Differentiation, Carry-over, and the Distributed Characteristic in Bilinguals: Structural "Mixing" of the Two Languages?

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1. Introduction

What level of interaction is there between a bilingual's two linguistic systems? Previous research is mixed on this question. Some researchers have posited an influence of one language on the other (Swain & Wesche 1975); some have suggested that there is influence in some areas, but not in others (Meisel 1986, Paradis 2000); and some have posited that bilinguals' grammars lie "in between" monolinguals' of either language (Hernandez, Bates, & Avila 1994, Kilborn & Ito 1989, McDonald 1987).

Perhaps the mixed results on this question can be attributed in part to differing definitions of a bilingual. There are considerable differences across studies in the age at which the participants began acquiring the two languages in question. Many studies could probably more properly be seen as addressing issues of second-language acquisition instead of bilingualism per se. Another difference across studies in the literature concerns the type of exposure the participants have had to their two languages. Has there been equal (frequency of) exposure to the two languages? At all ages? Has one language been learned in an educational setting only? In addition, there is variation in the ages of subjects examined across studies.

The present study aims to examine the question of interaction between the two syntactic systems in bilinguals. The data come from two populations. The two populations share the following characteristics:

1. Both populations exist in community contexts in which both languages are alive and spoken extensively on a daily basis in the community. The first bilingual group live in Miami-Dade, in South Florida, where Spanish and English are spoken by a large proportion of the population. The second group live in the Gwynedd/Anglesey counties in North Wales, where Welsh and English are spoken by a substantial proportion of the population (see, e.g., Deuchar this volume).

2. The second characteristic of the groups to be studied here is that a large proportion of the bilingual population have lived in the area since birth. The studies reported here on bilingual children's use of their languages have been restricted to children born in the given communities. Thus, for example, although there is a constant influx of new immigrants into Miami-Dade, the study to be reported excluded children born outside the community. The North Wales community is a fairly stable bilingual community, and its bilingualism is not due to recent immigration into the community. 3. Finally, both studies to be reported here controlled for exposure to the languages in question. In each case, children were assigned to distinct groups on the basis of the language(s) spoken in the home and on the basis of the language(s) used as a medium of education in the school. The data from Miami-Dade come from a larger project (Oller & Eilers 2002b) on the acquisition of language and literacy in the Miami-Dade

1 Supported in part by ESRC grants R000 23 7882 and H474254101/R25037.
context. The data from North Wales come from a larger project (Gathercole & Thomas, in preparation) on the acquisition of the Welsh language in North Wales.

The questions addressed here are the following:
1. To what extent do language of the home and the instructional medium in the school contribute to the development of morpho-syntactic structures?
2. Do the paths followed by bilinguals mirror those followed by monolinguals?
3. To what extent do bilinguals' systems remain separate and to what extent is there influence from one language to the other?

In each case, the structures examined involve constructs that "exist" in both languages, but which take on different shapes in the two languages. In the case of the Spanish-English bilinguals, the relevant constructs involve that-trace structures; in the case of the Welsh-English bilinguals, they involve sentential arguments --Subjects/Direct Objects-- in sentences.

2. The Data
2.1. Spanish-English bilinguals

In the case of the Spanish-English bilinguals, that-trace structures were examined (see Gathercole 2002c, Gathercole & Montes 1997 for full reports). These are structures such as those in (1) and (2), where the presence of the complementizer that is not allowed in English when the subject wh-word has been moved to the front of the sentence, but where the complementizer que is required in Spanish in comparable sentences.

(1) English:
Who do you think ___ has green eyes?
* Who do you think that ___ has green eyes?

(2) Spanish:
* ¿Quién piensas ___ tiene ojos verdes?
¿Quién piensas que ___ tiene ojos verdes?

2.1.1. Method

The general procedure followed was that participants were given "grammatical" and "ungrammatical" constructions and were asked first to judge whether each sentence was all right and, if it was not, to then provide a correction of the sentences.

The participants were 311 children, approximately half (149) at Grade 2 and half (162) at Grade 5. The monolingual English and bilingual children came from schools in the Miami-Dade area, and the monolingual Spanish-speaking children came from schools in Lima, Peru. The bilinguals came from two types of home language: homes in which only Spanish was spoken ("OSH") and homes in which both Spanish and English were spoken ("ESH"). They also attended one of two types of school, depending on the medium of instruction in the school: English Immersion ("EI") schools or 2-way (i.e., two-language) schools. The number of children in each group was as follows:

Monolingual English: Grade 2: 32, Grade 5: 35;
Bilinguals from OSH, 2-way schools: Grade 2: 27, Grade 5: 32; OSH, EI schools: Grade 2: 26, Grade 5: 28; ESH, 2-way schools: Grade 2: 24, Grade 5: 23; ESH, EI schools: Grade 2: 24, Grade 5: 28;
Monolingual Spanish: Grade 2: 16, Grade 5: 16.

