BUCLD 35 Proceedings
To be published in 2011 by Cascadilla Press
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Bilingual Acquisition of Greek Voice Morphology and Dutch Gender: What Do They Have in Common?

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1. Introduction

Research on L1 acquisition shows that some linguistic phenomena are acquired 'early' (Wexler, 1998) while others are relatively 'late', i.e. in early school years. Different factors, internal and external, have been considered responsible for 'late' acquired structures. Internal factors may involve linguistic properties or cognitive and processing prerequisites as well. By linguistic properties we refer to whether the phenomenon is in the core or in the periphery of the grammar, and whether it is a phenomenon constrained by particular lexical or discourse conditions which have to be learned by the child in order to use and interpret the structure appropriately (Borer, 2004; Sorace, 2005; Tsimpli, 2006). For example, the appropriate mappings between pronominal subjects and pragmatic conditions are acquired late by monolingual Italian children (Sorace & Serratrice, 2009; Sorace et al., 2009). External factors are typically associated with input (quality and quantity) as well as socio-economic factors, parental education and schooling (e.g., Gathercole, 2002; Paradis, 2010; Scheele et al., 2010), although it is unclear precisely how some of these factors distinguish between 'early' and 'late' phenomena. The interaction between internal and external factors is likely to be involved in the acquisition of 'late' phenomena: a phenomenon which is linguistically complex, underspecified or underdetermined by the grammar may require more input and/or higher level of processing abilities in the analysis and integration of linguistic properties and lexical or pragmatic conditions.

Since there is no comprehensive approach which could distinguish between 'early' and 'late' phenomena – because this would require the detailed investigation of the linguistic properties they involve as well as the empirical evidence pertaining to their development, which is beyond the scope of ht

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present paper – we consider amount of exposure (or input quantity) a likely factor responsible for delay in acquisition. Accordingly, 'late' phenomena clearly require more input, although it is not clear how much (see e.g., Valian, 2009 for relevant discussion). Data from children exposed to two languages may be informative in this respect. The present paper aims to investigate the role of varying amounts of input in child bilinguals and in particular to compare bilingual performance on two phenomena which are typically acquired 'late' in monolingual acquisition: Greek voice and Dutch gender. We use the term 'child bilingual' as a general term referring to any child who is exposed to two languages in childhood. Such a group of children is heterogeneous in nature, including children exposed to two languages from birth, i.e., simultaneous bilinguals, as well as those exposed to a second language at some point in early or late childhood, i.e., successive bilinguals. The second aim of this paper is thus to identify which of the various variable factors in this group of children (age of onset, length of exposure, lexical development, etc.) is the best predictor for bilingual performance in the two 'late' phenomena examined.

We begin by outlining the basic properties of the two phenomena under discussion, concentrating on previous suggestions aiming to account for their 'late' acquisition. We then turn to the presentation of our bilingual groups and the research methodology we used for eliciting production data on Dutch gender and Greek voice. We then consider the results in terms of possible differentiations between bilingual and monolingual groups. We conclude by revisiting our predictions regarding the role of input effects in bilingualism in the acquisition of phenomena acquired late by monolingual children.

2. 'Late' phenomena: Linguistic properties & previous acquisition findings

2.1. Dutch gender

Dutch has a two-way gender system, distinguishing between common and neuter; this distinction is marked on definite and demonstrative determiners, relative pronouns and attributive adjectives. The focus here is on definite determiners only. Common nouns take the definite determiner *de*, as in *de muis* 'the mouse', whereas neuter nouns are preceded with *het*, as in *het huis* 'the house'. All plural DPs take *de* and there is no gender-marking on indefinite determiners. There are some morphological and semantic regularities but these are limited and there are many exceptions (Donaldson, 1987; Haeseryn et al., 1997).

When it comes to the acquisition of grammatical gender in Dutch, monolingual, 2L1 and L2 children have been shown to overgeneralise the common determiner *de* with neuter nouns, producing non-target DPs of the type **de huis* 'the$_{\text{COMMON}}$ house$_{\text{NEUTER}}$', but they generally do not produce overgeneralizations in the other direction. Monolingual children make these errors until at least age six (Blom et al., 2008; van der Velde, 2003). 2L1/L2

children have been found to continue to make such errors beyond this age (Blom, et al., 2008; Cornips & Hulk, 2006; Hulk & Cornips 2006; Unsworth, 2008).

