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Language Discrimination by English-Learning 5-Month-Olds: Effects of Rhythm and Familiarity

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Six experiments using the headturn preference procedure investigated 5-month-old American infants' ability to discriminate languages. The impetus for the present study was a report that newborns discriminate languages across, but not within, rhythmic classes (Nazzi et al., 1998). Two experiments verified that at 5 months, infants still discriminate pairs of languages from different rhythmic classes (British English vs Japanese; Italian vs Japanese). An additional experiment indicated that American 5-month-olds did not discriminate two languages within a foreign rhythmic class (Italian vs Spanish, syllable-based). Three subsequent experiments tested language discrimination within the native stress-based class. Discrimination of the languages occurred when the native language or one of its variants was presented (British English vs Dutch; American English vs British English), but not when both languages were equally unfamiliar (Dutch vs German). Our findings suggest that language discrimination within the native rhythmic class derives from infants' developing knowledge of the sound organization of their native language.

Key Words: rhythm; language discrimination; language acquisition.

An increasing body of literature shows that, during the first year of life, infants' speech perception abilities evolve as a consequence of their increasing knowledge about their native language (for a review see Aslin, Jusczyk, & Pisoni, 1998). From an initial state in which these capacities appear to be language general, infants' abilities become more closely attuned to the structure of their native language. Such early tuning was first observed for infants' phonetic perception abilities. Under 6 months of age, infants discriminate very subtle phonetic contrasts, both consonantal and vocalic, whether they appear in their native language or not (Eimas, 1975; Eimas, Siqueland, Jusczyk, & Vigorito, 1971; Morse, 1972; Streeter, 1976; Trehub, 1973, 1976). However, the ability to discriminate nonnative consonant contrasts declines around 10 months of age (Werker & Tees, 1984), though not for all types of nonnative contrasts (Best, McRoberts, & Sithole, 1988). The evidence suggests that declines in sensitivity to nonnative contrasts depend on their relation to phonemic categories in the native language (Best, 1995; Best, Lafleur, & McRoberts, 1995). There are also some indications that sensitivity to nonnative vowel contrasts declines at an earlier age than for consonants (Kuhl, Williams, Lacerda, Stevens, & Lindblom, 1992; Polka & Bohn, 1996; Polka & Werker, 1994).

Although much infant speech research has concentrated on the perception of phonetic segments, increasing attention has been devoted to infants' sensitivity to the prosodic organization of their native language. Sensitivity to the prosodic dimensions of duration, fundamental frequency, and intensity during the first few months of life is attested by a large number of studies (Fernald & Kuhl, 1987; Jusczyk &

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Thompson, 1978; Karzon & Nicholas, 1989; Kuhl & Miller, 1982; Morse, 1972; Nazzi, Bertoncini, & Mehler, 1998; Nazzi, Floccia, & Bertoncini, 1998; Spring & Dale, 1977). The proposal that prosody might play a crucial role in early language acquisition (Gleitman & Wanner, 1982; Jusczyk, 1997; Morgan & Demuth, 1996; Peters, 1983) has stimulated interest in infants' sensitivity to and their acquisition of the prosodic characteristics of their native language. Recent evidence indicates that between 6 and 9 months, infants begin to specify the prosodic properties of words in their native language. For example, Jusczyk, Friederici, Wessels, Svenkerud, and Jusczyk (1993b) found that 6-month-old English learners detect the prosodic differences that distinguish English from Norwegian words. The present study further explores issues related to the early sensitivity to and acquisition of the prosodic properties of the native language.

Studies with adults indicate that the rhythm of one's native language influences on-line speech processing such that speakers of French, English, and Japanese appear to use different segmentation procedures based on the rhythmic units of their native language. For instance, Mehler, Dommergues, Frauenfelder, and Segui (1981) reported that the unit of segmentation used by French-speaking adults is the syllable. However, English segmentation strategies are apparently guided by information about typical word-stress patterns (Cutler, Mehler, Norris, & Segui, 1986; Cutler & Norris, 1988), which involve an alternation of strong syllables (ones containing full vowels) and weak syllables (ones with reduced vowels). A third pattern has been reported for Japanese listeners, who apparently rely on the mora to segment speech (Otake, Hatano, Cutler, & Mehler, 1993). The mora is a rhythmic unit that can either be syllabic or subsyllabic. In English, a mora roughly corresponds to a CV syllable with a short vowel (e.g., "the" as opposed to "thee," which has a long vowel). In Japanese, CV syllables with long vowels and syllables with final nasals (like the first syllable in "Honda") or final geminate consonants (like the first syllable in "Nissan") have two morae. Moreover, adults' segmentation procedures appear to be determined by their native language rather than by the language they are listening to. So, once they master a particular language adults rely on procedures tailored to that language even when listening to a foreign language (Cutler et al., 1986; Otake et al., 1993).

It has been suggested that each of the different types of segmentation procedures is optimally adapted to processing a particular rhythmic class of languages (Cutler & Mehler, 1993; Otake et al., 1993; see also Sebastián-Gallés, Dupoux, Segui, & Mehler, 1992; Vroomen, van Zon, & de Gelder, 1996). This proposal is based on a three-way classification of languages according to their predominant rhythmic structure (Abercrombie, 1967; Pike, 1945). By this classification, most Romance languages (e.g., French, Italian, and Spanish) have a rhythm based on the syllable, most Germanic languages (e.g., English, Dutch, and German) have a rhythm based on the stress unit, while languages such as Japanese have a mora-based rhythm. Evidence for these rhythmic classes is reported in several recent investigations (Arvaniti, 1994; den Os, 1988; Fant, Kruckenberg, & Nord, 1991; Nazzi, 1997; Shafer, Shucard, & Jaeger, 1999; Ramus, Nespor, & Mehler, 1999).

The view that the rhythmic properties of language help to shape listeners' processing strategies has influenced views of how infants develop efficient procedures for processing native-language utterances. Mehler, Dupoux, Nazzi, and Dehaene-Lambertz (1996) proposed that procedures for segmenting native-language utterances originate in a sensitivity to linguistic rhythm that allows infants to distinguish utterances from various rhythmic classes.

Several prior investigations of infants' language-discrimination abilities allow for an evaluation of infants' sensitivity to rhythm. Mehler, Jusczyk, Lambertz, Halsted, Bertoncini, and Amiel-Tison (1988) studied French newborns' and 2-month-old American infants' abilities to discriminate utterances drawn from languages of different rhythmic classes. Both groups of infants discriminated utterances in their native language from those in a foreign language (Russian and Italian, respectively), but neither group appeared to discriminate between two foreign languages. This led to the conclusion that early language discrimination was based on recognition of the native language (see also Bahrick & Pickens, 1988; Dehaene-Lambertz & Houston, 1998; Moon, Panneton-Cooper, & Fifer, 1993) rather than on rhythmic-class discrimination. However, the latter conclusion was undermined by a subsequent reanalysis of these data by Mehler and Christophe (1995) in which the data for the different subgroups were merged. This new analysis showed that the newborns did discriminate the foreign languages (although the 2-month-olds had not), thus raising the prospect that newborns did rely on rhythmic differences.