Approximately half the children in each of the monolingual English and in each of the bilingual groups came from a low socio-economic status ("SES") and approximately half from a high SES. The monolingual Spanish-speaking children all came from a high SES (see Gathercole 2002a, Oller & Eilers 2002a, for further details).

2.1.2. Results
2.1.2.1. General

For both English and Spanish, all children performed better on grammatical than on ungrammatical
sentences, and children at Grade 5 performed better than children at Grade 2, especially on ungrammatical sentences (since performance on grammaticals was near ceiling). In addition, performance was better overall on Spanish than on English, again especially on ungrammatical sentences (mean correct judgments (out of 4): English ungrammaticals: Grade 2: 0.22, Grade 5: 0.82; Spanish ungrammaticals: Grade 2: 1.20, Grade 5: 2.22 (compare: E grammaticals: Grade 2: 3.48, Grade 5: 3.46; S grammaticals: Grade 2: 3.37, Grade 5: 3.18)).

The differential performance on Spanish and English appears related to differences in the obligatoriness and optionality of que vs. that in Spanish and English: The obligatoriness of que across constructs in Spanish is quite consistent and transparent, whereas the rules governing the distribution of obligatory vs. optional uses of that across structures in English are quite inconsistent and opaque (see Gathercole 2002c, Gathercole & Montes 1997 for discussions).

Figure 1. Performance on Grammatical Sentences, that-trace Study, Monolinguals and Bilinguals by School Language X SES
2.1.2.2 Differences across groups

For each language, monolinguals performed better than bilinguals overall, and within the bilinguals, there were significant effects involving School Language, Home Language, Grade, and SES. Children's performance by School Language and SES is shown in Figures 1 and 2 for the grammatical and ungrammatical sentences, respectively. On grammatical sentences, there were no differences across groups. On ungrammaticals, for English, high SES bilingual children outperformed low SES bilingual children. On ungrammaticals for Spanish, the children who performed the best were low SES children attending 2-way schools.

Children's performance by Home Language, Grade, and SES is shown in Figure 3 for English and Spanish. While Home Language was not a significant variable for children's performance on English (since performance on ungrammaticals was at floor–compare, e.g., Gathercole 2002a, 2002b), SES was significant at Grade 5, with high SES children from both home language groups outperforming low SES children.

In contrast, Home Language was significant for Spanish, in interaction with SES and Grade. At Grade 2, children from the low SES OSH group performed the best and those from the low SES ESH group the least well; by Grade 5, however, all groups performed similarly.
2.1.3. Discussion

These data suggest a number of conclusions: First, monolinguals generally outperform bilinguals on this task. Secondly, there were improvements with age. And, in fact, some differences at one age appear to disappear at a later age, as in the case of the performance of the bilinguals on Spanish. While the low SES OSH group seems to have had the advantage at Grade 2, the other groups have "caught up" with this group by Grade 5.

Do these data show any evidence of carry-over from one language to the other within bilinguals' knowledge of that-trace in the two languages? These structures provide a nice test case, in that the two languages require the opposite in relation to the use of that/que in these comparable structures. The strongest test within these data for carry-over from one language to the other is the performance of the group that has the greatest command in Spanish on the ungrammatical sentences (since everyone performs at a low level for English) -- the low SES 2-way group.

If this group is "transferring" the Spanish "rule" to English, we would expect their judgments of Spanish ungrammaticals and English grammaticals to be "inverses" of each other, and, similarly, their judgments of Spanish grammaticals and English ungrammaticals to be inverses. Figure 4 shows the expected performance by this group if their English performance were the reverse of their Spanish performance, alongside their observed performance. It is quite clear that their observed English performance cannot be predicted as an inverse of the Spanish performance.

