



OPEN ACCESS

EDITED BY

Brechje Antonet Van Osch,
UiT The Arctic University of Norway, Norway

REVIEWED BY

Artemis Alexiadou,
Leibniz-Centre General Linguistics
(ZAS), Germany
Jeff MacSwan,
University of Maryland, College Park,
United States

*CORRESPONDENCE

Yourdanis Sedarous
✉ sedarous@umich.edu

RECEIVED 01 May 2024

ACCEPTED 22 July 2024

PUBLISHED 04 December 2024

CITATION

Sedarous Y and Baptista M (2024) Resumptive pronouns and code-switched A-bar dependencies: investigating the effects of optimization strategies in Egyptian Arabic/English bilinguals.
Front. Lang. Sci. 3:1426275.
doi: 10.3389/flang.2024.1426275

COPYRIGHT

© 2024 Sedarous and Baptista. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Resumptive pronouns and code-switched A-bar dependencies: investigating the effects of optimization strategies in Egyptian Arabic/English bilinguals

Yourdanis Sedarous^{1*} and Marlyse Baptista²

¹Department of Linguistics, University of Michigan, Ann Arbor, MI, United States, ²Department of Linguistics, University of Pennsylvania, Philadelphia, PA, United States

In this paper we investigate bilinguals' sensitivity to two structures that display overlapping word orders across their two languages but are argued to have different derivational properties in their formation. We focus on filler-gap dependencies with and without resumptive pronouns in Egyptian Arabic, a language argued to have grammatical resumptive pronouns base generated at the tail end of nominal A-bar dependencies, and English, a language argued to have intrusive resumptive pronouns inserted post-syntactically due to illicit movement operations, such as in *syntactic islands*. Using experimental data from code-switched filler-gap dependencies, we argue that when given conflicting requirements of structural well-formedness, this population of bilinguals converge on a single structural representation across their two languages, resulting in a one-to-one mapping between derivational properties and surface form rather than maintaining two distinct representations resulting in a many-to-one mapping. To explain why bilinguals may have chosen to converge onto a unified structure rather than maintaining two distinct representations, we highlight that such one-on-one mapping is part of an arsenal of optimization strategies observable in the grammars of various bilingual populations in which bilinguals capitalize on the structural overlaps already present between their two languages. For the purpose of this paper, such optimization results in a structure that is ultimately common to both English and Egyptian Arabic, for this population of bilinguals.

KEYWORDS

code-switching, A-bar dependencies, Egyptian Arabic, language contact, resumptive pronouns, optimization strategies, convergence, experimental syntax

1 Introduction

In this paper we investigate heritage bilinguals' sensitivity to two structures that display overlapping word orders across their two languages but are argued to have different derivational properties in their formation. While research on bilingual sentence processing has argued that structures which fully overlap in surface word order across two

languages are stored as a shared, language independent structure in bilinguals' mental representation (Loebell and Bock, 2003), it is unclear to what extent the derivational properties of structures play a role in storing structures with overlapping word orders. We focus on filler-gap dependencies with and without resumptive pronouns in Egyptian Arabic and English: In Egyptian Arabic, resumptive pronouns are required at the tail end of all nominal A-bar dependencies (e.g. wh-questions) and are argued to be insensitive to constraints on A-bar movement, such as *syntactic islands* (Aoun and Li, 2003; Soltan, 2011; a.o.), as seen in (1).

(1) Resumptive pronouns in Egyptian Arabic

a. Non island contexts

[anhii risalaa] el-safeer 'aal inn el-ra'ees katab-(ha/*__i)
 [which speech] the-ambassador claimed that the-president wrote-(it/*__i)
 lit: Which speech did the ambassador claim that the president wrote (it i/*__i)?

b. Island Contexts

[anhii risalaa] el-safeer zi'il lamma el-ra'ees katab-(ha/*__i)
 [which speech] the-ambassador upset when the-president wrote-(it/*__i)
 lit: Which speech was the ambassador upset when the president wrote (it i/*__i)?

In English, resumptive pronouns occur less frequently, and are mostly found as antecedents of A-bar structures that would otherwise violate constraints on movement (see Asudeh, 2011; Morgan and Wagers, 2018; a.o.). See (2).

(2) Resumptive pronouns in English

a. Nonisland contexts:

[Which speech] did the ambassador claim that the president wrote (*it/*__i)

b. Island context:

[Which speech] was the ambassador upset when the president wrote (?it/*__i)

To draw conclusions about bilinguals' linguistic representations of these structures, we test their sensitivity to A-bar structures with and without a resumptive pronoun in island and non-island wh-questions in both unilingual and code-switched contexts. We propose that code-switching is a particularly relevant domain of investigation for determining how structures with similar surface word order but with similar or different derivational properties across two languages are processed by bilingual individuals, as recent theoretical (MacSwan, 2009, 2013; Grimstad et al., 2018) and behavioral studies (see Declerck et al., 2019; Phillips and Pylkkänen, 2021; Sedarous, 2022; a.o.) have argued that bilinguals rely on the same computational mechanism to build and process both code-switched and unilingual utterances. Using data from code-switching, we propose that when presented with multiple structural derivations that map onto a single constituent surface word order, this population of bilinguals opts for a one-to-one mapping from representation to word order, rather than maintaining a many-to-one mapping across their two languages. These results support Polinsky and Scontras (2020) proposal that heritage bilinguals may choose to reduce ambiguity by favoring a grammar with one-to-one mapping from surface structures to interpretations, even if the baseline allows for multiple mappings from surface structure to interpretation. To explain why bilinguals may have chosen to converge onto a unified structure rather than maintaining two distinct representations, we suggest that the presence of this unified derivational strategy in

the code-switched contexts may have resulted from optimization strategies whereby these speakers are operationalizing L1/L2 syntactic mappings whenever possible (see Baptista et al., 2016; Baptista, 2020). We argue that such one-on-one mapping is part of an arsenal of optimization strategies observable in the grammars of various bilingual populations, and thus emphasize the role that *congruence* (as operationalized in Baptista, 2020) can play in the mental representation of syntactic structures for heritage speakers.

The organization of this paper is as follows: In Section 2 we highlight the empirical domain under investigation: wh- structures with and without a resumptive pronoun. As we will show, under certain conditions this structure results in overlapping word orders across Egyptian Arabic and English but is argued to be formed via base generation in Egyptian Arabic and movement in English. In Section 2, we explicitly lay out three assumptions that motivate our methodology and inform our conclusions: (i) island sensitivity can serve as a diagnostic for movement, (ii) factorial designs can reliably test the presence and magnitude of a syntactic island, and (iii) the grammaticality status of intra-sentential code-switched sentences fallout from the syntactic conditions of the presumably individual grammars being mixed. In Section 3, we introduce the methodology used to carry out this study. Here we test bilinguals' sensitivity to these structures in both a unilingual and code-switched context and predict that bilinguals may choose to either retain two derivations or converge onto one. In Section 4, we detail our predictions for code-switched contexts, outlining the anticipated outcomes if bilinguals converge onto a singular derivational strategy or maintain two distinct strategies for congruent word orders. In Section 5, we present the results of our study, and discuss these results based on our predictions from Section 4. Ultimately, we show that this population of bilinguals appear to converge on a singular derivational strategy that aligns with the congruent word order in code-switched conditions, rather than maintaining two separate derivations. To explain why this is the case, in Section 6 we argue that this may be due to the fact that speakers enhance congruent syntactic mappings across their languages whenever possible. In Section 7 we conclude the paper.

2 The empirical domain and our assumptions

As we are interested in structures that overlap in word order across Egyptian Arabic and English but have been argued to have different derivational properties across the two languages, we focus our empirical investigation on long-distance dependencies, particularly wh-questions with and without a resumptive pronoun; we label the structures with a resumptive pronoun as "wh-resumptive" structures. In Section 2.1, we outline the empirical domain of the structures under study, while in Section 2.2, we discuss three underlying assumptions that shape our methodology, predictions, and interpretation of results.