To clarify the issue, Nazzi, Bertoncini, and Mehler (1998) conducted a new study with newborns, testing the hypothesis that infants extract the rhythmic characteristics of utterances and use these characteristics to sort utterances (languages) into a limited number of rhythmic classes. This *rhythmic hypothesis*, which predicts that infants only discriminate languages belonging to different rhythmic classes, was tested by systematically varying the rhythmic distance between the languages presented.

Nazzi et al.'s results supported the rhythmic hypothesis. French newborns discriminated two foreign languages from different rhythmic classes, stress-based British English and mora-based Japanese, but did not discriminate two languages from the stress-based class, British English and Dutch. In another experiment, infants were familiarized with utterances from two languages and then tested on whether they discriminated these from utterances from two other languages. Discrimination was found when the languages were paired according to the rhythmic classes (i.e., stress-based British English and Dutch vs syllable-based Italian and Spanish), but not when the pairing was made across the rhythmic classes (i.e., British English and Italian vs Dutch and Spanish). Hence, newborns discriminated the languages only when there was a rhythmic basis for doing so. Moreover, it appeared that newborns were not sensitive to the prosodic differences existing between languages from the same rhythmic class or at least that the intraclass differences were less important than the intraclass similarities. Additional support for the view that young infants have difficulty discriminating languages from the same rhythmic class comes from the finding that English 2-month-olds do not discriminate British English from Dutch (Christophe & Morton, 1998).

The finding that young infants are sensitive to linguistic rhythm lends support to the rhythmic hypothesis. Sensitivity to rhythmic features would initially allow infants to classify utterances into the rhythmic classes that appear to determine adults' segmentation procedures. In their article Nazzi et al. noted that the age at which infants begin to discriminate languages from the same rhythmic class remained to be determined. Since then, Bosch and Sebastián-Gallés (1997; Bosch, 1998) reported that 4-month-olds from Barcelona can discriminate Spanish and Catalan, two syllable-based languages, one of which was the native language of the infants. This finding suggests an evolution between birth and 4 months in infants' abilities to discriminate languages that cannot be accounted for solely by the rhythmic hypothesis. Several interpretations of this result are possible, three of which are outlined below.

According to the *rhythmic-class acquisition hypothesis*, proposed by Nazzi et al. (1998), infants' initial sensitivity to rhythmic classes is the foundation for learning about the common rhythmic organization of the native rhythmic class. Knowledge of this organization could allow infants to develop the effective procedures used by adults for processing and segmenting speech in the native rhythmic class. It could also enable them to perform more detailed analyses of the rhythmic properties of languages within the native class, leading to improvements in discriminating languages within that class. Accordingly, by a few months of age, infants should discriminate any two languages from the native rhythmic class, but should not discriminate languages belonging to the same foreign rhythmic class.

However, two other possibilities are worth considering. The *native-language acquisition* *hypothesis* asserts that newborns' sensitivity to rhythmic classes might lead to learning the rhythmic properties of their native language (those that it shares with other languages and those that distinguish it from other languages in its class) rather than the common properties of the native-language class as a whole. This pattern of acquisition is similar to the one observed for the acquisition of the phonetic and phonotactic properties of the native language. In the latter case, early perceptual categories seem to pave the way for learning about the phonetic and phonotactic organization of their language (Jusczyk et al., 1993b; Jusczyk, 1998a; Werker & Tees, 1984). This hypothesis predicts that the ability to discriminate languages evolves during the first months with the emergence of the ability to discriminate the native language from foreign languages belonging to the native rhythmic class. However, infants should not discriminate two foreign languages from the native rhythmic class (except possibly if one language is much closer to the native language than the other), nor should they discriminate between two foreign languages from the same foreign rhythmic class.

Finally, infants may undergo a general maturation process between birth and 4 months that allows them to make more subtle language discriminations. This *maturation hypothesis* holds that, at some point in development, infants should discriminate any two languages, provided that they differ sufficiently at the acoustic level. Furthermore, infants should discriminate languages both within the native language class and within foreign classes.

The goal of the present study was to determine which one of these hypotheses best describes the evolution of infants' language-discrimination abilities. Consequently, we explored the language-discrimination abilities of English-learning 5-month-olds (about the same age as those tested by Bosch, 1998; Bosch & Sebastián-Gallés, 1997). However, testing these older infants necessitated using a different procedure than the one used by Nazzi et al. (1998) with newborns and Christophe and Morton (1998) with 2-month-olds. For this purpose, we adapted the Headturn Preference Procedure (HPP) to provide a discrimination measure (see also Bosch, 1998). Because of the new procedure, we decided to begin by testing infants on language contrasts involving languages from different rhythmic classes. Specifically, we presented one language from the infants' native-language rhythmic class (stress-based British English) and one from a different rhythmic class (mora-based Japanese) in Experiment 1 and two languages from different nonnative language rhythmic classes (syllable-based Italian vs mora-based Japanese) in Experiment 2. Experiment 3 examined infants' discrimination of a pair of languages from a rhythmic class that differed from that of their native language (i.e., syllable-based Italian vs syllable-based Spanish). Finally, Experiments 4 to 6 examined infants' abilities to discriminate three language pairs from their native-language rhythmic class (British English vs Dutch in Experiment 4; American English vs British English in Experiment 5; Dutch vs German in Experiment 6) in order to clarify the nature of this ability.

EXPERIMENT 1

Given previous findings in which infants discriminated between utterances from their native language and utterances from another language of a different rhythmic class (Bahrick & Pickens, 1988; Dehaene-Lambertz & Houston, 1998; Hesketh, Christophe, & Dehaene-Lambertz, 1997; Mehler et al., 1988), American 5-month-olds should discriminate utterances in American English from ones in Japanese. However, because Nazzi et al.'s (1998) investigation is a critical reference point for investigating the discrimination of languages from within and between rhythmic classes, we thought it wise to use the same materials, insofar as possible. Consequently, because Nazzi et al. had used stimuli produced by British-English speakers, we decided to use those same samples. One potential risk in using these samples is that perceived differences between British English and American English might be distracting to the infants, perhaps hindering their discrimination of these samples from ones in Japanese. However, according to the rhythmic hypothesis and the results with newborns (Nazzi et al., 1998), infants should discriminate languages from different rhythmic classes even when both are foreign languages. Hence, we predicted that 5-month-old American infants would discriminate these British-English samples from ones from a different rhythmic class (i.e., Japanese).

Method

Participants. Twenty American 5-month-olds (13 males and 7 females) from monolingual English-speaking homes participated. The infants' average age was 148 days (range = 136 to 167 days). The data from an additional 10 infants were not included for the following reasons: fussing and crying (6), experimental errors (2), failing to listen for an average of 3 s to passages of each language (1), and not turning to the lights (1).

Stimuli. The stimuli consisted of 8 British-English and 8 Japanese passages (see Appendix). Each passage was made up of 5 unrelated sentences recorded by the same speaker (the sentences were those used in Experiment 1 of Nazzi et al., 1998). Four female native speakers of each language had been recorded. Each speaker had read 10 sentences of her native language (in other words, each speaker recorded 2 of the passages for her language). Here and in all the following experiments, efforts were made to minimize voice-quality differences (pitch and timbre) of the different speakers, both within and between languages. In line with the materials used in previous investigations of language-discrimination abilities, the utterances were produced as adult-directed speech. The mean duration of the passages was about 16 s for the two languages, and the same duration was used in all the following experiments reported here.