With respect to the acquisition of Dutch gender by bilingual children, age of onset effects have been considered as one of the factors affecting bilingual performance on gender in Dutch; however, our data showed no age of onset effects (Unsworth et al., submitted). This opened up the possibility of investigating the 'late' status of Dutch gender acquisition in monolingual children as a potential indicator of input or lexical knowledge effects (Unsworth et al., submitted).

The 'late' L1 acquisition of Dutch (neuter) gender has been attributed to a number of external factors, such as the sociolinguistic context, as well as the quantity and quality of the input to which children are exposed (Cornips & Hulk, 2008; Unsworth, 2008). Internal factors such as the lack of a gender distinction in plural and indefinite DPs, the lack of morphological cues on the head noun, the status of *het* as a pronoun and as a nominalizer, in impersonal constructions and with predicative superlatives (Roodenburg & Hulk, 2008) are all properties of the gender system in Dutch which complicate the discovery of unambiguous and salient cues by the learner. Longer exposure to the language is thus considered an important prerequisite for Dutch gender acquisition for monolingual and for bilingual children (Unsworth, 2008).

2.2. Greek Voice morphology and transitivity changes

Greek marks voice distinctions (active vs. non-active) morphologically on the verb. These distinctions, however, do not correspond to active/passive readings in a one-to-one fashion, since non-active (NACT) morphology can be used to mark a range of structures, including reflexive/reciprocal, middle, anti-causative and passive forms, as in (1) below:

Reflexive or Passive

(1) a. To pedi pli-thi-ke (mono tu / apo tin mitera tu).
the child wash-NACT-3s (own his / by the mother his)
'The child washed itself.' / 'The child is being washed.'

Passive or Anticausative

b. To spiti gremis-ti-ke apo tus ergates / apo to sismo.
the house demolish-NACT-3s by the workers / by the earthquake
'The house was demolished by the workers' /
'The house was demolished by the earthquake.'

Tsimpli (2006) has argued that non-active morphology can be associated with two different syntactic derivations – the reflexive which includes a true (animate) agent in subject position, and the non-reflexive, in which the syntactic (+/-animate) subject is derived from a VP-internal position. The non-reflexive derivation is involved in anticausative, passive and middle readings. The preferred choice of interpretation is constrained by the semantic feature of animacy specified on the syntactic subject as well as by factors outside the syntax proper, such as lexical and idiosyncratic properties, and discourse.

Some of the Greek anti-causatives are marked with active (ACT) morphology, similar to English ergatives (Alexiadou & Anagnostopoulou, 2004; Levin & Rappaport Hovav, 1995), exemplified by (2) below:

(2) I porta anikse apo ton aera
The door opened-ACT by the wind
'The door opened (*by the wind)'

In the present paper, we examine the bilingual acquisition of anticausatives with NACT or ACT morphology and reflexives.

Previous studies on the monolingual acquisition of transitivity alternations in Greek show that monolingual children demonstrate sensitivity to voice morphology in comprehension from an early age (3;6), while a gradual increase in the production of non-active voice morphology leading to overgeneralizations such as "#I porta klistike (the door was-closed)" is also attested. Reflexive, passive and anticausative readings are simultaneously available in comprehension and production (Fotiadou & Tsimpli, 2010). Development involves the shift from ambiguity (reflexive, passive, anticausative) to one reading only, or a strong preference for one of the available readings for each verb (Fotiadou & Tsimpli, 2010). This takes place in the early school years (6 years and older) when children show evidence of verb classes which favor one of the grammatically available interpretations. The formation of verb classes presupposes lexical knowledge in the form of vocabulary expansion but also in the form of conceptual, pragmatic and idiosyncratic properties of individual verbs.

One of the factors responsible for the late convergence on the adult readings is the underspecification of voice morphology with respect to reflexive, passive, middle, anti-causative readings. Since the derived readings are not uniformly determined by the grammar, interface properties such as lexical, pragmatic and discourse factors need to be integrated in order for one reading to be strongly preferred or appear as the only one available. Accordingly, the interface status of the phenomenon in question constitutes an additional factor responsible for the 'late' convergence on adult interpretative choices. In sum, language-internal factors, namely underspecification of voice morphology, and the integration of lexical, formal and discourse properties at the interface, could be held responsible for the 'late' convergence on the adult grammar.