2.1 The empirical domain: wh-resumptive structures in Egyptian Arabic and English

Resumptive pronouns refer to the overt pronominal elements that are found in the canonical argument position of a verb within an A-bar dependency. Wh-resumptive structures are a perfect empirical domain to test bilinguals' sensitivity of two structures that ultimately result in overlapping word orders across their two languages but are argued to have different derivational properties in their formation. This is because the presence of a resumptive pronoun within a structure does not automatically indicate its derivational history: Some resumptive pronouns are base generated in the canonical position they appear in, termed *grammatical* resumptive pronouns; some behave as spelled out copies of the traces formed by movement, termed *movement* resumptive pronouns; some obligatorily appear in order to save a derivation from crashing in the presence of an ungrammatical movement operation, termed *last resort* resumptive pronouns; others serve more as an artifact of parsing and production rather than being grammatical elements of the language, those are labeled *intrusive* resumptive pronouns (see McCloskey, 2006; Asudeh, 2011; Rouveret, 2011; and references therein for different classifications along these lines).¹

Egyptian Arabic has been typologically categorized as a language with *grammatical resumptive pronouns*. In such cases, the resumptive pronouns are base generated in their canonical position and bound by the structurally higher A-bar constituent, in a derivation that does not involve movement of the wh-phrase. In such a derivation, the wh-constituent is assumed to be base generated in a structurally high position and binds the resumptive pronoun, which was base generated in a structurally lower position such as in (3).

- (3) [CP Wh-ConstituentOP_i C [TP ... [CP ... [TP ... Resumptive Pronoun_i...]]]]

This categorization is based primarily on the two following observations. First, in Egyptian Arabic, resumptive pronouns are required at the tail end of most object argument A-bar dependencies with a nominal antecedent, and their absence leads to ungrammaticality, as seen in (4).

- (4) [anhii shanta]_i Masnoti 'aalit inn el-muHamii nisii-(ha; /* ___i) fil maktab?
[which bag]_i Masnoti said that the-lawyer forgot-(it; /* ___i) in.the office?
"Which bag did Masnoti say that the lawyer forgot it at the office?"

Second, speakers of Egyptian Arabic exhibit insensitivity toward structures that are argued to constrain movement, such as syntactic islands (Ross, 1967), when assessing the acceptability of A-bar dependencies co-referring with a resumptive pronoun in their argument position, as evidenced by the grammaticality in (5). This is likely because the co-reference between the antecedent, in this case "anhii shanta" meaning "which bag," appears in a structurally higher position without undergoing movement.

- (5) [anhii shanta]_i Masnoti zi'lit lamma el-muHamii nisii-(ha; /* ___i) fil maktab?
[which bag]_i Masnoti upset when the-lawyer forgot-(it; /* ___i) in.the office?
"Which bag was Masnoti upset when the lawyer forgot it at the office?"

In English on the other hand, clause initial wh-constituents have been analyzed as an instance of wh-movement where the wh-constituent is moved from its canonical position to a fronted position, leaving behind a trace in its canonical position, as seen in the representation in (6).

- (6) [CP Wh-Constituent_i C [TP ... [CP ... [TP ... t_i...]]]]

In contexts with licit wh-movement, speakers of English tend to prefer a trace over an overt resumptive pronoun, as seen in (7a). In contexts with illicit wh-movement (e.g. islands), however, speakers of English have been shown to prefer the presence of a resumptive over its absence, at least when judging the comprehensibility of a sentence (see Beltrama and Xiang, 2016), as seen in (7b).

- (7) a. [Which book]_i did Masnoti say that the lawyer forgot [t_i/ ²it_i] in the office?
b. [Which book]_i did Masnoti leave when the lawyer forgot [^{*}t_i/ ²it_i] yesterday?

Although resumptive pronouns have been shown to be systematically produced both naturalistically (see Prince, 1990) and in lab settings that induced their production (see Ferreira and Swets, 2005; Morgan and Wagers, 2018), speakers consistently rate their presence as being highly unacceptable both in non-island and island conditions (see Alexopoulou and Keller, 2007; Heestand et al., 2011). For this reason, English has been typologically categorized as a language with *intrusive resumptive pronouns*, which function more as artifacts of parsing and production.²

Based on this discussion, we observe that while both Egyptian Arabic and English exhibit evidence of resumptive pronouns in A-bar structures, which we term "wh-resumptive" structures, these structures are derived in different ways. In Egyptian Arabic, the clause-initial wh-constituent is assumed to be base-generated in

¹ In this typology, we differentiate *movement* resumptive pronouns from *last resort* resumptive pronouns. Languages like Vata and Gbadi have been documented to have resumptive pronouns that appear at the tail end of A-bar positions, but show sensitivity to island configurations even when they are present (see Koopman and Sportiche, 1982). We label these kinds of resumptive pronouns as *movement* resumptive pronouns. Other languages, like Hebrew or Lebanese Arabic, have been argued to have optional resumptive pronouns in the absence of island structures, but they have obligatory resumptive pronouns in the presence of island structures in order to "save" the derivation from crashing and ameliorate the island effect (see Shlonsky, 1992; Aoun et al., 2001; Sichel, 2014). We label these so-called "structure-saving" resumptive pronouns as *last resort* resumptive pronouns.

² This claim is not uncontroversial: Some scholars such as Cann et al. (2005), Radford (2019), Sedarous (2023), and Agnes Bi, p.c have argued that resumptive pronouns may in fact be productive, grammatical elements in English, that are simply restricted to specific A-bar dependencies.

a structurally higher position, specifically [Spec, CP], and binds a co-referring resumptive pronoun, which is also assumed to be base-generated in a lower position. In English, the clause-initial wh-constituent is assumed to move to the structurally higher position [Spec, CP], and if a resumptive pronoun is inserted, it occurs later in the derivation post-syntactically. Therefore, wh-resumptive structures were selected as an empirically relevant domain to test heritage bilinguals' sensitivity to structures that appear similar in terms of surface word order across both Egyptian Arabic and English but undergo different derivations to achieve that surface word order in the two languages. To investigate this, we use a factorial design to examine bilinguals' sensitivity to island and non-island structures in both unilingual and code-switched contexts. In the next section, we outline the specific assumptions motivating this methodology, which will in turn inform our conclusions.

2.2 Assumptions: syntactic islands, factorial design, and code-switching

To examine bilinguals' syntactic representations of wh-resumptive structures, we test their sensitivity to island and non-island structures, by using a factorial design, in both unilingual and code-switched contexts.

Why islands? We chose to test bilingual individuals' island sensitivity with respect to resumptive pronouns because island sensitivity has been used as a diagnostic for whether a derivation with an apparently displaced element involves movement.

Although long-distance dependencies are unconstrained with respect to length between the filler and the gap, they are said to be constrained by *syntactic islands*, i.e. structures out of which a wh-phrase cannot "escape," and as a result, filler-gap dependencies cannot be formed (Ross, 1967). For instance, take the English declarative sentences in (8). While the distance between the filler, *who*, and its gap site is local in (8a), the wh-phrase moves out of the embedded CP in which it originated to the matrix CP in (8b), and in (8c) it moves up two CPs. This indicates that there is no *length* restriction between filler gap dependencies.

- (8) Long-distance dependencies
- Who_i did Masnoti see t_i ?
 - Who_i did Masnoti say that Mona saw t_i ?
 - Who_i did Masnoti say that Mona thinks that Mary saw t_i ?
 -

When we consider restrictions on filler-gap dependencies, we find that certain structures do not allow for a co-occurrence relationship to be established between a filler and a gap, as seen in (9).

- (9) Syntactic Islands
- Whether Island: *Who_i did Masnoti ask whether Mona was waiting for t_i ?
 - Complex NP Island: *What_i did you hear the rumor that Masnoti broke t_i ?
 - Adjunct Island: *What_i do you worry if Masnoti breaks t_i ?
 - Coordinate Structure Island: *What_i did Masnoti buy a shirt and t_i ?

The difference in grammaticality between (8) and (9) has been attributed to whether or not the wh-element can move from its canonical, base generated position: although movement is permitted in (8), leading to grammatical interrogatives, it is blocked in (9), leading to ungrammatical interrogatives. Under the assumption that island sensitivity serves as a diagnostic for movement, we can assess the derivation that bilinguals have built by testing their sensitivity to wh-structures within and outside of syntactic islands. If participants exhibit significantly reduced acceptability of an island structure when compared to an analogous non-island structure, we assume they do so because the island structure violates a principle of grammar, specifically some constraint on *movement*.