Procedure and apparatus. The experiment was conducted in a three-sided test booth made of pegboard panels. Except for a small section of preexisting holes in the front panel used for monitoring the infant's headturns, the panels were backed with white cardboard to prevent the infant from seeing behind the panels. The test booth had a red light and a loudspeaker (7-inch Advent) mounted at eye level on each of the side panels and a green light mounted on the center panel. Directly below the center light a 5-cm hole accommodated the lens of a video camera used to record each test session. A white curtain suspended around the top of the booth shielded the infant's view of the rest of the room. A computer terminal (Macintosh Quadra 650) and response box were located behind the center panel, out of view of the infant. The response box, which was connected to the computer, was equipped with a series of buttons that started and stopped the flashing center and side lights, recorded the direction and duration of headturns, and terminated a trial when the infant looked away for more than 2 s. Information about the direction and duration of the headturns and the total trial duration were stored in a data file on the computer.

A modified version of the HPP was used in the present study. Normally, in HPP, infants are presented with two types of materials, and preferences for one type or the other are indexed from a comparison of average orientation times to each type (Hirsh-Pasek, Kemler Nelson, Jusczyk, Wright Cassidy, Druss, & Kennedy, 1987; Kemler Nelson, Jusczyk, Mandel, Myers, Turk, & Gerken, 1995). In such cases, infants display a preference for materials that conform to a familiar structure in their native language, be it syntactic form (Hirsh-Pasek et al., 1987), phonotactic structure (Jusczyk et al., 1993b), or the predominant word-stress pattern (Jusczyk et al., 1993a). However, the objective of the present version of the procedure was to test language discrimination irrespective of infants' prior experience with a particular language. Thus, we habituated infants to utterances in one language, then measured their orientation times to new utterances in the same language or to new ones in a new language. Given Bosch's (1998) findings, we expected that if infants discriminated between the languages, during the test phase they would listen longer to the passages from the new language.

Each infant was held on the lap of a caregiver seated on a chair in the center of the test booth. Each trial began by blinking the green light on the center panel until the infant oriented in that direction. Then, the center light was extinguished and the red light above the loudspeaker on one of the side panels began to flash. When the infant turned at least 30° in the direction of the light, the stimulus for that trial began to play and continued until the five sentences in the passage had been presented or until the infant failed to maintain the 30° headturn for 2 consecutive s. The stimuli, digitized on the computer, were presented over 7-inch Advent loudspeakers via a 12-bit D/A converter, antialiasing filters, and a Kenwood audio amplifier (Model KA 5700). If the infant turned away from the target by 30° in any direction for less than 2 s and then turned back again, the time spent looking away was not included in the orientation time. Thus, the maximum orientation time for a given trial was the duration of the entire speech sample. The red light flashed for the duration of the trial.

In the familiarization phase, four passages in one language (two different passages from two different speakers of the same language) were presented until infants had listened for at least 20 s to each passage. In the test phase, infants heard four passages from the other language (spoken by two different speakers) and four new passages from the familiarization language (spoken by the remaining two speakers). The order of presentation of the eight test passages was randomized for each infant. The side of the loudspeaker from which the stimuli were presented was randomly varied from trial to trial.

An observer hidden behind the center panel looked through a peephole and recorded the direction and duration of the infant's headturns using a response box. The observer was not informed as to the familiarized language condition (British English vs Japanese) to which the infant was assigned. Because both the observer and the infant's caregiver wore earplugs and listened to masking music over tight-fitting closed headphones, they were unaware of the ordering of the test samples.

Design. Ten infants were randomly assigned to each of two groups, defined in terms of the language (British English or Japanese) presented in the familiarization phase.

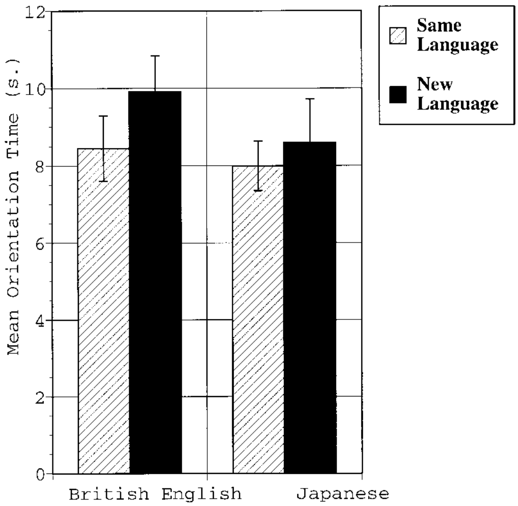

FIG. 1. Mean orientation times (and standard error bars) broken down by the language used in familiarization for the passages in the new versus familiarized language in the test phase of Experiment 1. The languages tested are British English and Japanese.

Results

Mean orientation times to the two languages in the test phase were calculated for each infant. Fifteen of the 20 infants had longer orientation times for the passages in the nonfamiliarized language. Across all infants, the average orientation times were 9.25 s (SD = 3.25 s) for the passages in the new language and 8.22 s (SD = 2.06 s) for the passages in the familiarized language (see Fig. 1). A two-way ANOVA with the main between-subjects factor of group (familiarized with British English vs Japanese) and the main within-subjects factor of status (new vs familiarized language during test) revealed a significant main effect of status, $F(1, 18) = 5.06$, $p = .037$. Infants had significantly longer orientation times to the new language than to the familiarized one. There was no effect of group, $F(1, 18) < 1$, and no interaction between the two factors, $F(1, 18) = 1.30$, $p = .27$. Thus, regardless of whether the infants were familiarized with British English or Japanese utterances, they listened significantly longer to the samples in the other language during the test phase.

Discussion

The present findings demonstrate that American 5-month-olds discriminate British-English from Japanese passages. These findings provide further confirmation of infants' abilities to discriminate these two languages and extend to a new age group the results found for newborns (Nazzi et al., 1998) and 2-month-olds (Hesketh et al., 1997). In line with the rhythmic hypothesis, 5-month-olds discriminated a language from their native-language rhythmic class (i.e., stressed based) from a language from a different rhythmic class (i.e., mora-based).

The symmetry of the infants' preference for the new language in the two language familiarization conditions is interesting. Whether infants considered British English as their native language or not, this symmetry suggests that infants compared the incoming test passages with the language they were familiarized with rather than to some stored representation of native-language rhythmic features. Hence, the present method is appropriate for testing infants' discrimination of languages, independent of their familiarity with the languages presented.

EXPERIMENT 2

Because Experiment 1 pitted a language from the native-language rhythmic class against one from a nonnative rhythmic class, infants' prior familiarity with the rhythmic properties of English may have been sufficient to discriminate the two languages. To determine if infants can discriminate two unfamiliar languages from different nonnative rhythmic classes, we presented our English learners with a contrast between a syllable-based language (Italian) and a mora-based language (Japanese). According to the rhythmic hypothesis, because these languages come from different rhythmic classes, infants should have no difficulty in discriminating them, despite their lack of prior experience with either language. Still, in a prior investigation (Christophe & Morton, 1998) English-learning 2-month-olds did not distinguish a syllable-based language (French) from a mora-based language (Japanese). A similar failure to discriminate in the present experiment would imply that either the present method is not sensitive enough or experience with the rhythmic properties of a particular language plays a significant role in 5-month-olds' discrimination of languages (even ones from different rhythmic classes).

