The early bird catches the worm(?): the acquisition of an English sound system in Dutch primary school children

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1. Language policy and early foreign language education

In line with the EU's official language policy, there is a current trend in language education to introduce children to a second or third language as early as possible. This trend is based on the assumption that high proficiency can most easily be attained when the acquisition process starts early, i.e. during childhood. If there is one domain in which the advantage for young starters can be expected most strongly, it is the acquisition of L2 sound systems. Although consensus may have been reached about the general advantage of young starters, the best age at which to start is still a strongly debated issue. Before joining the bandwagon of starting foreign language learning as early as possible, systematic comparative studies need to be carried out to shed light on the best age to start. In this paper we will report on a study investigating the effect of foreign language learning on the phonological development of children at different starting ages as embedded in the Dutch educational system.

As in many European countries, early bilingual or early English education is vastly growing in popularity in the Netherlands. Although some politicians fear that learning foreign languages negatively affects native language development, the majority of studies show that children in fact benefit from early L2 education. Goorhuis-Brouwer and De Bot (2005a; 2005b) show that the level of Dutch of bilingually educated children does not differ significantly from monolingually educated children. For both immigrant children and children with dyslexia, the level of Dutch is eventually even higher than of those children in normal educational settings. These studies followed the establishment of the Dutch EarlyBird programme, in which children from age four are taught English in a school setting and the derived EarlyBird Light programme, in which children participate from the age of eight.

2. The advantage of an early start in acquiring an L2 sound system

While some scholars have argued that ultimate L2 attainment is impossible for learners who have started learning the second language at a late age (Scovel, 1988), others have claimed that even late learners can reach the highest levels of L2 proficiency in certain aspects of the language system, provided that the learning situation is ideal (in terms of input, language instruction, motivation, etc.) (Bongaerts, 1999). The fact is that numerous studies have reported that the age of onset of L2 acquisition is the most successful predictor of the learner's ultimate attainment, most obviously when it concerns the acquisition of the L2 sound system.

To account for the advantage for younger starters, several studies have related this observation to the learner's native language. While the role of crosslinguistic influence in syntax and semantics is subject to debate, it is generally recognized that learners transfer properties of their first language's sound system into the foreign language. Research has shown that the role of crosslinguistic influence on L2 sound systems correlates with the age of acquisition (AoA): the lower the AoA, the less important crosslinguistic influence is. The most familiar models accounting for the acquisition of L2

sound systems (Best's (1994) Perceptual assimilation Model, Kuhl's (1992) Native Language Magnet Model and Flege's (1995) Speech Learning Model) have all related age to the influence of the native language sound system. All of these models address the issue of categorical perception, which is present even in neonates. These mechanisms are shaped by the interaction of the child's continuous mode of perception and his/her categorical mode (Wode, 1993; Flege, 1991). With the coming of age, it becomes increasingly difficult to reset phoneme boundaries. Although this account provides a strong explanation for the way in which native speakers acquire the sound system of their first language, it also raises several questions that are left unanswered. While some researchers have shown that phonemic vowel categories have become established at around 6 months (Kuhl, 1986), it has also been argued that establishment of phonemic categories is not complete until young adulthood (Flege, 1995). For second language acquisition this account alone is not sufficient to predict the best age at which to start learning an L2. This, then, remains an empirical question.

3. The characteristics of Dutch English pronunciation: the case of VOT

In this study we have used Voice Onset Time (VOT) as a measure of L2 pronunciation quality. Obviously, VOT is only one parameter in a complex dynamic process, in which many components interact. However, VOT measurement is a suitable, simple and objective way to assess pronunciation that has several advantages for the current study. VOT can be measured from very simple words such as 'dog' and 'table', which young learners of English presumably are familiar with. In addition, VOT can be regarded as a valuable measure to determine foreign accent (see for instance Cho & Ladefoged, 1999). Furthermore, VOT is a rather unintentional phenomenon, and Dutch and English are crucially different in the way plosives are produced. While native speakers of English show positive VOT values ("aspiration") for /p/, /t/ and /k/, and produce VOT near-zero /b/, /d/ and /g/, Dutch native speakers typically produce /p/, /t/ and /k/ with near-zero VOTs and /b/, /d/ and /g/ with negative VOTs "prevoicing". Even though prevoicing is acquired rather late (2;6) in comparison to the acquisition of aspiration (2;0), it is easily transferred into a foreign language (Simon, 2009), thus indicating that it is a rather marked feature of speech that is difficult to 'unlearn'. In her study on Dutch L2 acquisition of English, Simon (2009) found significantly longer VOT values in alveolar obstruents than in bilabial obstruents in English, but not in Dutch (p. 11). In the present study, only alveolar obstruents are investigated; firstly since in this setup more differences are expected for alveolar obstruents than for bilabial obstruents, and secondly since the voiced velar obstruent /g/ does not occur in standard Dutch. In addition, this study only uses words with a vowel following the word initial alveolar obstruent.