Why factorial design? To test bilingual individuals' island sensitivity, we used a factorial. We opted for a factorial design because factorial designs have consistently been able to isolate island effects from extra grammatical processing effects both in English (see Sprouse et al., 2012 for initial reasoning, but also Hofmeister et al., 2012 for criticism) and cross-linguistically (see Tucker et al., 2019 for Modern Standard Arabic; Sprouse et al., 2016 for Italian; Stepanov et al., 2018 for Slovenian; Almeida, 2014 for Brazilian Portuguese; Kush et al., 2018 for Norwegian; a.o). Our logic is that there are two processing costs associated with island-violating extractions: First, even in the absence of an island structure, there is a general processing cost that is associated with processing a long-distance dependency (e.g wh-fronting, Gibson, 1998, 2000). Indeed, research has shown that long-distance dependencies tend to be more difficult to process than shorter dependencies (see Lewis and Vasishth, 2005). This processing difficulty is often reflected in acceptability judgment ratings, where long-distance dependencies, e.g wh-questions extracted from an embedded clause, tend to receive lower ratings than shorter dependencies, e.g wh-questions extracted from the matrix clause. Second, island structures are often more inherently complex than non-island structures, so there is also a processing cost that is associated with processing an embedded island structure, even when extraction is not from the island itself (see Kluender, 2004). If this structural complexity has an impact on acceptability judgments, then acceptability ratings for sentences that contain an island structure are predicted to be lower than the acceptability judgments for sentences that do not, regardless of whether or not extraction from said structure took place.

Factorial designs are used here to isolate the processing effects of *clause type* and *island presence* (see Sprouse et al., 2012; a.o), typically through a fully crossed design which introduces *clause type* as the first factor and *island presence* as the second factor, as seen in Table 1. This allows us to make specific predictions: If there is no island effect, in that there is no effect that goes beyond the summed costs of processing both a long-distance dependency and an island structure, then the interaction of the two factors should be insignificant. However, if there is an island effect, in that the effect of the wh-island structure goes beyond the summed costs of processing both a long-distance dependency and an island structure, then the interaction of the two factors should be significant.

Why code-switching? Finally, to draw conclusions about bilinguals' syntactic representations of wh-resumptive structures, we tested their sensitivity to both unilingual and code-switched

TABLE 1 An example of a fully crossed 2X2 factorial design that is intended to isolate island effects from processing effects.

Island	Clause type	Example
Absent	Matrix	Who ___ was sure that the lawyer forgot the book at the office?
Absent	Embedded	Which book are you sure that the lawyer forgot ___ at the office?
Present	Matrix	Who ___ was worried if the lawyer forgot the book at the office?
Present	Embedded	Which book are you worried if the lawyer forgot ___ at the office?

contexts. As we will show in this section, code-switching serves as an optimal domain for investigating bilinguals' sensitivity to structures that display overlapping word orders across their two languages but are argued to have either similar or different derivational properties in their formation. This is because the acceptability of code-switched sentences, and the constraints determining licit vs. illicit code-switched sentences, are argued to rely on the same structure building operations as the constraints determining licit vs. illicit unilingual sentence (see MacSwan, 2013; Sedarous, 2023 on word-internal code-switching and head movement, and González-Vilbazo and López, 2012 and López et al., 2017 on intrasentential code-switching within and between phases), which allows us to draw conclusions about bilinguals' linguistic representations. For the remainder of this section, we discuss this further.

Code-switching is a conversational practice used by bilinguals where they switch back and forth between their two or more languages within the same conversation. These switches broadly occur either across sentential boundaries, termed *intersentential* code-switching as seen in (10a), or within sentential boundaries, termed *intrasentential* code-switching as seen in (10b).

(10) a. Intersentential code-switching

imbaarah ana ruHt lil madrasa | Today I am going to the store.
 Yesterday I went to.the school | Today I am going to the store.
 “Yesterday I went to the school. Today I am going to the store.”

b. Intrasentential code-switching

ukhtii ishtarit | a new shirt yesterday.
 Sister.my bought | a new shirt yesterday
 “My sister bought a new shirt yesterday.”

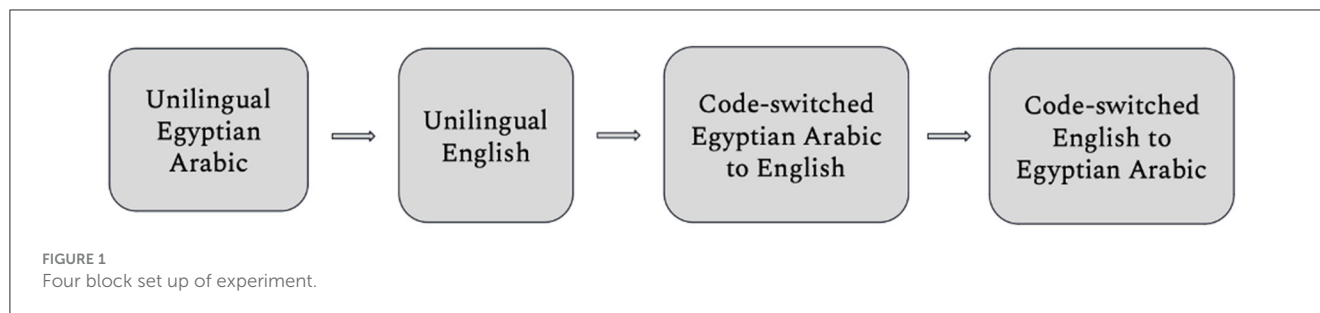
Since the early 1980s there has been a growing literature investigating the grammatical constraints set on intrasentential code-switching. While researchers have observed that intersentential code-switching is relatively *free*, in that code-switching between any two well-formed sentences produces a grammatical utterance, *intrasentential* code-switching is a constrained system subject to structural well-formedness requirements (see Pfaff, 1979; Sankoff and Poplack, 1981; Woolford, 1983; Belazi et al., 1994; Santorini and Mahootian, 1995; Myers-Scotton and Jake, 2017; Sedarous, 2022, 2023; a.o). This literature is based on the observation that not all intrasentential code-switches are licit. To explain such contrasts, some generative approaches to the syntax of intrasentential code-switched sentences

have argued that the constraints determining licit vs. illicit code-switched sentences rely on the *same* structure building operations as the constraints determining licit vs. illicit unilingual sentences. This means that no principle of grammar may refer to either the operation of code-switching itself or to a third grammar, i.e. a grammar that is distinct from the two or more grammars being mixed in a code-switched utterance, when positing the well-formedness conditions under which a code-switched sentence is either licit or illicit. Instead, the grammaticality status of intrasentential code-switched sentences is predicted to fall out from the syntactic conditions of the presumably individual grammars being mixed (MacSwan, 2009, 2013; González-Vilbazo and López, 2012; López et al., 2017; Alexiadou and Lohndal, 2018; Riksem, 2018).

Taken together, intrasentential code-switching then becomes a particularly relevant domain of investigation for determining how structures with similar surface word orders, but either similar or different derivations across the two languages, are stored as part of the bilingual individual's linguistic representation system. This enables us to make specific predictions (see section 4): If this population of bilinguals maintains two derivational strategies in the code-switched contexts, then participants' (in)sensitivity to island structures and their (dis)-preference for resumptive pronouns will be dependent on the direction of the code-switch, following the global requirements of the language of the matrix CP. Specifically, we would expect bilinguals to exhibit insensitivity to island structures in situations where the code-switch begins in Egyptian Arabic but ends in English but sensitivity to these same structures in contexts where the code-switch begins in English and ends in Egyptian Arabic. On the other hand, if this population of bilinguals capitalizes on the overt structural overlaps between their two languages, they may instead converge onto a single derivational strategy for both code-switch directions, resembling either that of Egyptian Arabic or English.

3 Methodology

To test bilingual individuals' sensitivity to island and non-island wh-questions in both unilingual and code-switched contexts, we conducted a four-block experiment administered within one experimental session. In the first and second blocks, we tested the acceptability of the wh-resumptive strategies in unilingual Egyptian Arabic and unilingual English sentences, while in the third and fourth blocks we tested the acceptability of the wh-resumptive strategies in code-switched sentences that either begin in Egyptian Arabic and ended in English or began in English and ended in Egyptian Arabic. This can be seen in Figure 1.



Participants were given the option to take a break between each block. The primary aim of the first two blocks was to establish a baseline, quantifying the magnitude of island effects in unilingual Egyptian Arabic and unilingual English sentences within this bilingual population.

