the words she hears uttered by others, and to understand speaking as a communicative act. By contrast, to view the infant as truly nonverbal, one must assume that she is not only mute but also deaf and therefore immune to aural speech. Moreover, viewing the infant this way renders the content of the adult’s speech irrelevant, too, as though the adult is mute as well.

What are the implications of the idea that language shapes the mind from the very earliest days of life? To state this boldly and even provocatively, there may be no form of self-experience that is profoundly or unequivocally beyond the reach of language, at least not in normal development. If this is so, then infancy provides no inherent justification for therapeutic approaches specifically designed to access modes of thought and being that are conceptualized as beyond language because they are before language in some sense.

**CLINICAL IMPLICATIONS**

Some clinical implications for psychoanalytic treatment with adults come into view when we consider moments when words fail in some way, as when silence hints at a loss of words, when actions speak louder than words
during an enactment, or when a vague or powerful somatic experience evades articulation. What do we make of such moments? What do we do?

If we conceptualize such moments as involving an experience that is beyond the reach of words and concepts, reminiscent of or analogous to the infant’s presumed original sensorimotor state, we would not expect patients to speak about them. Rather than attempting to put words to the experience ourselves, we would observe the patient’s bodily expressions and search our own emotional state for clues to what is taking place in an experiential mode. Following the Boston Change Process Study Group (see, e.g., 2008), we would consider the experience itself to hold therapeutic potential, particularly if it is interpersonally shared, whether or not it is verbalized.

By contrast, if we expect that words may have some role to play in such a moment, despite their apparent absence or inadequacy, then we may try to find the words in the experience, either with or for the patient (see Vivona 2003). We will pay close attention to the words produced by the patient and thought by us as clues to what is and is not being spoken, as well as to the rules about speaking and thinking that the patient has internalized. We may think of words as harbingers of experience, as memories of relationships, as containers of meaning and value. Following Loewald (1978), we will regard words as essentially personal rather than purely abstract, as potentially infused with experience rather than always obscuring it; we will see talking as a means of transformation, in addition to being a reflection of it (Loewald 1960).

Informed by a developmental view in which the lexicon expands over time, we will think of verbalization in terms of degrees, rather than as present versus absent. We will wonder how much or how well or in what ways an experience can be thought and verbalized, rather than whether it can. We may think of our therapeutic work as facilitating the development of concepts and vocabulary for the important experiences of life, work that is carried out through the interpersonal therapeutic mechanisms of verbalization and conversation. With our words, we can draw the patient’s attention to aspects of experience he may not attend to, perceive, or articulate on his own, as does the mother who draws the baby’s attention to objects and events in the world, marking them as important with her interest, and who voices the words that become part of those experiences, and vice versa.

Finally, we will wonder why words are absent or failing in a particular moment; if even the infant’s experience is not nonverbal by default, then the absence of words may not automatically herald an experiential
state, but instead may warrant explanation. What intrapsychic or interpersonal experiences does the inarticulate moment defend against? What does it mean, in this moment, to think or speak or be heard, or not to be? Who encouraged the thinking and speaking of such experiences? Who discouraged it?

There may appear to be a subtle difference between these perspectives, different shades of gray rather than black versus white. But I think the difference is profound. That is, if words play no role at all in some experiences, if indeed such experiences resist words and are tainted by them, then we must need some other way to work with such moments in therapy. By contrast, if words can be mobilized to do the work, even if in different ways and to different degrees at different moments, then we are always practicing a talking cure.

CONCLUSION

To recall the words of Zora Neale Hurston with which we began, the research on infant speech processing is indeed consistent with the idea that “words float around on thought and thought on sight and sound.” The sights and sounds of the infant’s experience support her thought, and her thought supports her words. The research also suggests that the relationship can go the other way, that thought floats on words, as when the infant uses the adult’s words to create categories of thought. Indeed, the research suggests new ways in which conceptual and verbal representations may be related to sensorimotor representations, potentially expanding our consideration of their integrations in psychoanalysis.

And what about “a depth of thought untouched by words”? Can we reconcile the idea of an essentially nonverbal experience with research that suggests a profound role for language from the first days of life? Of course, the research reviewed here does not invalidate the idea that nonverbal thought is present in the mind, either during infancy or subsequently. But the research does, I believe, pose a challenge to psychoanalysts who float their theories of such thought on a view of the infant as essentially and radically nonverbal. That is, infancy itself does not explain the presence of “a depth of thought untouched by words.”

On the other hand, I do not mean to suggest that all thought is essentially verbal. That would be neither wise nor psychoanalytic. But I would propose, emboldened by the research on infant speech processing, that words may touch thought earlier and thus, perhaps, more fundamentally...
than we have imagined. Of course, the mind has many mechanisms for rendering thought unspeakable. William James emphasized the potential presence of words in patently “nonverbal” experiences: “The rhythm of a lost word may be there without a sound to clothe it. . . . Everyone must know the tantalizing effect of the blank rhythm of some forgotten verse, restlessly dancing in one’s mind, striving to be filled out with words” (1890, p. 244). There may be, therefore, “a depth of thought untouched by words” whose rhythm remains in memory, a thought that is neither inherently resistant nor indifferent to words, but instead strives to be filled out with them.

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