Method

Participants. Twenty American 5-month-olds (11 males and 9 females) from monolingual homes participated. The infants' average age was 157 days (range = 135 to 180 days). The data from 10 additional infants were not included because of fussing or crying (8), equipment failure (1), and failure to look at the lights (1).

Stimuli. The eight Japanese passages were the same as in Experiment 1. In addition, as in Experiment 1, eight Italian passages of five sentences each (see Appendix) were created from the materials used in Experiment 3 of Nazzi et al. (1998). Once again, there were four different female Italian speakers and two different passages from each speaker. The eight Italian sentences were matched with the Japanese ones on their number of syllables, which varied from 15 to 21.

Procedure, apparatus, and design. The procedure and the apparatus were the same as in Experiment 1. Ten infants were randomly assigned to each of two groups, according to the language (Japanese or Italian) presented in the familiarization phase.

Results

Mean orientation times to the two languages in the test phase were calculated for each infant. Fourteen of the 20 infants had longer orientation times for the passages in the nonfamiliarized language. Across all infants, the average orientation times were 7.80 s (SD = 3.26 s) for the passages in the new language and 5.81 s (SD = 2.22 s) for the passages in the familiarized language (see Fig. 2). A two-way ANOVA with the between-subjects factor of group and the within-subjects factor of status revealed a significant main effect of status, $F(1, 18) = 5.69$, $p = .028$. Infants' orientation times were

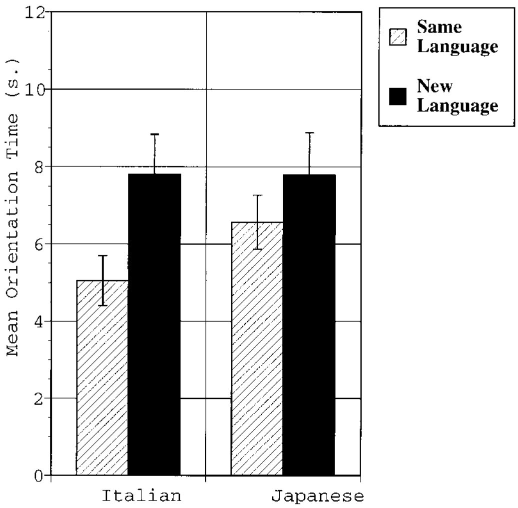

FIG. 2. Mean orientation times (and standard error bars) broken down by the language used in familiarization for the passages in the new versus familiarized language in the test phase of Experiment 2. The languages tested are Italian and Japanese.

longer to the new than to the familiarized language. There was no effect of group, $F(1, 18) < 1$, and no interaction between the two factors, $F(1, 18) < 1$.

Discussion

Despite their lack of previous experience with either language, American 5-month-olds discriminated Italian from Japanese utterances. Thus, evidence of infants' ability to discriminate between rhythmic classes is extended to the previously untested syllable- vs mora-timed distinction. Moreover, as predicted by the rhythmic hypothesis and as was previously shown with newborns (Nazzi et al., 1998), infants can discriminate languages from different rhythmic classes even when neither language comes from the native rhythmic class. Hence, both studies suggest that experience is not required for infants to discriminate languages that come from different rhythmic classes.

At this point, it is worth considering an apparent paradox. Although both newborns and 5-month-olds discriminate pairs of foreign languages from different rhythmic classes, both Mehler et al. (1988) and Christophe and Morton (1998) were unable to establish that English-learning 2-month-olds discriminated such pairs (French–Russian, French–Japanese, and Dutch–Japanese). A preliminary experiment we conducted may provide an explanation for this discrepancy. Initially, we tested 5-month-olds' ability to discriminate British English from Japanese using an adaptation of the HPP procedure (Tucker, Jusczyk, & Jusczyk, 1997) that was more similar to the one used by Mehler et al. (1988) and Christophe and Morton (1998). In this other procedure, infants were habituated to utterances in one language and then tested on new utterances from either the same language or a different language rather than with both languages as in the present study. Also, the data analysis in the present study took into account performance on all test trials, as opposed to the change trial measure used in the earlier studies. As with the earlier studies using versions of the habituation procedure (and contrary to the present study), we found no evidence of discrimination between British English and Japanese. Thus, the failure to find evidence for a discrimination of foreign languages from different rhythmic classes at 2 months of age may be attributable to an insensitive test procedure in those studies rather than evidence against the rhythmic hypothesis. Conversely, a comparison of the results of our preliminary experiment with those of Experiments 1 and 2 indicates that the present modification of the HPP is sufficiently sensitive for testing the discrimination of languages, even when both languages are unfamiliar to the infants.

Having established the sensitivity of the procedure, we now explore 5-month-olds' ability to discriminate languages from the same rhythmic class. In the introduction, we noted three competing hypotheses that might explain the emergence of within-class language discrimination around 4–5 months of age. Two of the hypotheses—the rhythmic-class acquisition and the native-language acquisition hypotheses—predict that within-class language discrimination should not occur within a nonnative rhythmic class, while the maturation hypothesis predicts it should.

EXPERIMENT 3

To determine if American 5-month-olds can discriminate between two languages from the same nonnative rhythmic class, we tested them on utterances from two syllable-based languages, Italian and Spanish. If, as the maturation hypothesis posits, 5-month-olds are simply more sensitive to general properties of sound organization that mark differences among languages, whether inside or outside the native-language rhythmic class, English learners should discriminate Italian and Spanish utterances. Alternatively, if either the rhythmic-class acquisition or the native-language acquisition hypothesis is correct, familiarity with the native-language rhythmic class determines whether infants will discriminate languages from the same rhythmic class. Consequently, because American 5-month-olds' experience is with a stress-based rhythmic class, they should not discriminate between two syllable-based languages, such as Italian and Spanish.

Method

Participants. Twenty American 5-month-olds (12 males and 8 females) from monolingual homes participated. The infants' average age was 148 days (range = 133 to 162 days). The data from seven additional infants were not included because of fussing or crying.

Stimuli. Eight Italian and eight Spanish passages of five sentences each (see Appendix) from Nazzi (1997) were used here. The Italian passages were the same as those in Experiment 2. These Italian sentences were matched with the Spanish ones on their number of syllables, which varied from 15 to 21. As with the materials in the other experiments, four female Spanish speakers recorded ten of the sentences. Construction of the Spanish passages was the same as in the previous experiments.

Procedure, apparatus, and design. The procedure and the apparatus were identical to those described in Experiment 1. Ten infants were randomly assigned to each of two groups, according to the language (Italian or Spanish) in the familiarization phase.