Methodologically, this procedural design of four blocks within one experimental session was chosen for the following reasons: First, there is some evidence that when unilingual sentences are mixed with code-switched sentences, this skews the scale in favor of the unilingual sentences resulting in overall higher judgements for unilingual sentences and overall lower judgements for code-switched sentences. For this reason, the code-switched sentences were separated from the unilingual sentences in different testing blocks. We chose to also separate the two unilingual sets of sentences from each other, rather than combine them into one block for a similar reason. As will be described in greater detail in section 3.3, these speakers self-report as being more dominant in English than they are in Egyptian Arabic. We worried that we would experience a similar preference for the English unilingual sentences over the Egyptian Arabic unilingual sentences if the two sets of sentences were presented in the same block. For this reason, we chose to separate the unilingual sentences. The code-switched sentences were also separated into two blocks to retain consistency across the entire experiment.

3.1 Materials

To better understand the magnitude of island effect, we used a 2X3 factorial design in each block. In the first factor, we manipulated whether a syntactic island was present in the stimuli. In the second factor we manipulated whether the *wh*-constituent was the subject of the matrix CP (labeled as *matrix*), or the object of the embedded verb in the embedded CP. The *wh*-question either co-referred with a gap in the embedded CP (labeled as *embedded: no RP*), to capture instances where a resumptive pronoun was absent, or with a resumptive pronoun cliticized onto the embedded verb (labeled as *embedded: yes RP*), to capture the *wh*-resumptive structure with a present resumptive pronoun. A sample set of stimuli used in each block will be presented in the following sections.

Each block consisted of a total of 32 items in the appropriate language condition: 6 critical items pseudo-randomly interspersed between 26 filler items of comparable length and varying acceptability. The critical stimuli for each block consisted of 6 sets of *wh*-questions, counterbalanced across six lists so that

each participant heard only one version of each target item. We compensated for the increased risk of noise associated with using one judgment per condition by collecting data from an increased sample size and we tested 40+ participants. This method was previously advocated in Sprouse and Almeida (2017) and effectively implemented in Tucker et al. (2019) with Modern Standard Arabic, and Al-Aqarbeh and Sprouse (2023) with Jordanian Arabic, to yield high statistical power for medium and larger effect sizes. As the total items in each block consisted of 32 items, the total experiment (including both critical items and fillers) consisted of 16 declarative sentences and 16 interrogative sentences. Care was taken so that an even proportion of sentences evenly spanned the complete range of acceptability. This means that we ensured that a third of the items in the experiment were considered *good*, a third were considered *medium*, and a third were considered *bad*.

In all four blocks, we focused only on temporal adjunct islands headed by *when* as the island domain of study. This was done for two reasons: first, since this experiment consisted of four blocks within one experimental session, we want to make sure that participants were not fatigued by the end of the experiment. Because of this, only one island type was tested. Adjunct islands were specifically chosen because of their general categorization as *strong islands* that are islands by virtue of their structural position,³ coupled with the fact that Tucker et al. (2019) and Al-Aqarbeh and Sprouse (2023) both reported an island effect for adjunct islands in Modern Standard Arabic and Jordanian Arabic, respectively. To our knowledge, no study has formally studied the magnitude of island effects specifically in Egyptian Arabic.

With respect to the code-switched conditions in blocks 3 and 4, in all critical items the code-switch location always occurred at the clause boundary, immediately after the matrix verb and immediately before the embedded clause. We choose this location because CPs are typically considered to be *phases*.⁴ These phases are then transferred to the phonological and semantic components and become inaccessible to further syntactic operations or alternative linearizations (see Fox and Pesetsky, 2005) from that point on.

³ Although see Truswell (2007, 2011), McInnerney and Sugimoto (2022), McInnerney (2023), among many others, for arguments in favor of categorizing adjunct islands based on the configurational properties of the phrase rather than solely its structural position as posited by the argument/adjunct distinction.

⁴ The notion of phase essentially involves dividing the structure of the sentence into chunks. The logic here is that certain syntactic heads, such as C or v (maybe even D or P), trigger spell-out of their complements as soon as they enter the derivation (see Chomsky, 2008).

TABLE 2 Critical stimuli for block 1, unilingual Egyptian Arabic sentences.

Island	Clause type	Example sentence					
Absent	Matrix	Miin Who	laaHiz realized	inn that	el-muHamii the-lawyer	nisee forgot	el-shanta? the-bag?
Absent	Embedded: No RP	Anhi shanta; Which bag_i	el-qaadi the-judge	laaHiz realized	inn that	el-muHamii the-lawyer	nisee-____i? forgot-____i?
Absent	Embedded: Yes RP	Anhi shanta; Which bag_i	el-qaadi the-judge	laaHiz realized	inn that	el-muHamii the-lawyer	nisee- ha _i ? forgot- ha _i ?
Present	Matrix	Miin Who	zi'il was.upset	lamma when	el-muHamii the-lawyer	nisee forgot	el-shanta? the-bag?
Present	Embedded: No RP	Anhi shanta; Which bag_i	el-qaadi the-judge	zi'il was.upset	lamma when	el-muHamii the-lawyer	nisee-____i? forgot-____i?
Present	Embedded: Yes RP	Anhi shanta; Which bag_i	el-qaadi the-judge	zi'il was.upset	lamma when	el-muHamii the-lawyer	nisee- ha _i ? forgot- ha _i ?

TABLE 3 Critical stimuli for block 2, unilingual English sentences.

Island	Clause type	Example sentence
Absent	Matrix	Who claimed that the school raised the budget?
Absent	Embedded: No RP	Which budget_i ; did the superintendent claim that the school raised ____i?
Absent	Embedded: Yes RP	Which budget_i ; did the superintendent claim that the school raised- it _i ?
Present	Matrix	Who complained when the school raised the budget?
Present	Embedded: No RP	Which budget_i ; did the superintendent complain when the school raised ____i?
Present	Embedded: Yes RP	Which budget_i ; did the superintendent complain when the school raised- it _i ?

Since these components have been transferred, code-switching between phases, in this case between CPs, are argued to be acceptable switch locations (see González-Vilbazo and López, 2012; López et al., 2017). This then allows us to see how bilinguals process structures with conflicting well-formedness requirements in the syntax, without the need to speculate about whether their sensitivities are attributable to switch location issues.

Finally, all the sentences in the four blocks of this experiment were recorded through Praat by the same speaker—the first author of this paper who is bilingual in both Egyptian Arabic and English (Boersma, 2001). Recordings were then distributed via a Qualtrics survey (see Sedarous and Namboodiripad, 2020, for best practices in conducting acceptability judgments with audio stimuli). For all sentences, the speaker used natural intonation and took care to produce a similar intonational contour across conditions.

3.1.1 Block 1: Unilingual Egyptian Arabic

The critical stimuli in this block consisted of six sets of unilingual Egyptian Arabic question sentences, following the sample stimuli in Table 2.

3.1.2 Block 2: Unilingual English

The critical stimuli in this block consisted of six sets of unilingual English question sentences, following the sample stimuli in Table 3. Since in the Egyptian Arabic question sentences, the resumptive pronouns were cliticized onto the verb, all resumptive pronouns in the English question sentences were cliticized as well.

3.1.3 Block 3: Code-switched Egyptian Arabic to English

The critical stimuli for the third block consisted of 32 sets of code-switched question sentences which began in Egyptian Arabic and ended in English, following the sample stimuli in Table 4. As explained in section 3.1 the code-switch location always occurred at the clause boundary. In Table 4, code-switch location is indicated by a |.

3.1.4 Block 4: Code-switched English to Egyptian Arabic

The critical stimuli for the fourth and block consisted of 32 sets of code-switched question sentences which began in English and ended in Egyptian Arabic, following the sample stimuli in Table 5. Similar to the critical items in block 3 the code-switch location always occurred at the clause boundary. In Table 5, code-switch location is indicated by a |.

3.2 Participants

Forty self-reported Egyptian-Arabic/English bilinguals living in the U.S. were recruited. This experiment was approved by the University of Michigan's Institutional Review Board (HUM00142209) and all participants provided informed consent. Demographic information was collected from a questionnaire following the experiment. Participants ranged from the ages of 18–47. All participants had been exposed to Egyptian Arabic before the

TABLE 4 Critical stimuli for block 3, code-switched Egyptian Arabic to English sentences.