Preliminary findings from child L2 data (Tsimpli, 2006) from Turkish-speaking 10- to 11-year-old children and late adolescents show that L2 learners, like L1 children, show an overall sensitivity to the syntax of non-active voice in transitivity alternations in that they do not provide ungrammatical, active readings. Nevertheless, there are differences between late child L2 acquirers and all other groups in the interpretive preferences attributed to non-active verbs. L1 children show an early preference for the passive interpretation of reflexive and anti-causative verbs, which disappears with age. In contrast, this preference is still significantly present in the late child L2 learners. Moreover, active anti-causatives (as in (2)) are less problematic than non-active verbs in production in the L2 child group. It could thus be argued that while morphosyntactic effects of non-active voice are acquired early by L1 and L2 learners, narrowing down the options to the adult target language is sensitive to input effects, both in terms of quantity and quality. Input quality in this case refers to vocabulary depth and in particular, variation in and frequency of verb types and tokens occurring in the input.

3. Predictions for bilingual acquisition of 'late' phenomena

The focus of the present paper is to identify the similarities in the acquisition prerequisites of two 'late' phenomena, namely Dutch gender and Greek voice and to determine which factor (age of onset, length of exposure, vocabulary knowledge etc.) is the best predictor of bilingual performance.

As outlined above, the cues for gender in Dutch are limited, the implication being that at least for neuter gender, the learner has to rely to some extent on lexical learning (Unsworth 2008; following Carroll 1989). Thus it is expected that input quantity should affect the acquisition of grammatical gender in Dutch. The cues for Greek transitivity changes are also ambiguous and limited insofar as frequency of non-active voice is concerned. In particular, ACT is vastly more frequent than NACT in child-directed speech and in adult corpora (Fotiadou & Tsimpli, 2010). Furthermore, while NACT signals transitivity changes, the interpretation of the 'changed' argument structure is underspecified by the grammar. Other disambiguating cues, such as by-phrases, are also rare (Fotiadou & Tsimpli, 2010). Similarly to Dutch gender, the limited unambiguous cues for the interpretation of transitivity alternations on Greek verbs, make this phenomenon underdetermined by grammar alone. Longer exposure to the target language is thus needed to establish mappings between interpretations and particular verb tokens in specific discourse contexts. In this respect, the acquisition of voice morphology and transitivity alternations should also be subject to input effects, including those relating to lexical knowledge.

The 'other' language of the child bilinguals tested in our study was English. English lacks morphological reflexives, passives and anticausatives as well as grammatical gender distinctions. Thus, the only possible influence from English is in the use of anticausatives of the 'break' class which in both Greek and

English are in the active form (as in (2) above). Since Dutch gender and Greek voice are both 'late' phenomena in monolingual development, in that they are acquired after the purported critical age, (i.e., after age 4), we predict that age of onset effects will not be able to distinguish between bilingual group performance. In other words, once age of monolingual acquisition is considered for Greek voice and Dutch gender, no effect of age of onset in bilingual acquisition is expected. We predict, instead, that external factors, such as length of exposure and vocabulary knowledge, will be sufficient to explain similarities and differences between monolingual and early bilingual development.

4. Method

Children's knowledge of grammatical gender-marking on definite determiners in Dutch was tested using elicited production tasks; for details, see Unsworth & Hulk, (2010) and Unsworth et al., (in press). Voice morphology in Greek was tested using an elicited production task. There were three conditions tested: anti-causative verbs in active and non-active voice, and reflexive verbs in non-active voice. Children were presented with pictures depicting inanimate referents in the case of anti-causatives and animate referents in the case of reflexives. The participants were first asked to name the referent on each picture and subsequently, they were asked a question about the same referent, thus eliciting a verb. An example for each condition is presented below:

(3) a. Anti-causative verbs (Inanimate subject / ACT):
Question: Ti epathe to pagoto?
'What happened to the ice-cream?'
Target answer: *Eliose*
melt-ACT.3s
'It melted.'

b. Anticausative verbs (Inanimate subject/ NACT):
Question: Ti epathe to pandeloni?
'What happened to the trousers?'
Target answer: *Lerothike*
got-dirty-NACT.3s
'They got dirty.'

c. Reflexive verbs (Animate subject / NACT):
Question: Ti kani o papus?
'What is grandpa doing?'
Target answer: *Ksirizete*
shaving-NACT.3s
'He is shaving himself.'