4. An experimental study

Participants. To investigate the advantage of young starters, we compared three groups of children that had started L2 English at different ages and in different school settings. The first ("regular") group consisted of 40 children in an EarlyBird Light educational setting which is similar to the conventional setting in the Netherlands, with the exception that these children started learning English in the fifth grade (age 8) rather than the seventh grade (age 10). From this group, subgroups of ten children per grade were selected from the fifth, sixth, seventh and eighth grade. The second ("experimental") group consisted of children in an EarlyBird educational setting, where children receive English education from the first grade onwards (age 4). In the EarlyBird programme, preferably all English lessons in the first through fifth grade are taught by a native speaker of (British) English. The experimental group consisted of three subgroups of again ten children, at three different levels, to enable cross-sectional comparisons. All

Dutch children were selected on the basis of a questionnaire investigating their language background. A third ("control") group consisted of nine monolingual British children aged four to ten, who attend an English international school in the Netherlands.

Materials and procedures. Two questionnaires were compiled, one to investigate the participants' language background and one to analyse the teaching methods and the amount of native English the children were exposed to. For the analysis of both the Dutch and English pronunciation of the subjects, two picture naming tests were administered, containing simple words and straightforward pictures that would be familiar to young children with only ten months of English education. Filler words were added to keep the children's attention away from the alveolar plosives. The Dutch children first took the Dutch test, familiarising them with the testing procedure and the test format. The subsequent English test was run by a different researcher using the same procedure. All tests were recorded for later VOT analyses using a Marantz Solid State recorder with Sennheiser Microphone.

Analyses. All words pronounced as repetitions and cases where the child was helped by the researcher were eliminated from the analyses. Next, all target items were measured in terms of VOT in Praat (Boersma & Weenink, 2009), using scripts and measurement protocols for consistency. Ambiguous or unclear recordings were blindly checked by a second researcher and were eliminated from the results when no agreement was reached. Averages per group, per sound, and per language were calculated and compared using ANOVAs, processed in SPSS.

Results. For the voiced alveolar obstruents (/d/), the difference in VOT values between the experimental (M=-28.4; SE=13.9) and the control group (M=27.5; SE=1.85) was smaller than the difference between the regular (M=-58.4; SE=13) and the control group. For the voiceless alveolar obstruents (/t/), again the difference in VOT values between the experimental (M=55.8; SE=3.9) and the control group (M=86.8; SE=7.8) was smaller than the difference between the regular ((M=35; SE=3.3) and the control group. In addition, as indicated in Figure 1, for both voiced and voiceless alveolar obstruents, the VOT values of the experimental group mostly developed towards the VOT values of the control group, while in the case of the regular group, there was either no development, or a negative development.

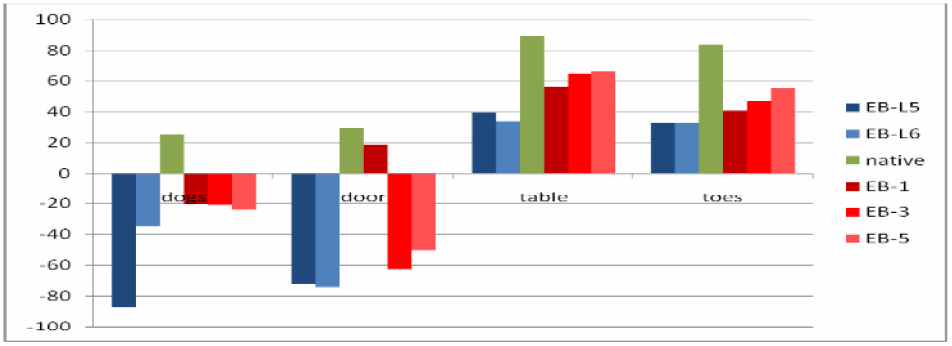

Figure 1: average VOT values per sub group (indicating development). EB = Early Bird (Experimental group); EB-L = Early Bird Light (Regular Group); Native = control group