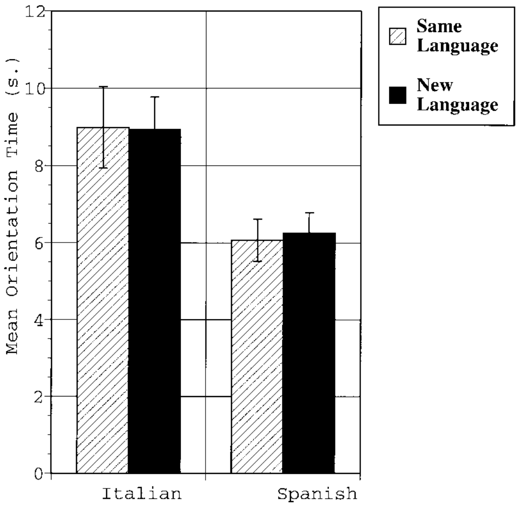

FIG. 3. Mean orientation times (and standard error bars) broken down by the language used in familiarization for the passages in the new versus familiarized language in the test phase of Experiment 3. The languages tested are Italian and Spanish.

Results

Mean orientation times to the two languages in the test phase were calculated for each infant. Eleven of the 20 infants had longer orientation times for the passages in the nonfamiliarized language. Across all infants, the average orientation times were 7.59 s (SD = 2.57 s) for the passages in the new language and 7.52 s (SD = 2.98 s) for the passages in the familiarized language (see Fig. 3). A two-way ANOVA with the between-subjects factor of group and the within-subjects factor of status revealed no significant effect of status, $F(1, 18) < 1$, indicating that infants' orientation times to the new language did not differ from those to the familiarized one. There was an effect of group, $F(1, 18) = 8.80$, $p = .01$, but no interaction between the two factors, $F(1, 18) < 1$. Although infants familiarized with Italian had longer orientation times during the test phase (M = 8.95 s, SD = 2.94) than infants familiarized with Spanish (M = 6.16 s, SD = 1.66), both groups of infants displayed a similar pattern of results with respect to language preference during the test phase.

Discussion

The present experiment provides no evidence that American 5-month-olds discriminated Italian and Spanish, two languages from a nonnative rhythmic class (i.e., syllable-based). This result argues against the view that the discrimination of languages from the native rhythmic class (Bosch & Sebastián-Gallés, 1997) is the result of general maturation of processing abilities (maturation hypothesis). However, like Bosch and Sebastián-Gallés (1997) findings, it is consistent with the predictions of the other two competing hypotheses. According to the rhythmic-class acquisition hypothesis, the discrimination of languages from the same rhythmic class should be limited to the native class. Similarly, the native-language acquisition hypothesis predicts that infants should only discriminate languages from the same rhythmic class when one is the native language (or when one language is much closer to the native language than the other). In the next three experiments, we tested American 5-month-olds on different pairs of languages from their native rhythmic class. The goal was to determine whether they discriminate languages from their native stress-based rhythmic class and whether this ability conforms to the predictions of the rhythmic-class acquisition hypothesis or the native-language acquisition hypothesis.

EXPERIMENT 4

To determine if American infants discriminate two languages from their native-language rhythmic class, we first tested them on British English and Dutch. As noted earlier, prior studies provide no evidence that younger infants, whether French newborns (Nazzi et al., 1998) or English 2-month-olds (Christophe & Morton, 1998), discriminate British English and Dutch. However, considerable evidence indicates that infants learn much about fine-grained phonetic and prosodic properties of words and syllables beginning at around 6 months of age (for a review see Jusczyk, 1997). A developmentally earlier sensitivity to the rhythmic organization of more global units of native language input (at the sentence level investigated here) would not be surprising. Certainly, Bosch and Sebastián-Gallés' (1997) findings that 4-month-olds from Barcelona discriminate syllable-based Spanish and Catalan fit this pattern. Consequently, we expected American 5-month-olds to discriminate stress-based British English and Dutch.

Method

Participants. Twenty American 5-month-olds (10 males and 10 females) from monolingual homes participated. The infants' average age was 156 days (range = 147 to 173 days). The data from five additional infants were not included because of fussing or crying.

Stimuli. The eight British-English passages from Experiment 1 plus eight comparable Dutch passages (taken from Experiment 2 of Nazzi et al., 1998) were used here. The eight Dutch passages of five sentences each (see Appendix) were recorded from four different female speakers, each of whom recorded two passages. These passages were matched with the British-English ones on their number of syllables, which varied from 15 to 21.

Procedure, apparatus, and design. The procedure and the apparatus were largely the same as in Experiment 1. The only exception was that new loudspeakers (Cambridge Soundworks New Ensemble II loudspeakers) were used. Ten infants were randomly assigned to each of two groups, according to the language (British English or Dutch) in the familiarization phase.

Results

Mean orientation times to the two languages in the test phase were calculated for each infant. Thirteen of the 20 infants had longer orientation times for the passages in the nonfamiliarized language (one infant had a null score). Across all infants, the average orientation times were 8.50 s ($SD = 3.08$ s) for the passages in the new language and 6.79 s ($SD = 3.29$ s) for those in the familiarized language (see Fig. 4). A two-way ANOVA with the between-subjects factor of group and the within-subjects factor of status revealed a significant main effect of status, $F(1, 18) = 6.73$, $p = .018$. Infants' orientation times were longer to the new language than to the familiarized one. There was no effect of

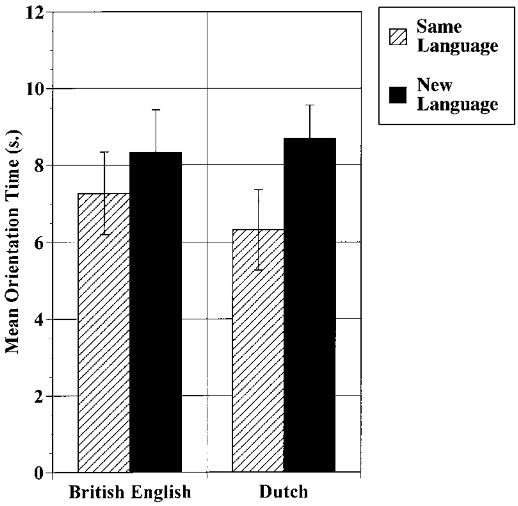

FIG. 4. Mean orientation times (and standard error bars) broken down by the language used in familiarization for the passages in the new versus familiarized language in the test phase of Experiment 4. The languages tested are British English and Dutch.

group, $F(1, 18) < 1$, and no interaction between the two factors, $F(1, 18) < 1$.

Discussion

The present results reveal that American 5-month-olds discriminated British English and Dutch. Thus, English-learning 5-month-olds discriminate two languages from the same (stress-based) rhythmic class. These results are consistent with those of Bosch and Sebastián-Gallés (1997), who found that 4-month-olds also discriminated two languages from the same rhythmic class (syllable-based Spanish and Catalan). Note that in both cases, the two languages belonged to the native-language rhythmic class.

The present results contrast with those of Nazzi et al. (1998), who found that newborns discriminate and classify languages according to broad rhythmic classes. The difference in behavior across these two age groups suggests an evolution of infants' speech-processing abilities between birth and 4 to 5 months of age, leading to more subtle language discriminations. What factors drive this change in infants' abilities to discriminate languages from within the native-language rhythmic class? Are infants learning only about the particular rhythmic properties of their native language, or are they acquiring more general information about the class of languages with these rhythmic characteristics that allows them to differentiate among them?