The maximum number of items per condition was four. Test items, interspersed with fillers, were presented in two orders, B being the reverse of A, counter-balanced across children. In addition to the elicited production tasks, children were also tested using standardised vocabulary tests: the Peabody Picture Vocabulary Test (PPVT-4) (Dunn 2007) or the British Picture Vocabulary Scale (BPVS) (Dunn 1997) for English, the PPVT-III-NL (Dunn 2005) for Dutch and the DVIQ (Diagnostic Verbal IQ) test for Greek (Stavrakaki & Tsimpli, 2000). The results of these tasks are used as a general indicator of the children's relative proficiency in the two languages. To measure input quantity we used an extensive parental questionnaire (Unsworth, in prep.) where very detailed information about the use of each language of the bilingual child is reported (see Unsworth et al., submitted, for details of how these data were used to calculate 'cumulative' length of exposure).

The Dutch gender results from the elicited production tasks are presented in detail in Unsworth et al. (submitted) and are only briefly summarized in this paper. We then concentrate on the presentation of the Greek data.

5. Results

5.1. Dutch gender data: A summary

Unsworth et al. (submitted) investigated the acquisition of Dutch gender in English/Dutch bilinguals 3 to 17 years old. The children were divided into three groups, based on their age of onset, namely 2L1 (n=56), i.e., exposure to both languages from birth, L2 children (n=53) i.e., exposure to Dutch between the ages of 4 and 10, and finally, early successive bilinguals (n=37), i.e., children who are exposed to English from birth and Dutch at age 1 but before age 4. All children were resident in The Netherlands; most attended Dutch-speaking primary schools, but some attended international schools, where English is the main language of instruction. Data were also collected from 30 monolingual Dutch 4 to 6 year old (*M* 5;9, *SD* 0;11). The main result was that 'cumulative' length of exposure to Dutch (i.e., the amount of exposure to NL in years over time, based on the parental questionnaire data) could best predict performance on the gender tasks (R^2 = .59, p < .001, β = .44, p < .001). In Unsworth (2010), the number of 2L1 children was increased to 136. These children were found to be delayed in comparison to the monolingual Dutch children but this difference disappeared when the two groups were matched on 'cumulative' length of exposure.

To summarise: Production of target definite determiner with neuter nouns in bilingual Dutch is best predicted by amount of exposure, i.e., no age effects are observed. Furthermore, the course of bilingual development is similar to 'late' monolingual acquisition in that development is protracted.

5.2. Greek voice data

The children were divided into three groups, based on their age of onset, as in Dutch. The 2L1 children were exposed to English and Greek simultaneously from birth or soon afterwards, the L2 children had exposure to Greek between 4 and 10 years of age, and the early successive bilinguals, were exposed to English from birth and to Greek between the ages of 1 and 4. All children were resident in Athens. Many child participants attended Greek-speaking primary schools, but several attended international schools, in which English is the main language of instruction. All the 2L1 children were raised using the 'one parent, one language' strategy. An overview of the biodata for the Greek participants, as well as the two measures based on the questionnaire and the results of the vocabulary tasks, is given in Table 1.

Table 1. Overview of biodata for English/Greek children

Gp	n	Age of onset	Age at testing	Trad. length of exp.	Cumul. length of exp.	% exposure to Greek	DVIQ scores (Max. 27)
L1	21	0	6;4 4-9;3 *SD* 1;4	6;4 4-9;3 *SD* 1;4	----	----	26.7 25-27 *SD* 0.6
2L1	19	0	5;5 4;2-6;9 *SD* 0;8	5;5 4;2-6;9 *SD* 0;8	3;2 1;8-4;9 *SD* 0;9	42 25-63 *SD* 12	25.8 24-27 *SD* 1.1
ESB	19	2;2 1;0-3;4 *SD* 0;7	9;3 5;0-16;0 *SD* 2;9	7;1 3;0-14;0 *SD* 2;9	2;2 0;8-3;9 *SD* 0;9	15 0-25 *SD* 14.4	20.8 10-27 *SD* 5.3
L2	19	6;4 4;0-10;5 *SD* 1;9	10;9 7;5-16;5 *SD* 2;2	4;5 0;5-9;5 *SD* 2;3	0;9 0-2;9 *SD* 0;9	8 0-24 *SD* 7.0	15.6 6-25 *SD* 6.2