Island	Clause type	Example sentence
Absent	Matrix	Miin laaHiz that the gambler unlocked the safe? Who realized that the gambler unlocked the safe?
Absent	Embedded: No RP	Anhi khazna; el-Haaris laaHiz that the gambler unlocked ___i? Which safe; the-guard realized that the gambler unlocked ___i?
Absent	Embedded: Yes RP	Anhi khazna; el-Haaris laaHiz that the gambler unlocked-it? Which safe; the-guard realized that the gambler unlocked-it?
Present	Matrix	Miin zi'il when the gambler unlocked the safe? Who was.upset when the gambler unlocked the safe?
Present	Embedded: No RP	Anhi khazna; el-Haaris zi'il when the gambler unlocked ___i? Which safe; the-guard was.upset when the gambler unlocked ___i?
Present	Embedded: Yes RP	Anhi khazna; el-Haaris zi'il when the gambler unlocked-it? Which safe; the-guard was.upset when the gambler unlocked-it?

TABLE 5 Critical stimuli for block 4, code-switched English to Egyptian Arabic sentences.

Island	Clause type	Example sentence
Absent	Matrix	Who claimed inn el-ra'ees katab el-risala? Who claimed that the-president wrote the-speech?
Absent	Embedded: No RP	Which speech; did the ambassador claim inn el-ra'ees katab ___i? Which speech; did the ambassador claim that the-president wrote ___i?
Absent	Embedded: Yes RP	Which speech; did the ambassador claim inn el-ra'ees katab- ha; ? Which speech; did the ambassador claim that the-president wrote- it; ?
Present	Matrix	Who celebrated lamma el-ra'ees katab el-risala? Who celebrated when the-president wrote the-speech?
Present	Embedded: No RP	Which speech; did the ambassador celebrate when el-ra'ees katab ___i? Which speech; did the ambassador celebrate when the-president wrote ___i?
Present	Embedded: Yes RP	Which speech; did the ambassador celebrate when el-ra'ees katab- ha; ? Which speech; did the ambassador celebrate when the-president wrote- it; ?

age of five, English before the age of twelve, and checked 'yes' when asked whether they self-identified as code-switchers. Participants were also asked to indicate how often they used both languages to *speak*, *listen*, *read*, and *write* within the past six months. Most participants reported *speaking in* and *listening to* Egyptian Arabic every day ($N = 26$ and 27) while the rest reported that they did so at least 3–4 times a week ($N = 14$ and 13). Details of participants' self-reported language use can be found in Table 6 for the Egyptian Arabic usage.

Details of participants' self-reported language use can be found in Table 7 for the English usage. All participants reported *speaking in* and *listening to* English every day.

As can be seen from the participants' self-reported usage in Tables 6, 7, although participants reported using Egyptian Arabic regularly for speaking and listening, they showed greater usage of English over Egyptian Arabic across all four domains of usage. In addition, when asked to self-report their proficiency levels of *speaking*, *listening*, *reading*, and *writing* in both languages on a scale of 1–7, participants reported higher averages for English proficiency (*speaking* = 6.68, *listening* = 6.68, *reading* = 6.7, *writing* = 6.54)

than for Egyptian Arabic proficiency (*speaking* = 5.63, *listening* = 5.95, *reading* = 3.32, *writing* = 2.97). All together this demographic information indicates that this pool of participants was more dominant in English than in Egyptian Arabic.

3.3 Procedure

Participants were instructed to listen to a sentence and rate its acceptability on a seven-point likert scale, where "1" indicated totally unacceptable and "7" indicated totally acceptable. Before beginning the experiment, participants were provided with detailed instructions and examples to illustrate that the task was not about prescriptive norms. This was followed by additional examples with varying degrees of acceptability to illustrate what type of code-switched sentences corresponded to different parts of the scale. Since the experimental sentences were presented aurally to participants, these training sentences were also presented aurally, and none of the example sentences used the same structure as the

TABLE 6 Participants' usage of Egyptian Arabic within the last 6 months.

<i>Egyptian Arabic</i>	Everyday	3-4 times a week	At most twice a week	Once a week	Never	Total
Speaking	26	14	0	0	0	40
Listening	27	13	0	0	0	40
Reading	7	12	6	6	9	40
Writing	5	3	15	5	12	40

TABLE 7 Participants' usage of English within the last 6 months.

<i>English</i>	Everyday	3-4 times a week	At most twice a week	Once a week	Never	Total
Speaking	40	0	0	0	0	40
Listening	40	0	0	0	0	40
Reading	40	0	0	0	0	40
Writing	39	1	0	0	0	40

target, critical stimuli sentences. After completing the experiment, participants filled out a questionnaire about their language use and background of both Egyptian Arabic and English.

3.4 Data analysis

Raw judgment ratings, including both target and filler items, were converted to within-participant *z*-scores (Schütze and Sprouse, 2013), to account for individual variation in how the scale was used (e.g. some participants might use one side of the scale more than the other). Two linear mixed effects models were constructed using *island* and *clause type* as fixed effects and *participant* and *item* as random intercepts for each clause type where the fronted *wh*-constituent formed a dependency with the embedded CP (embedded: no RP, or embedded: yes RP) using the *lme4* package in R (Bates et al., 2015). We refer to our two models as our *no resumptive pronoun model* and *yes resumptive pronoun model*: (i) *no resumptive pronoun model*: island (present vs. absent) X clause type (matrix vs. embedded: no RP). (ii) *yes resumptive pronoun model*: island (present vs. absent) X clause type (matrix vs. embedded: yes RP).

4 Predictions

As highlighted in Section 3, we divided the experiment into four blocks: unilingual Egyptian Arabic, unilingual English, code-switched Egyptian Arabic to English, and code-switched English to Egyptian Arabic. The first two blocks were intended to serve as a baseline that initially tested the magnitude of island effects in unilingual Egyptian Arabic and unilingual English sentences within this bilingual population. The purpose of the second two blocks was to test whether bilinguals, when presented with conflicting structural requirements, maintain two representations or converge on a single structural representation. This methodology also allowed us to draw conclusions regarding the mental representations of both languages based on the unilingual sentences (blocks 1 and 2) and make specific predictions

about what to expect in the code-switched sentences (blocks 3 and 4). In this section, we discuss these predictions.

4.1 The unilingual conditions

In our earlier discussion in this paper (particularly in Section 2.1) we noted that although the *wh*-resumptive structure has the same word order across Egyptian Arabic and English, it has been argued to be formed via *different* derivations across these two languages. In Egyptian Arabic, the *wh*-constituent is base generated in the matrix CP domain and binds a resumptive pronoun in the structurally lower position, which was also base generated in that position. In English, on the other hand, *wh*-questions that appear in matrix CP are argued to end up in the specifier position of the matrix CP via movement. Based on these assumptions we predict the following for the unilingual conditions in blocks 1 and 2. In the unilingual Egyptian Arabic conditions (block 1), we predict that participants will rate *wh*-questions without a resumptive pronoun as being unacceptable, and they will rate the ones with a resumptive pronoun as acceptable, regardless of whether or not a syntactic island is present, since movement is not required for this operation. In the unilingual English *wh*-resumptive structures (block 2), we predict that participants will be sensitive to the presence of an island in the absence of a resumptive pronoun, and that the resumptive pronoun may or may not ameliorate this island effect either fully or partially.

4.2 The code-switched conditions

As explained in section 3.1, in the code-switched conditions the code-switch location always occurred right after the verb in the matrix CP and before the C head of the lower CP. Although this methodology ensures that the switch location is in an acceptable switch location, the phrases being mixed result in, presumably, conflicting well-formedness requirements. For this reason, we predict that one of two things could happen. This population

of bilinguals can either (i) maintain two derivational strategies for each code-switch direction or (ii) adopt a single derivational strategy for each code-switching direction, resembling either the strategy of base generation found in Egyptian Arabic, or the strategy of movement found in English.