One characteristic common to both cases of language discrimination within a rhythmic class (British English and Dutch in the present experiment and Spanish and Catalan in Bosch & Sebastian-Gallès, 1997) is that one language was the infants' native language, or a dialectal variant of it. This fact raises questions about the extent of infants' abilities to discriminate languages from their native rhythmic class. Can infants discriminate any two languages within the native rhythmic class (rhythmic-class acquisition hypothesis), or can they only discriminate their native language from other languages within this class (native-language acquisition hypothesis)? The next two experiments explore this issue.

EXPERIMENT 5

As noted earlier, the rationale for using British English in the earlier experiments was to provide a direct comparison of our within-rhythmic-class results to those of Nazzi et al. (1998). However, although it is stress-based, British English is not the dialect that American infants are learning. Consequently, one reading of the results of Experiments 1 and 4 is that the infants treated British English as their native language and that they discriminated their native language from a foreign language. Alternatively, the infants may have distinguished between American and British English and thus discriminated what they perceived to be two nonnative languages. To investigate this issue, we tested whether American 5-month-olds discriminate these two English dialects, using British and American versions of the same passages. Given that this distinction is more subtle than any other tested so far, evidence of a discrimination would allay doubts that the failure to discriminate Italian and Spanish is simply attributable to the greater similarity of these two languages than of the stress-based languages, British English and Dutch (as suggested by an anonymous reviewer). Furthermore, a finding that American 5-month-olds do discriminate British from American English would be another indication of their developing sensitivity to the particulars of native-language sound organization.

Method

Participants. Twenty American 5-month-olds (11 males and 9 females) from monolingual homes participated. The infants' average age was 156 days (range = 145 to 165 days). The data from six additional infants were not included because of fussing or crying (5) and an aborted session due to a bowel movement (1).

Stimuli. The eight British-English passages from Experiment 1 plus eight comparable American-English passages were used here (see Appendix). The eight American passages of five sentences each were recorded from four different female speakers of a Northeastern American English dialect. Once again, each speaker recorded two of the passages. The British and American passages contained identical sentences and thus were matched in their number of syllables, which varied from 15 to 21.

Procedure, apparatus, and design. The procedure and the apparatus were identical to those described in Experiment 4. Ten infants were randomly assigned to each of two groups, according to the dialect (British or American) in the familiarization phase.

Results

Mean orientation times to the two languages in the test phase were calculated for each infant. Fifteen of the 20 infants had longer orientation times for the passages in the nonfamiliarized language. Across all infants, the average orientation times were 7.97 s (SD = 2.67 s) for the passages in the new language and 7.03 s (SD = 2.91 s) for the passages in the familiarized language (see Fig. 5). A two-way ANOVA with the between-subjects factor of group and the within-subjects factor of status revealed a significant main effect of status, $F(1, 18) = 5.62$, $p = .029$. Infants' orientation times were longer to the new than to the familiarized dialect. There was no effect of group, $F(1, 18) < 1$, and no interaction between the two factors, $F(1, 18) < 1$.

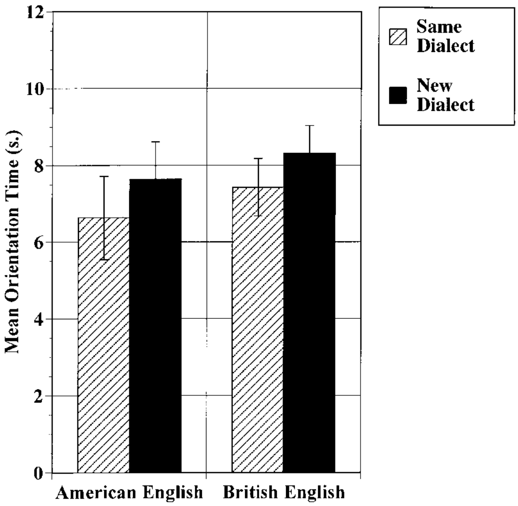

FIG. 5. Mean orientation times (and standard error bars) broken down by the language used in familiarization for the passages in the new versus familiarized language in the test phase of Experiment 5. The languages tested are British English and American English.

Discussion

The present results indicate that American 5-month-olds discriminated British- and American-English dialects. Thus, not only can they discriminate two different languages within their native-language rhythmic class, but they also can discriminate two different dialects of their native language. These findings suggest that 5-month-olds are attentive to features of sound organization that serve to distinguish languages within their native-language rhythmic class. Thus, it is very unlikely that the failure to discriminate syllable-based Spanish and Italian (Experiment 3) is due to the fact that these languages were intrinsically too similar. More likely, English-learning infants' lack of experience with syllable-based languages is the deciding factor in their inability to discriminate Spanish and Italian. The present results further suggest that infants in Experiment 4 may actually have been discriminating between what they perceived to be two nonnative languages from within their native-language rhythmic class. At the very least, it appears that infants are not limited to their own native dialect in discriminating two languages from within their native-language rhythmic class. Although 5-month-olds might have a detailed and specific representation of the native language to which they have been exposed, their ability to discriminate languages from within the same rhythmic class goes beyond comparing utterances that conform to their prior experience with ones that differ from it.

How far can 5-month-olds go in discriminating two nonnative languages in the native-language rhythmic class? Although they may perceive a difference between British and American dialects of English, American 5-month-olds may still find many similarities between them. Hence, discriminating British English from Dutch may still involve a contrast between utterances that are very similar to what they have experienced and ones that are considerably more different. Would American 5-month-olds fare as well in discriminating two nonnative stress-based languages that are likely to be equally unfamiliar to them?

EXPERIMENT 6

Testing American 5-month-olds' abilities to discriminate two unfamiliar languages from the stress-based rhythmic class should clarify the nature of their language-discrimination abilities. If experience with their own native language makes infants more sensitive to subtle differences in the rhythmic organization of languages in that class, as the rhythmic-class acquisition hypothesis predicts, infants should discriminate two unfamiliar languages. Alternatively, if 5-month-olds' sensitivity to the rhythmic organization of languages is tied more closely to their knowledge of native-language rhythmic structure, as the native-language acquisition hypothesis holds, they may have more difficulty in discriminating languages that diverge too much from familiar patterns. To resolve this issue, we tested American 5-month-olds' ability to discriminate two unfamiliar stress-based languages, German and Dutch.

Method

Participants. Twenty American 5-month-olds (10 males and 10 females) from monolingual homes participated. The infants' average age was 160 days (range = 151 to 179 days). The data from three additional infants were not included because of fussing or crying (2) or failure to look at the lights (1).

Stimuli. The eight Dutch passages from Experiment 4 plus eight comparable German passages were used here (see Appendix). The eight German passages of five sentences each were recorded from four different female speakers, each of whom recorded two passages. These passages were matched with the Dutch ones on their number of syllables, which varied from 15 to 21.

Procedure, apparatus, and design. The procedure and the apparatus were identical to those described in Experiment 4. Ten infants were randomly assigned to each of two groups, according to the language (German or Dutch) in the familiarization phase.

Results

Mean orientation times to the two languages in the test phase were calculated for each infant. Ten of the 20 infants had longer orientation times for the passages in the nonfamiliarized language. Across all infants, the average orientation times were 5.82 s (SD = 2.77 s) for the passages in the new language and 5.59 s (SD = 2.02 s) for the passages in the familiarized language (see Fig. 6). A two-way ANOVA with the between-subjects factor of group and the within-subjects factor of status revealed no significant effect of status, $F(1, 18) < 1$, indicating that orientation times to the new language did not differ from the familiarized one. Neither was the effect of group, $F(1, 18) < 1$, nor was the interaction between the two factors significant, $F(1, 18) < 1$.