There is quite some variation in the amount of exposure to Greek both within and across groups, whereas the L2 children have the lowest exposure scores (similar to the Dutch bilingual groups).[1]

The elicited production task involved naming an event depicted in a picture on prompting by a question of the type: *What is x doing?* or *What happened to x?*. Children were thus expected to produce a verb with ACT or NACT morphology. We calculated as correct responses those in which the appropriate voice morphology was used. 'No answer' and 'other answer' were not calculated as errors. Participants without any useable data, i.e., with 'no answer'

[1] Children who have 0% exposure to Greek or 0 cumulative years of exposure are children who speak English only at home, who attend an English-speaking school and whose main/only contact with Greek is during a 2/3-hour class every week and from ambient language exposure, i.e., in shops, etc.

or ‘other answer’ responses only, were excluded from the relevant analysis. The group results for all three conditions are presented in Figure 1.

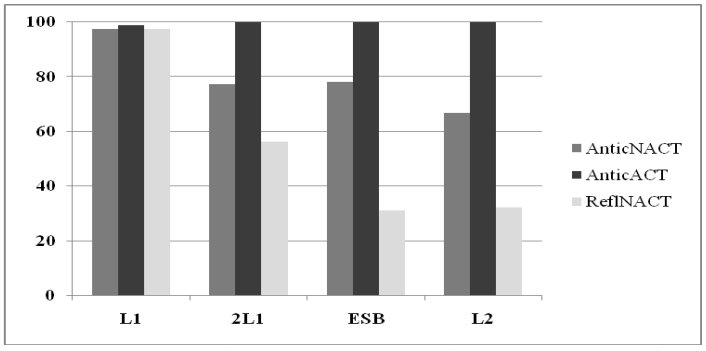

Figure 1 Average % correct responses for each condition/group

The production of anticausative verbs in the active voice seems to be unproblematic as all groups perform at ceiling. However, this is not the case with the two other conditions with verbs in the non-active form. The monolingual children are at ceiling in all conditions.

The bilingual groups, however, differ from monolinguals in the production of non-active voice, in both the anticausative and reflexive verbs. The between-group analysis (paired sample t-tests) shows that the three bilingual groups perform significantly better in ACT than in NACT voice (2L1 group: anticNACT vs. anticACT verbs, $t(18) = -4.7$, $p = .000$; anticACT vs. reflNACT verbs $t(18) = 4.9$, $p = .000$); ESB group: anticNACT vs. anticACT verbs, $t(16) = -3.3$, $p = .004$; anticACT vs. reflNACT verbs, $t(17) = -8.7$, $p = .000$; L2 group: anticNACT vs. anticACT verbs, $t(9) = -3.1$, $p = .013$; anticACT vs. reflNACT verbs, $t(12) = -6.1$, $p = .000$). Furthermore, the 2L1 and ESB children show a more accurate performance in the NACT anticausatives than in the reflexives (2L1: anticNACT vs. reflNACT verbs, $t(18) = 2.4$, $p = .030$; ESB: anticNACT vs. reflNACT verbs, $t(16) = 5.3$, $p = .000$).

The between-group analysis (ANOVA) reveals a significant effect of group for both types of verbs in the non-active voice (anticausative: $F(3,63) = 5.4$, $p = .002$; reflexives: $F(3,69) = 17.3$, $p = .000$). Post-hoc comparisons using the TUKEY test show that the L1 group is significantly different from the bilingual participants in both verb types in the non-active voice, whereas there are no differences between the bilingual groups (anticNACT verbs: L1 vs. 2L1 $p = .028$; L1 vs. ESB $p = .045$; L1 vs. L2 $p = .004$; reflNACT verbs: L1 vs. 2L1 $p = .001$; L1 vs. ESB $p = .000$; L1 vs. L2 $p = .000$).

The main error type in these conditions is the overgeneralization of active morphology; the opposite error does not occur, however. In the reflexive condition, bilinguals opted for an avoidance strategy by producing a periphrastic structure such as ‘shave his beard’ instead of *shave_NACT*. The frequency of this type of response for each group is presented in Table 2.