If participants maintain two derivational strategies, then their (in)sensitivity to island structures and (dis)-preference for resumptive pronouns will be dependent on the direction of the code-switch. Specifically, the magnitude of island sensitivity, and subsequent ameliorative effects of resumptive pronouns, will follow the same pattern as the language of the matrix CP. In the code-switched Egyptian Arabic to English conditions, we predict that participants will be insensitive to the presence of an island, as the Egyptian Arabic wh-constituent is predicted to be base generated in the matrix CP position without undergoing movement from the lower CP. If [Soltan \(2011\)](#) is correct in predicting that all Egyptian Arabic A-bar constituents must bind a resumptive pronoun, then participants should prefer the presence of a resumptive pronoun over its absence in the Egyptian Arabic to English conditions as well. In contrast, in the code-switched English to Egyptian Arabic conditions, we predict that participants will be sensitive to the presence of an island, as the English wh-constituent is predicted to have moved from the embedded CP to the specifier position of the matrix CP. Because of this, in the presence of a lower CP that blocks movement (here, *syntactic islands*) the code-switched sentence will be unacceptable, while in the presence of an embedded CP that permits movement the code-switched sentence will be acceptable. Because resumptive pronouns in English wh-questions are argued to be intrusive elements rather than productive components of the grammar, we predict that in the non-island contexts where the code-switched sentence begins in English and ends in Egyptian Arabic the presence of a resumptive pronoun will be dispreferred and its absence preferred. However, in the island contexts, the presence of a resumptive pronoun may ameliorate the island effect either fully or partially.

If participants instead capitalize on the word order overlap across the two languages and converge on a unified derivational strategy, we anticipate that they would treat both code-switching directions as either resembling the base generation strategy of Egyptian Arabic or the movement strategy of English. If this population of bilinguals adopts a single derivational strategy for each code-switching direction resembling the strategy found in Egyptian Arabic, then participants will demonstrate insensitivity

to constraints on movement in both code-switch directions—Egyptian Arabic to English (block 3) and English to Egyptian Arabic (block 4). However, if this population of bilinguals converge on one derivational strategy for each code-switch direction, akin to the strategy found in English, we predict that participants will exhibit sensitivity to constraints on movement in both code-switch directions—Egyptian Arabic to English (block 3) and English to Egyptian Arabic (block 4). The presence of a resumptive pronoun may or may not ameliorate this sensitivity.

5 Results and discussion

In this section we present the results of this experiment in Section 5.1, and Section 5.2 discuss the interpretation of the experiment's results based on our predictions.

5.1 Results

In this section, we present the results of this experiment. We first discuss the findings from the unilingual conditions, blocks 1 and 2, and discuss the results from the code-switched conditions, blocks 3 and 4.

The unilingual conditions: In both unilingual conditions, we observed that structures where the clause initial wh-constituent referred to the object of the verb in the embedded CP (the *embedded: no RP* and *embedded: yes RP* conditions) were rated as being less acceptable than structures where the wh-phrase was the subject of the matrix CP (the *matrix* conditions). Zooming in on the structures with a clause initial wh-constituent, we found that, in block 1 (unilingual Egyptian Arabic), participants rated the sentences with a resumptive pronoun (the *embedded: yes RP* conditions) as more acceptable than the sentences without a resumptive pronoun (the *embedded: no RP* conditions). In block 2 (unilingual English), however, we found that in the absence of an adjunct island (the *absent* conditions) participants rated the sentences with a resumptive pronoun (the *embedded: yes RP* conditions) as less acceptable than sentences without a resumptive pronoun (the *embedded: no RP* conditions). In contrast, in the presence of an adjunct island (the *present* conditions), participants rated the sentences with a resumptive pronoun (the *embedded: yes RP* conditions) as being more acceptable than the sentences without

TABLE 8 Average ratings (raw judgements and z-scores) for each condition from the unilingual conditions, testing the acceptability of wh-resumptive structures in unilingual Egyptian Arabic (block 1) and unilingual English (block 2) contexts.

Island	Clause type	Block 1: Egyptian Arabic		Block 2: English	
		Average raw score	Average z-score	Average raw score	Average z-score
Absent	Matrix	6.53	1.17	6.23	0.96
Absent	Embedded: No RP	4.07	0.03	5.8	0.78
Absent	Embedded: Yes RP	5.03	0.45	4.53	0.24
Present	Matrix	6.65	1.22	6.13	0.93
Present	Embedded: No RP	3.8	-0.08	3.4	-0.24
Present	Embedded: Yes RP	4.58	0.23	4.88	0.39

TABLE 9 Estimated coefficients and t-values for the linear mixed effects model with clause type (matrix vs. embedded) and adjunct island presence (present vs. absent) as fixed effects in the unilingual Egyptian Arabic sentences.

	No resumptive pronoun model				Yes resumptive pronoun model			
	Estimate	SE	t-value	p-value	Estimate	SE	t-value	p-value
Intercept	0.57312	0.06565	8.73	<0.001	0.76694	0.06528	11.749	<0.001
Clause Type: Matrix vs. Embedded	0.61141	0.04369	13.995	<0.001	0.42022	0.04667	9.006	<0.001
Island: Present vs. Absent	0.01149	0.04386	0.262	0.79	0.03845	0.04649	0.827	0.41
Interaction: Clause Type X Island	-0.042	0.04366	-0.962	0.34	-0.0665	0.04665	-1.425	0.16

Significant effects are shown by p-values.

TABLE 10 Estimated coefficients and t-values for the linear mixed effects model with clause type (matrix vs. embedded) and adjunct island presence (present vs. absent) as fixed effects in the unilingual English sentences.

	No resumptive pronoun model				Yes resumptive pronoun model			
	Estimate	SE	t-value	p-value	Estimate	SE	t-value	p-value
Intercept	0.60677	0.06741	9.001	<0.001	0.63325	0.04685	13.516	<0.001
Clause Type: Matrix vs. Embedded	0.3434	0.0432	7.949	<0.001	0.31167	0.04685	6.652	<0.001
Island: Present vs. Absent	0.26324	0.04303	6.117	<0.001	-0.02617	0.04685	-0.559	0.58
Interaction: Clause Type X Island	-0.25026	0.04312	-5.805	<0.001	0.04227	0.04685	0.902	0.37

Significant effects are shown by p-values.