Discussion

The present results indicate that American 5-month-olds did not discriminate German from Dutch utterances, even though both languages belong to the same stress-based rhythmic class

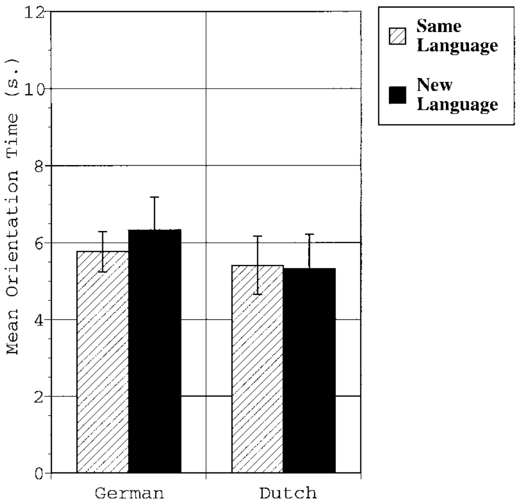

FIG. 6. Mean orientation times (and standard error bars) broken down by the language used in familiarization for the passages in the new versus familiarized language in the test phase of Experiment 6. The languages tested are Dutch and German.

as English. These findings contrast with those of Experiments 4 and 5, in which American infants discriminated British English from Dutch and British English from American English. Hence, English-learning 5-month-olds are not equally adept at discriminating languages from within the native rhythmic class. Rather, their ability to discriminate stress-based languages appears to be tied to how similar these languages are to their own native-language dialect. When one of the languages to be discriminated was either their own dialect or a related one, the infants discriminated it from another stress-based language. However, when both languages were more distant from the native-language dialect, 5-month-olds did not discriminate them. This pattern of results is incompatible with the rhythmic-class acquisition hypothesis, which predicts that infants should discriminate both familiar and unfamiliar languages from their native-language rhythmic class. However, this pattern of results fits the predictions of the native-language acquisition hypothesis, which holds that infants learn the specific rhythmic properties of their native language rather than general properties of the native rhythmic class as a whole.

GENERAL DISCUSSION

Using a modified version of the Headturn Preference Procedure (Jusczyk, 1998b; Kemler Nelson et al., 1995), we studied English-learning 5-month-old Americans' discrimination of languages. When languages from different rhythmic classes were presented (stressed-based British English vs mora-based Japanese and syllable-based Italian vs mora-based Japanese), infants readily discriminated them. Combined with previous results for younger infants (Bahrick & Pickens, 1988; Dehaene-Lambertz & Houston, 1998; Hesketh et al., 1997; Mehler et al., 1988; Nazzi et al., 1998), these between-class discrimination results indicate sensitivity to different types of rhythm over the first 5 months of life. These results are in line with the rhythmic hypothesis. Namely, young infants' sensitivity to the rhythmic properties of utterances allows them to discriminate languages belonging to different rhythmic classes (Nazzi et al., 1998).

The results for comparisons of languages from the same rhythmic class suggest that the relation between the native rhythmic class and that of the languages to be discriminated is critical. For languages from a nonnative rhythmic class (syllable-based Spanish and Italian), no discrimination was found. For languages from the native language class, 5-month-olds showed some discrimination ability. They discriminated British English from Dutch and their native dialect (American English) from another dialect (British English), but failed to discriminate German from Dutch. Earlier reports have indicated that newborns and 2-month-olds do not discriminate languages from a same rhythmic class (Christophe & Morton, 1998; Nazzi et al., 1998). Thus, one implication of the present results is that the ability to discriminate among languages within a rhythmic class has undergone some development during the course of the first 5 months. Our findings about how language-discrimination abilities develop in this period also have some interesting ramifications for the three hypotheses proposed to explain the development of infants' abilities to discriminate languages.

The maturation hypothesis states that the advent of better processing abilities allows infants to perform finer grained analyses of speech and to discriminate languages that differ significantly at the acoustic level. This hypothesis cannot account for the fact that 5-month-olds discriminated the subtle distinction between their native language (American English) and another dialect of the same language (British English), but did not discriminate two more distinctive pairs of languages (Italian vs Spanish and Dutch vs German).

The rhythmic-class acquisition hypothesis holds that the development of language-discrimination abilities stems from the acquisition of the rhythmic properties shared by the different languages in the native-language rhythmic class. The fact that 5-month-olds discriminate languages from within the same rhythmic class only when they are from the native-language rhythmic class fits the predictions of this hypothesis. However, the failure of English-learning 5-month-olds to discriminate Dutch and German utterances is problematic for this hypothesis.

The native-language acquisition hypothesis seems to account best for the behavior of 5-month-olds. This hypothesis states that infants learn the specific rhythmic features of their native language rather than those of the rhythmic class as a whole. Thus, utterances with the same general rhythmic properties (e.g., stress-based rhythms for English learners) are evaluated against infants' knowledge of the specific kinds of rhythmic patterns that they have frequently experienced in their linguistic input. Whenever one of the sets of utterances is similar enough to the familiar patterns (as in the case of British English for American infants), then infants can discriminate it from a set of utterances that is more distant from the familiar rhythmic patterns. In effect, infants consider the latter set of utterances as outside those of their native language. When both sets of utterances are dissimilar enough to be treated as outside the native language (as in the case of Dutch vs German or Spanish vs Italian for English-learners), infants appear to group them together as non-native language input.

In summary, the developmental pattern across these various studies illustrates an early evolution of infants' processing abilities, resulting in selectively finer language-discrimination performance between birth and 5 months of age. A complete description of how language-discrimination abilities develop involves a combination of two components. An innate sensitivity to rhythmic types, independent of any knowledge of the rhythmic properties of the native language, explains abilities to discriminate languages from different rhythmic classes from birth onward. However, infants' growing knowledge of native-language rhythmic features seems to be the key to their ability to discriminate languages from within the native-language rhythmic class. Thus, elements of both the rhythmic hypothesis and the native-language acquisition hypothesis are required to account for how language-discrimination abilities evolve between birth and 4–5 months.

What information do infants use to make the finer types of discriminations required to distinguish between languages from within the same rhythmic class? Given the age of the infants tested here, only two levels of linguistic information could possibly have been used: the prosodic level and the phonetic–phonotactic level. These two alternative interpretations cannot be completely disentangled in the present study because both phonetic–phonotactic and prosodic information are included in the utterances. Acoustic analyses that we carried out on the prosodic characteristics on a matched set of 16 sentences from the British English and American English samples (4 sentences from each of the 4 talkers of each dialect) indicated that they were closely matched in their pitch contours. However, in accordance with Bolinger's (1989) observations, the British-English utterances had a greater proportion of higher sentence-initial pitches and a greater proportion of terminal rises than the American-English utterances. In addition, there was a suggestion that the British-English speakers tended to have greater variability in the production of syllable durations. Although only marginally significant [$t(15) = 1.79$, $p < .10$], the tendency was for British speakers to use longer durations for stressed syllables than American speakers and shorter durations for unstressed syllables.