5. Discussion and conclusion

The smaller differences in average VOT values between the experimental and the control group in comparison to the differences between the regular and the control group

indicate an overall more native like pronunciation of the children in the EarlyBird programme ("experimental") as compared to the EarlyBird Light ("regular"). In addition, the EarlyBird children develop both more and more rapidly towards a native-like pronunciation, demonstrating the effect of a younger starting age, native speaker input and a combination of these two.

Due to the nature of both the task and the analyses and due to the distribution of the participants across the conditions, this study has some limitations. We have opted for making recordings in a setting that is as natural as possible to avoid imitation and to warrant ecologically sound research. This downside of this approach is the limited control and some missing values in our data. In addition, using naturally occurring groups did not allow us to systematically investigate the interaction between starting age and native speaker input. Finally, as the process of (second) language development is nonlinear and highly variable, these findings will have to be corroborated by longitudinal research that focuses on the interacting variables shaping the acquisition process.

In spite of these limitations, the results are promising and clearly point towards the merits of a well integrated L2 learning approach as applied in the Early Bird setting. The combination of a very early start and natural native speaker input yields results that may be very difficult to achieve in other settings, at least for the development of L2 English pronunciation. Given the general advantages of multilingualism for cognitive and linguistic development and the increasing importance of being able to express ourselves in English, we can tentatively conclude that it is indeed the early bird that catches the worm.

6. References

Best, C. T. (1994). The emergence of native-language phonological influences in infants: A perceptual assimilation model. In C.Goodman & H. C. Nusbaum (Eds.), *The development of speech perception: the transition from speech sounds to spoken words* (pp. 171-204). Cambridge, MA: MIT Press.

Boersma, P. & Weenink, D. (2009) Praat: doing phonetics by computer, version 5.1.01.

Bongaerts, T. (1999). Ultimate attainment in L2 pronunciation: the case of very advanced late L2 learners. In D.Birdsong (Ed.), *Second language acquisition and the critical period hypothesis* (pp. 133-159). Mahwah/London: Erlbaum.

Cho, T. & Ladefoged, P. (1999). Variation and universals in VOT: evidence from 18 languages. *Journal of Phonetics, 27,* 207-229.

Flege, J. E. (1991). Age of learning affects the authenticity of voice-onset time (VOT) in stop consonants produced in a 2dn languauge. *Journal of the Acoustical Society of America, 89,* 395-411.

Flege, J. E. (1995). Second language speech learning. Theory, findings and problems. In W.Strange (Ed.), *Speech perception and linguistic experience* (pp. 233-277). Timonium, MD: York Press.

Goorhuis-Brouwer, S. & De Bot, C.L.J. (2005). De ontwikkeling van de Nederlandse taalvaardigheid van kleuters met vroeg vreemde-taal onderwijs.

Goorhuis-Brouwer, S. & De Bot, C.L.J. (2005). Heeft vroeg vreemde-talenonderwijs een negatief effect op de Nederlandse taalontwikkeling van kinderen? *Levende Talen Tijdschrift, 6,* 3-7.

Kuhl, P. K. (1986). Reflections on infants' perception and representation of speech. In J.S.Perkell & D. H. Klatt (Eds.), *Invariance and variability of speech processes* (pp. 19-30). Hillsdale, NJ: Erlbaum.

Kuhl, P. K. (1992). Psychoacoustics and speech perception: internal standards, perceptual anchors, and prototypes. In L.Werner & E. Rubel (Eds.), *Developmental psychoacoustics* (pp. 293-332). Washington, DC: American Psychological Association.

Scovel, T. (1988). *A time to speak: a psycholinguistic inquiry into the critical period for human speech*. Rowley, MA: Newbury House.

Simon, E. (2009). Child L2 development: A longitudinal case study on Voice Onset Time in word-initial stops. *Journal of Child Language, in press.*

Wode, H. (1993). The development of phonological abilities. In K.Hyltenstam & A. Viberg (Eds.), *Progression and regression in language: Sociocultural, neuropsychological and linguistic perspectives* (pp. 415-438). Cambridge: Cambridge University Press.