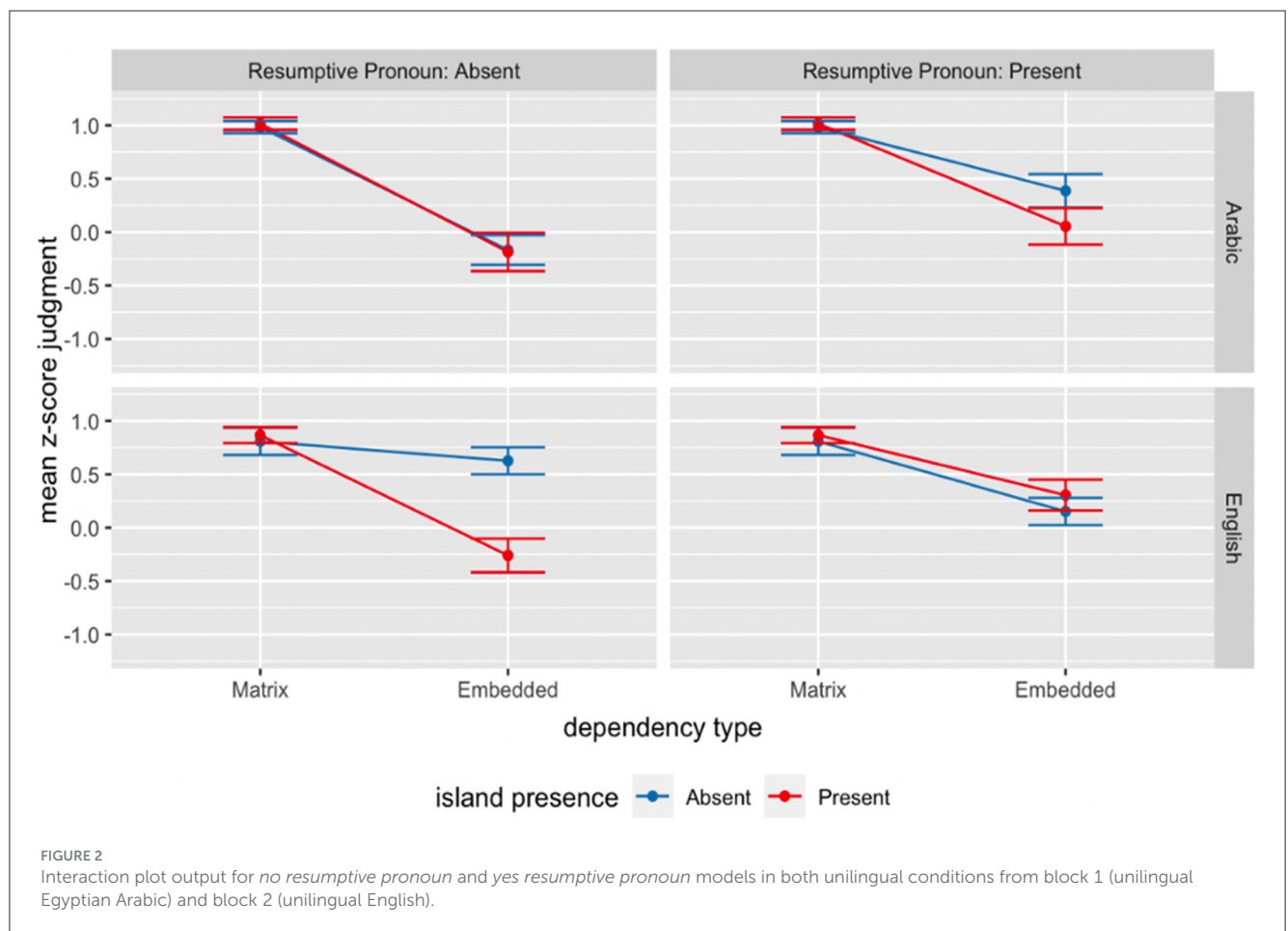


FIGURE 2 Interaction plot output for no resumptive pronoun and yes resumptive pronoun models in both unilingual conditions from block 1 (unilingual Egyptian Arabic) and block 2 (unilingual English).

TABLE 11 Average ratings (raw judgements and z-scores) for each condition from the code-switched conditions, testing the acceptability of wh-resumptive structures in code-switching Egyptian Arabic to English (block 3) and code-switched English to Egyptian Arabic (block 4) contexts.

Island	Clause	Block 3: Egyptian Arabic to English		Block 4: English to Egyptian Arabic	
		Average raw score	Average z-score	Average raw score	Average z-score
Absent	Matrix	6.4	0.78	6.38	0.78
Absent	Embedded: No RP	5.15	0.22	5.15	0.23
Absent	Embedded: Yes RP	5.14	0.21	5.55	0.43
Present	Matrix	6.38	0.76	6.33	0.75
Present	Embedded: No RP	4	-0.30	3.7	-0.41
Present	Embedded: Yes RP	4.43	-0.10	4.05	-0.22

TABLE 12 Estimated coefficients and t-values for the linear mixed effects model with clause type (matrix vs. embedded) and adjunct island presence (present vs. absent) as fixed effects in the code-switched Egyptian Arabic to English sentences.

	No resumptive pronoun model				Yes resumptive pronoun model			
	Estimate	SE	t-value	p-value	Estimate	SE	t-value	p-value
Intercept	0.36502	0.05605	6.512	<0.001	0.40954	0.05318	7.701	<0.001
Clause Type: Matrix vs. Embedded	0.40464	0.04631	8.737	<0.001	0.35477	0.04358	8.141	<0.001
Island: Present vs. Absent	0.13722	0.04635	2.961	<0.05	0.08258	0.04363	1.893	0.06
Interaction: Clause Type X Island	-0.1221	0.04631	-2.637	<0.05	-0.07342	0.04358	-1.685	0.09

Significant effects are shown by p-values.

a resumptive pronoun (the *embedded: no RP* conditions). These results are summarized in Table 8.

Concerning our statistical models (the *no resumptive pronoun model* and the *yes resumptive pronoun model*), in block 1 both models revealed no effect for the interaction of *clause type* and *island presence* (no resumptive pronoun model: $p = 0.34$; yes resumptive pronoun model: $p = 0.16$). These results suggest that participants were insensitive to island structures in Egyptian Arabic, with or without a resumptive pronoun, which is expected under the assumption wh-questions are not formed via movement in Egyptian Arabic, and that resumptive pronouns in Egyptian Arabic are grammatical elements. In block 2, however, the *no resumptive pronoun model* revealed a main effect for the interaction of *clause type* and *island presence* ($p < 0.001$), while the *yes resumptive pronoun model* revealed no effect ($p = 0.37$). These results suggest that participants were sensitive to the presence of an island in the absence of a resumptive pronoun, but insensitive to it in the presence of a resumptive pronoun. These results are expected under the assumption that wh-questions are formed via movement in English, and that the presence of a resumptive pronoun may or may not ameliorate the island effect to varying degrees. These results can be summarized in Tables 9, 10, respectively, while relevant interaction plots can be found in Figure 2.

The code-switched conditions: Similarly to the unilingual conditions, in both code-switched conditions, we observed that structures where the clause initial wh-constituent referred to the object of the verb in the embedded CP (the *embedded: no RP* and *embedded: yes RP* conditions) were rated as being less acceptable than structures where the wh-phrase was the subject of the matrix CP (the *matrix* conditions). With respect to the conditions in which the clause initial wh-constituent co-referred with the object

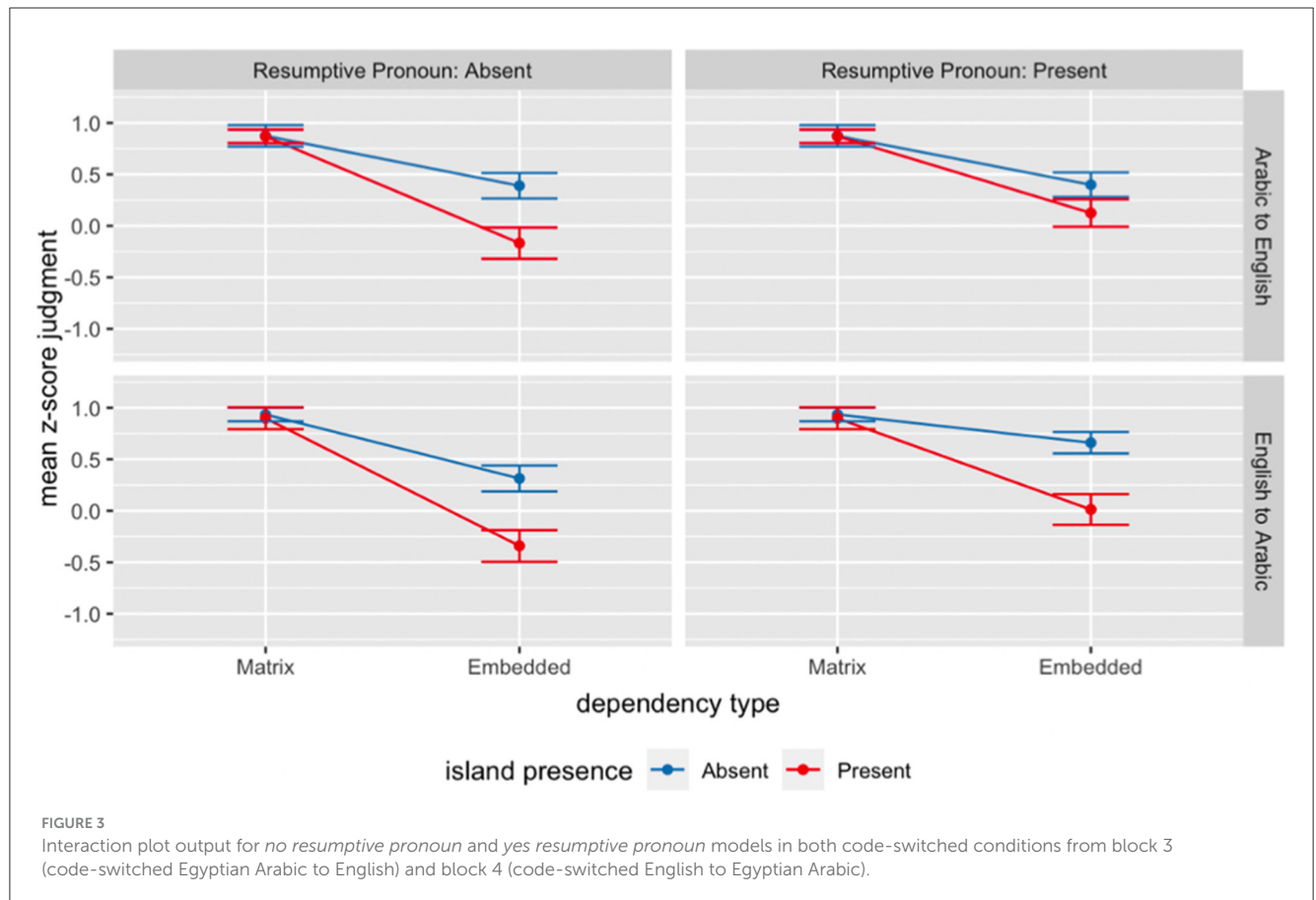
of the embedded verb, we found the following: When the code-switch direction went from Egyptian Arabic into English (block 1), participants preferred the presence of a resumptive pronoun over its absence in the context of an adjunct island (the combination of the *present* conditions with the *embedded: yes RP* conditions). However, when the biclausal phrase did not include an adjunct island (the *absent* conditions), participants rated both conditions (the *embedded: no RP* and *embedded: yes RP* conditions) as being equally acceptable. When the code-switch direction went from English to Egyptian Arabic (block 2), we found that across the board participants rated wh-questions without an adjunct island (the *absent* conditions) as being more acceptable than sentences with an adjunct island (the *present* conditions), regardless of whether or not a resumptive pronoun was present. With respect to their resumptive pronouns sensitivity, we found that participants rated the sentences in which the resumptive pronoun was present (the *embedded: yes RP conditions*) as being more acceptable than the sentences where the resumptive pronoun was absent (the *embedded: no RP conditions*) both within and outside of an adjunct island. These results are summarized in Table 11.