Several other pieces of information also seem to favor the prosodic alternative. First, the finding in Experiment 5 that 5-month-olds discriminate the same passages (with identical phonotactics) in American English and British English rules out phonotactic cues as a possible explanation. If infants used any segmental information, it could have been subtle differences in the acoustic realization of the same phonemes in the two dialects. This possibility seems unlikely given that American 6-month-olds do not discriminate between lists of American-English words and lists of Dutch words on the basis of phonetic and phonotactic differences (Jusczyk et al., 1993b). The discrimination of such differences was only evident in 9-month-olds. Given these results and the fact that the phonemes of American English differ more from Dutch than from British English, it is unlikely that infants used phonemic differences to discriminate American English and British English. Rather, the fact that the prosodic information in the British-English and Dutch passages in the present study is much richer than that in the word lists used by Jusczyk et al. (1993b) favors a prosodic account of their discrimination. In addition, support for a prosodic account comes from Bosch and Sebastián-Gallés' (1997) findings that 4-month-old infants from Barcelona discriminated Spanish and Catalan even when the utterances were low-pass filtered—a transformation that preserves prosodic information while removing most of the phonetic information.

Thus, there are grounds for believing that infants rely on prosodic information to distinguish their native language from other languages and dialects from the same rhythmic class. If so, then the evolution of the discrimination performance is based on a developmental trend that allows infants to do more fine-grained analyses of the prosodic properties of their native language. Our acoustic analyses suggest that rhythmic properties play a role in such discriminations, although this does not preclude contributions from other prosodic dimensions such as pitch.

Let us now consider the nature of the process that refines the discrimination of languages from within a rhythmic class. The present findings suggest that this process is rooted in infants' experience with their native language. Perhaps the adaptation of speech-perception capacities to native-language sound organization that has been observed for phonetic perception (Best, Lafleur, & McRoberts, 1995; Kuhl, Williams, Lacerda, Stevens, & Lindblom, 1992; Werker & Tees, 1984) begins earlier for prosodic features.

An increasing body of evidence indicates that, very early on, American infants acquire the prosodic features of their native language, including its rhythmic patterns. In English, the predominant rhythmic pattern of words is the trochaic stress pattern—a strong syllable followed by a weak syllable (Cutler & Carter, 1987). Evidence for a preference for trochaic words over iambic (weak-strong) words emerges between 6 and 9 months of age in American infants (Jusczyk, Cutler, & Redanz, 1993a; Turk, Jusczyk, & Gerken, 1995). Sensitivity to this aspect of English sound organization also influences how American infants group syllables into word-like constituents (Echols, Crowhurst, & Childers, 1997; Morgan, 1994, 1996). Finally, English-learning 7.5-month-olds can segment bisyllabic words with trochaic patterns, but not ones with iambic patterns, from fluent speech (Jusczyk, Houston, & Newsome, 1999; Newsome & Jusczyk, 1995).

The temporal proximity of the emergence of prosodically based language discrimination within the native language class and the acquisition of the rhythmic pattern of the native language should not pass unnoticed. Both phenomena may reflect the same developmental trend. Infants begin with a language-general type of processing of prosodic properties that serves to distinguish among broad classes of languages defined in terms of rhythmic type. Eventually, this type of processing gives way to language-specific processing that reflects fine-grained properties of the native language—a hallmark of adults' language processing (Cutler et al., 1986; Mehler et al., 1981; Otake et al., 1993). Within this framework, the emergence of language discrimination within the native-language rhythmic class indicates an increase in attention to those fine-grained properties that, a few months later, result in the specification of the trochaic pattern for English.

One way to explore this proposal would be to conduct a longitudinal study to determine if there is a temporal correlation between the emergence of discrimination within the native-language class and the acquisition of the trochaic pattern. But other information could also bear on this matter. Thus, if learners of some languages show delays in when they begin to discriminate their native language from others in the same rhythmic class, one might also expect them to be slower in acquiring those aspects of the native language that depend on the perception of fine-grained rhythmic properties. For instance, with respect to one aspect of language that depends on a fine-grained rhythmic property, word segmentation, Dutch infants begin to use stress cues only at 9 months, whereas American infants begin to do so at 7.5 months (Kuijpers, Coolen, Houston, & Cutler, 1998). If, relative to American infants, Dutch infants are also delayed in discriminating their native language from others within the same class, this pattern would fit with the proposal outlined above.

In conclusion, our investigation establishes a developmental sharpening of infants' processing of prosodic information that allows for the emergence of some within-class language discrimination by English-learning 5-month-olds. This evolution in language-discrimination abilities seems to be driven by infants' experience with their native language. The role of linguistic experience in this process is manifested in two ways. First, discrimination of languages from within the native-language rhythmic class does not occur when infants have no prior experience with either language. Second, the fact that American 5-month-olds distinguish their dialect from British English suggests that they have learned a great deal about its specific rhythmic and prosodic organization. Whereas the rhythmic hypothesis provides an explanation of infants' abilities to discriminate languages from different rhythmic classes, the native-language acquisition hypothesis offers the most straightforward account of their abilities to discriminate languages from within the native-language rhythmic class.

APPENDIX

Examples of the passages used for each language. The complete list of passages can be obtained by mail from the authors or found at the following Internet address: www.psy.jhu.edu/~jusczyk.

Dutch: De prinses had kramp in haar hand van het lintjes doorknippen. Als je nog eens hier komt zwemmen, neem dan vooral een handdoek mee. Een gevoel van enorme opluchting maakte zich van hem meester. Het nieuwe model fiets werd afgedaan als een vergezocht modeverschijnsel. Dankzij de volle inzet van alle medewerkers is het project een succes.

British English and American English: The young boy got up quite early in order to watch the sunrise. This supermarket had to close due to economic problems. The committee will meet this afternoon for a special debate. Having a big car is not something I would recommend in this city. Mothers usually leave the maternity unit two days after giving birth.

German: Der Knabe stand fruh auf, um die Sonne aufgehen zu sehen. Der Supermarkt mußte wegen finanzieller Probleme schließen. Das Kommittee wird sich nachmittags für die Debatte treffen. Ein großes Auto ist nicht etwas, das ich in dieser Stadt empfiehle. Mütter verlassen gewohnlich die Mutterschaftswarte zwei Tage nach der Geburt.

Italian: I genitori lasciano Marco senza risorse. Il bambino scese prestissimo per vedere l'alba. Non ha mai voluto rendersi conto dei suoi gran difetti. Credo che riuscirai nei tuoi piani senza farti problemi di sorta. Alla riunione sará rappresentata la delegazione tedesca.

Japanese: Shussango sooki ni taiinsuru keekooga tsuyomatta. Tokurei wa kaino sanseinashini wa mitomerarenai. Jikai no kaikaku no taishoo wa gakkookyooiku no naiyoodesu. Keekaku no jitsugen niwa shikin ga kanari hitsuyoodeshoo. Kodomo o kooritsukoo ni susumaseru nowa muzukashikunai.

Spanish: Los niños salen todos los dias a la misma hora. La tienda está abierta durante todo el día. Los bancos cierran particularmente temprano el viernes. Este palacio es un monumento histórico de gran valor. En verano, las grandes cuidades europeas se llenan de turistas.

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