Similarly, if the low SES 2-Way bilinguals are transferring knowledge of Spanish to English, we might expect this to manifest itself in their corrections of sentences they judge to be unacceptable. We might expect their insertions of que and that to be similar; similarly, we might expect their deletions of the two to...
be equivalent. Again, this was not the case: This group inserted *que* 27%-48% of the time in their corrections of ungrammatical Spanish sentences (or, 71%-73% relative to correct judgments); they inserted *that* 9% of time. This same group never deleted *que*, while they deleted *that* 0-4% of time (0-38% relative to correct judgments).

2.2. Welsh-English bilinguals

In the case of the Welsh-English bilinguals, the interpretation of sentential arguments in sentences was examined (see Gathercole & Thomas, in preparation, for a fuller report). There are a number of linguistic features that serve to encode subject-hood across languages, including word order, subject-verb agreement, and the like. Both Welsh and English make prominent use of word order to encode subjects of sentences, and, at least with nominal subjects, both languages show relatively limited use of subject-verb agreement (with nominal subjects, English only shows number marking in the third person present tense; Welsh does not show number agreement with nominal subjects, only with pronominal subjects).

2.2.1. Background

2.2.1.1. Word order

The word orders used (as defaults) in the two languages are as follows. Welsh makes use of two dominant word orders, the first with finite main verbs, as in (3), the other with periphrastic constructions involving finite auxiliaries, as in (4).

(3) **VNN / VSO**
Mi welodd y gath y ci
saw - the cat - the dog
"the cat saw the dog"

(4) **Aux NVN / Aux SVO**
Naeth y gath weld y ci
did -the cat - see - the dog
"the cat saw the dog"

In everyday speech, the Auxiliary in (4) is often deleted, so forms such as *Ti isio panad?* "You want a cup (of tea)?", without an auxiliary, are common.

Compare this with English. English word order does not allow a VNN/VSO order, while NVN/SVO is the dominant order, as in (5), and Aux NVN/ Aux SVO is common in questions, as in (6):

(5) **NVN /SVO**
The cat saw the dog.

(6) **Aux NVN / Aux SVO**
Did the cat see the dog?
2.2.1.2. Soft mutation

A second property of Subject and Object marking in Welsh is that Objects sometimes, in some contexts, undergo a process of Soft Mutation. Soft Mutation is a process whereby word-initial consonants undergo lenition (voiceless stops and liquids become voiced, /m/ and the voiced stops /b/ and /d/ become fricativized, /g/ becomes deleted) (see Gathercole & Thomas, this volume, for details). Soft Mutation is triggered by a variety of lexical and syntactic environments, with the result that there are multiple form-function pairings associated with Soft Mutation. This lends a great deal of opacity to its use.

Direct objects undergo Soft Mutation in the case when the Object is indefinite (and, thus, carries no article--there is no indefinite article in Welsh) and immediately follows the Subject; this is because Objects then satisfy the conditions for Soft Mutation after Phrasal Categories (see, e.g., Borsley & Tallerman 1996, Harlow 1989). Note that this condition only applies to VNN structures, not NVN structures. Examples of Direct Objects that do not undergo mutation are shown in (7); examples of Direct Objects undergoing mutation are shown in (8).²

² Note that cath “cat” undergoes mutation after the definite article y in these examples for a totally different reason: Feminine nouns undergo Soft Mutation when they occur in the singular after the definite article (see Gathercole & Thomas, this volume).
(7) (a) VNN -- Definite Objects

Mi welodd y ci y car
saw - the dog - the car
"the dog saw the car"

Mi welodd y gath y ci
saw - the cat - the dog
"the cat saw the dog"

(b) Aux NVN -- Definite and Indefinite Objects

Naeth y ci weld y car
did-the dog-see-the car
"the dog saw the car"

Naeth y gath weld y ci
did -the cat - see - the dog
"the cat saw the dog"

Naeth y gath weld ci
did -the cat - see - (a) dog
"the cat saw the dog"

(8) (a) VNN -- Indefinite Objects

Mi welodd y ci gar
saw - the dog - (a) car
"the dog saw a car"

Mi welodd ci gar
saw -(a) dog - (a) car
"a dog saw a car"

Mi welodd y gath gi
saw - the cat - (a) dog
"the cat saw a dog"

Mi welodd cath gi
saw -(a) cat - (a) dog
"a cat saw a dog"

The present study examined the extent to which the language of the home and the instructional medium in the school contribute to the development of Subject and Direct Object marking, whether the paths followed by bilinguals mirror those followed by more monolingual subjects, and the extent to which bilinguals’ systems remain separate and the extent to which there is influence from one language to the other.