Table 2. Average % avoidance errors (out of the total no. of responses)

Group	n	Avoidance errors
L1	21	1.2%
2L1	19	31.6%
ESB	15	32.8%
L2	15	19.7%

Simple bivariate correlations between the dependent and independent variables were used initially to identify the independent variables that showed significant bivariate correlations with each dependent variable. Only these independent variables were selected for a BACKWARD (elimination) regression analysis, with each of the outcome variables taken as the dependent variable in each of these analyses (Jia et al., 2002). For both verb types in non-active voice, the following independent variables were used to investigate correlations: age at time of testing, traditional length of exposure, cumulative length of exposure, % exposure to Greek, age of onset and vocabulary score in Greek (DVIQ-GR). For anticausatives, age at time of testing, vocabulary score in Greek (DVIQ-GR) and traditional length of exposure were selected. The results of the BACKWARD regression analysis show that vocabulary measures (DVIQ) and traditional length of exposure are the only significant predictor variables (R^2 = .197, p = .005; DVIQ: β = .347, p = .019; LoE trad.: β = -.285, p = .052). However, DVIQ has a larger Beta coefficient and a p-value less than .05, and can thus be interpreted as having a larger effect on the criterion variable than traditional length of exposure, which is only marginally significant. The Greek vocabulary score was the only variable selected for the reflexives; the regression analysis also shows that it is a significant predictor variable (β = .508, p = .000; R^2 = .247, p = .000).

To summarize: all bilinguals perform better on ACT than on NACT verb forms. In the NACT conditions, the L1 group is significantly different from all bilingual groups, while there are no differences between the bilingual groups. Furthermore, the 2L1 and ESB children perform better on non-active anticausatives than on reflexives. The main error in the non-active verbs is the inappropriate overgeneralization of active voice, while in the reflexive condition avoidance errors are observed. The regression analysis shows that in both NACT conditions (anticausative and reflexive), it is the Greek vocabulary score which best predicts performance, although in anticausatives, traditional length of exposure was also a predictor variable, although it was only marginally significant.

6. Discussion

In this paper, we presented bilingual data from two phenomena which are acquired late by monolingual children, namely Dutch gender and Greek voice.

We hypothesised that since the 'late' acquisition of these phenomena in monolingual development is associated with problems with ambiguous input cues in Dutch and Greek respectively, input effects were expected to be predictive of bilingual development. Accordingly, no differences among child bilinguals were expected to be found with respect to the distinction between simultaneous and successive bilinguals. The results for both Dutch gender and Greek voice are consistent with these predictions.

What Dutch gender and Greek voice have in common is that the linguistic involves, as a shared property, lexical development as a prerequisite for adult-like performance. If both lexical depth and breadth are considered, lexical knowledge can be regarded as an effect of both input quantity and quality (e.g., Oller & Eilers 2002). On the other hand, differences between the properties of Dutch gender and Greek voice are clearly relevant, too. Dutch gender is a morpho-syntactic phenomenon involved in agreement processes, while Greek voice distinctions are subject to lexicon-syntax and syntax-discourse interface constraints. The differences between the two phenomena can account for some of our findings. In particular, the possibility of crosslinguistic influence is available for Greek transitivity changes but not so readily for Dutch gender. Specifically, the ceiling performance of English/Greek children in active anticausatives could be attributed to the morphological identity of the 'active' form in both languages. In addition, the use of the 'avoidance' strategy in reflexives could be an effect of the availability of periphrastic rather than morphological reflexives in English. Turning to Dutch, although English lacks grammatical gender, the overuse of *de* in Dutch could be due to its initial status as a determiner marking definiteness only, as in English, with no grammatical gender feature specification as yet (Cornips & Hulk 2008). If this is the case, then the 'ceiling' performance on *de*, where no differences between the L1 and various L2 groups are found, could also involve crosslinguistic influence. However, given that overgeneralization of *de* is also the most commonly made error by all learners, irrespective of their status as mono- or bilingual or the other language involved, it is impossible to say with any certainty that crosslinguistic influence is involved the source of the errors observed in our English/Dutch bilinguals.

What is crucial for our working hypotheses is that our data revealed two properties shared by both language phenomena: a) no between-group differences for the bilingual children, i.e. no age of onset effects, and b) input, in the form of vocabulary scores and length of exposure, constituted the most significant predictor variables. We interpret these results as confirming the close association between the 'late' acquisition of a phenomenon in monolingual development and the primary role of input in the acquisition of the same phenomenon by bilingual children. Consistent with much previous research, there is no qualitative difference between bilingual and monolingual development.

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