Note: In Welsh writing, the letter “m” represents /m/, “f” represents /v/, “c” represents /k/, and “g” represents /g/.
2.2.2. Method

The general procedure followed a Competition Model type task (MacWhinney 1987, MacWhinney, Bates, & Kliegl 1984). Participants were shown sets of cartoons on a video screen while they heard a (grammatical or ungrammatical) sentence, and they had to point to the cartoon that best "went with" the sentence they heard. For each sentence, the set of cartoons involved three cartoons seen at once on a video screen. In one, the referent of the first noun (N1) in the sentence could be seen doing the action to the referent of the second noun (N2); in one, N2 was doing the action to N1; and in one, both N1 and N2 were doing the action to a third party. There were 120 such stimuli.

All sentences were semantically reversible; sentences were constructed to control for a variety of factors, including word order, mutation on N1 and on N2, gender of the nouns, and animacy of the noun referents. Sample sentences are shown in (9).

(9)

VNN

hoffodd blaidd mwnci "liked (a) wolf (a) monkey" (A-A, no mutations on Nouns)
hoffodd blaidd fwnci (A-A, N1 not mutated, N2 mutated)

NVN

mwnci pinsiodd peg "(a) monkey pinched (a) peg" (A-I, no mutations on Nouns)
fwnci pinsiodd peg (A-I, N1 mutated, N2 not mutated)

NNV

dysgl cacynen dilynodd "(a) dish (a) wasp followed" (I-A, no mutations on Nouns)
dysgl gacynen dilynodd (I-A, N1 not mutated, N2 mutated)

The task was administered to 324 3- to 9-year-olds; however only the responses of the 5-, 7-, and 9-year-olds (N=274) are reported here. This included 87 children aged 5, 87 aged 7, and 100 aged 9. All children came from the Gwynedd/Anglesey area in North Wales. While it is impossible to find fully monolingual Welsh speakers in North Wales, it is possible to find children growing up in homes in which only Welsh is spoken. The participants in this study came from three types of homes: homes in which only Welsh was spoken ("OWH"), homes in which both Welsh and English were spoken ("WEH"), and homes in which only English was spoken ("OEH"). They also attended one of two types of school, depending on the medium of instruction in the school: schools in which only Welsh ("OWS") was used for all instruction, and schools in which both Welsh and English ("WES") were used for instruction.


2.2.3. Results

2.2.3.1. General

The focus here will be on results relating to Word Order and N2 Mutation (for a full analysis, see Gathercole & Thomas in preparation). With regard to Word Order, in general, children treated word order as the dominant cue to Subjects, and chose N1 as Subject most often with VNN sentences, next most often with NVN sentences, and least often with NNV sentences. Performance increased with age, in particular with VNN and NVN sentences. Also performance was better overall, especially with VNN and NVN sentences, when the nouns were masculine than when they were feminine. In general, N2 mutation did not affect performance overall (although there were differences by Home Language group, described below).
2.2.3.2. Differences across groups

There were differences by Home Language and by School Language. In general, OWH and WEH children outperformed children from OEH homes, and children from OWS schools performed better than children at WES schools. There were several interactions involving Word Order, Home Language, and School Language. On VNN sentences, there were significant differences across the three Home Language groups: OWH children chose N1 as subject significantly more often than WEH children, who in turn chose N1 as subject significantly more often for VNN sentences than OEH children. On NVN sentences, there were also differences across groups, but in this case, children from WEH homes, especially those attending WES schools, chose N1 as subject more often than the OWH and OEH children. Performance by Word Order, Home Language, and School Language is shown in Figure 5.

With regard to N2 Mutation, the only groups that showed a greater choice of N1 as subject if N2 was mutated than if N2 was not mutated were the OWH group (for sentences involving either feminine or masculine nouns: 65.4% vs. 63.6%) (for VNN sentences with N1 not mutated only, the figures show 78% choice of N1 when N2 was mutated, compared with 73% when N2 was not mutated) and the WEH group (for masculine nouns only: 66.5% vs. 63.5%).

Figure 5. Choice of N1 as Subject by Word Order, Home Language, and School Language

The question of whether there is any carry-over from English to Welsh for these bilinguals can be examined by comparing the responses of the three Home Language groups. If there is carry-over, we might expect greater choice of N1 as subject with NVN in English-dominant children than in OWH children. Furthermore, we could expect this to occur the most in children for whom English is most dominant—i.e., the OEH children.
The data shown in Figure 5 make it clear that it is the WEH children, especially those at WES schools, that led in responses favoring N1 with NVN sentences. In fact, they showed this effect most at the youngest age, Age 5, relative to the other groups. See Figure 6. This suggests that it is those bilinguals who have a relatively balanced command of both languages who may be most likely to carry over structural information from one language to the other, and this may be most likely to occur in cases where the two languages share a given structure (see, e.g., Döpke 2000 for a point similar to this latter one).

2.2.4. Discussion

These data point to a number of conclusions: First, the greater the exposure to Welsh at home and at school, the better overall the children are at responding. The OWH children performed best overall in both using word order to identify Subjects and to make at least some use of N2 mutation to determine Subjects. WEH children also performed better than OEH children.

Secondly, performance increased in every group across ages. This was particularly true for the VNN and NVN structures, those allowed in Welsh.
However, it is also the case, as in the Spanish-English data, that some differences across groups at an early age disappeared or were mitigated by later ages. For example, the data in Figure 6 show that by age 9, all groups were performing well in the identification of N1 as the subject of NVN sentences. Similar age effects are apparent with VNN sentences, as can be seen in Figure 7: By age 9, all groups, with the possible exception of the OEH children at WES schools, performed well in the choice of N1 as subject in VNN structures.

Finally, possible carry-over effects from English to Welsh appear most relevant to the WEH children at WES schools—the group with the most balanced input in the two languages at both home and school. This suggests that any carry-over effects are most likely in the most balanced bilinguals and in cases where their two languages share a comparable structure.

Figure 7. Performance by Age, Home Language, and School Language on VNN sentences.

![Bar chart showing performance by age, home language, and school language on VNN sentences.

- OEH - OWS
- OEH - WES
- OOH - OWS
- OOH - WES
- WEH - OWS
- WEH - WES

Performance values at ages 5, 7, and 9 are as follows:
- OEH - OWS: 54, 58, 65
- OEH - WES: 72, 77, 82
- OOH - OWS: 40, 53, 58
- OOH - WES: 50, 70, 80
- WEH - OWS: 73, 74, 82
- WEH - WES: 79, 82, 82

VNN structures.
3. Conclusion

In the case of both bilingual groups examined here, we can conclude the following. First, frequency of exposure to the language, at home and at school, plays a key role in the timing of acquisition of the structures in question. In both cases, the greater the input in the language in question, the earlier the child shows evidence of a command of the structure in question.

This is, of course, relative. It appears especially relative to two things: (1) This effect of frequency of exposure applies only up until a point at which children have gained a "critical mass" of input data on which to extract the relevant patterns. As distinct groups arrive at such a critical mass, early differences between those groups become negligible. Examples we have seen here include all children's command of that-trace structures in Spanish (Figure 3) and all but the OEH-WES children's knowledge of VNN structures in Welsh (Figure 7).

A second factor that qualifies the conclusion that the role of exposure is key in the timing of acquisition concerns the role of complexity of the structures in question. Complexity is relevant to both the Spanish-English and Welsh-English bilinguals. In the case of the former, it is clear that that-trace structures in English pose particular difficulties for all English-speaking children. As noted above, it is posited that this is due to the opacity of the rules governing the obligatoriness and optionality of the complementizer that in English, as well as the multiple functions of the word that in English (see Gathercole 2002c, Gathercole & Montes 1997 for discussion).

In the case of the Welsh-English bilinguals, a set of constructs that pose similar difficulties for the acquisition of Welsh is those involving Soft Mutation. The use of Soft Mutation in Welsh is very opaque (see Gathercole & Thomas, this volume, Gathercole & Thomas, in preparation). We have seen here that N2 mutation is only marginally influential in children's processing of VNN sentences, and only to any extent in the OWH and (possibly) WEH children. Work on the acquisition of gender marking in Welsh (which is encoded through mutation) reveals comparable levels of difficulty in acquiring that system (Gathercole & Thomas, this volume, Gathercole & Thomas, in preparation).

Finally, the data examined here, on the whole, show only marginal support for carry-over from one of a bilingual's languages to the other. In relation to these syntactic structures, there is no evidence of carry-over in Spanish-English bilinguals' use of that-trace in the two languages. In the case of the Welsh-English bilinguals, what evidence there might be for such carry-over suggests that if and when it does occur, it is most likely to occur in those bilinguals who are most fluent in both languages, not dominant in one, and most likely in cases where the two languages share a comparable structure.

References