Concerning our statistical models (the *no resumptive pronoun model* and the *yes resumptive pronoun model*), in both blocks 3 and 4, the *no resumptive pronoun model* revealed a main effect for the interaction of *clause type* and *island presence* (block 3: $p < 0.05$, block 4: $p < 0.05$). This suggests that, in the absence of a resumptive pronoun, participants were sensitive to the presence of an adjunct island, regardless of whether the code-switched sentence began in Egyptian Arabic and ended in English (block 3) or began in English and ended in Egyptian Arabic (block 4). The *yes resumptive pronoun model*, on the other hand, revealed no effect for the interaction of *clause type* and *island presence* in block 3 ($p =$

TABLE 13 Estimated coefficients and t-values for the linear mixed effects model with clause type (matrix vs. embedded) and adjunct island presence (present vs. absent) as fixed effects in the code-switched English to Egyptian Arabic sentences.

	No resumptive pronoun model				Yes resumptive pronoun model			
	Estimate	SE	t-value	p-value	Estimate	SE	t-value	p-value
Intercept	0.33803	0.04977	6.792	<0.001	0.43652	0.05418	8.056	<0.001
Clause Type: Matrix vs. Embedded	0.42712	0.04977	8.583	<0.001	0.32799	0.04653	7.048	<0.001
Island: Present vs. Absent	0.16738	0.04977	3.363	<0.001	0.17094	0.0465	3.676	<0.001
Interaction: Clause Type X Island	-0.15161	0.04977	-3.046	<0.05	-0.15409	0.04652	-3.313	<0.001

Significant effects are shown by p-values.



0.09) but a significant effect in block 4 ($p < 0.001$). This suggests that, in the absence of a resumptive pronoun, participants were insensitive to the presence of an adjunct island when the code-switched sentence began in Egyptian Arabic and ended in English (block 3), but sensitive to it when the code-switched sentence began in English and ended in Egyptian Arabic (block 4). These results are summarized in Tables 12, 13, while relevant interaction plots can be seen in Figure 3.

5.2 Discussion

In this section, we explore the interpretation of the experiment's results. We first analyze the findings from the unilingual conditions and then investigate the interpretation of the outcomes from

the code-switched conditions. Ultimately, we will argue that the findings from bilingual participants in the code-switched conditions suggest that, rather than maintaining two derivations for each code-switch direction, these bilinguals seem to have converged on a single one-to-one mapping from derivation to surface word order.

5.2.1 The unilingual conditions

The results from the unilingual conditions suggest that this population of bilinguals has acquired the language-specific derivational properties from the baseline input for these structures. Recall that in Egyptian Arabic, fronted nominal wh-questions are presumed to be base-generated in a structurally higher position co-referring to a resumptive pronoun base-generated in a structurally

lower position. In contrast, English fronted *wh*-questions are proposed to have undergone movement to their overt structurally higher position. Because of this, we predicted that participants would show insensitivity to island structures in unilingual Egyptian Arabic sentences but sensitivity to these same structures in unilingual English sentences, presumably because these structures are formed via movement in English but not in Egyptian Arabic. Concerning their sensitivity to resumptive pronouns, we predicted a preference for the presence of a resumptive pronoun over its absence, both within and outside of islands, in Egyptian Arabic. Additionally, we anticipated a potential amelioration effect on island sensitivity in the presence of a resumptive pronoun in English. In this experiment, we observed that participants were indeed insensitive to the presence of a syntactic island in Egyptian Arabic, regardless of the presence of a resumptive pronoun. However, they exhibited sensitivity to syntactic islands in English, particularly in the absence of a resumptive pronoun, and this sensitivity was ameliorated in the presence of a resumptive pronoun. This confirms that this population of bilinguals did, in fact, acquire the language-specific derivational properties of these two structures.

5.2.2 The code-switched conditions

Regarding the code-switch conditions, our results can be summarized as follows. In the absence of a resumptive pronoun, participants consistently rated the non-island structure as significantly more acceptable than the island structure. This trend held true in both contexts: when the code-switch occurred from Egyptian Arabic to English (block 3) and when it occurred from English to Egyptian Arabic (block 4). However, when a resumptive pronoun was introduced, participants assigned consistently high ratings to both the island and non-island conditions in the contexts where the code-switch went from Egyptian Arabic to English (block 3). Yet, in the contexts where the code-switch went from English to Egyptian Arabic (block 4), participants rated the island conditions as statistically less acceptable than the non-island conditions. Taken together, these results suggest that participants were sensitive to constraints on movement in both code-switching contexts (from Egyptian Arabic to English, and from English to Egyptian Arabic), and that the presence of a resumptive pronoun ameliorated this effect in the contexts where the code-switch began in Egyptian Arabic but ended in English (block 3). When comparing our results against our predictions in the context of the code-switched conditions, we anticipated two possible scenarios: On the one hand, this population of bilinguals could maintain two derivational strategies for each code-switching direction, reflecting the global sensitivities of the language of the matrix CP. On the other hand this population of bilinguals could instead converge on one derivational strategy resembling either that of Egyptian Arabic or English for each code-switch direction. For the remainder of this section, we will argue that this population of bilinguals converged on a single derivational strategy, resembling the movement strategy of English, across both code-switched conditions.

If participants had maintained two derivational strategies for each code-switch direction, then under the assumptions that the language of the matrix CP determines the global acceptability

of a code-switched sentence (see Section 4 for a more detailed explanation), certain outcomes can be anticipated. Given that clause-initial, nominal *wh*-constituents in Egyptian Arabic are presumed to be base-generated in a structurally higher position, rather than moving there, participants would be expected to show insensitivity to island structures when the code-switch begins in Egyptian Arabic and ends in English (block 3, with sample stimuli demonstrated in Table 4). In contrast, since clause-initial *wh*-constituents in English are assumed to move to their overt structurally higher position, participants would be expected to exhibit sensitivity to these constraints on movement when the code-switch begins in English but ends in Egyptian Arabic (block 4, with sample stimuli demonstrated in Table 5). The presence of a resumptive pronoun may ameliorate this sensitivity to varying degrees. Our findings revealed that participants not only demonstrated sensitivity to island contexts in the code-switched conditions that began in English and ended in Egyptian Arabic (block 4, with sample stimuli demonstrated in Table 5) but also in the conditions where the code-switch began in Egyptian Arabic and ended in English, when a resumptive pronoun was absent (block 3, with sample stimuli demonstrated in Table 4). This suggests that participants were sensitive to constraints on movement in both code-switched contexts regardless of whether the code-switched sentences began in Egyptian Arabic and ended in English (block 3, with sample stimuli demonstrated in Table 4) or began in English and ended in Egyptian Arabic (block 4, with sample stimuli demonstrated in Table 5).

From this we conclude that, when presented with two structures with overlapping word orders but different derivational properties across the two languages leading to these word orders, this population of bilinguals did not maintain two distinct representations. Instead based on their sensitivity to islands constraints in both code-switched directions, it seems that participants converged on a single derivational strategy across both code-switched conditions, mainly that of movement as in English. Although the presence of a resumptive pronoun ameliorated these effects in the contexts that began in Egyptian Arabic and ended in English (block 3, with sample stimuli demonstrated in Table 4), it did not have the same ameliorative impact in the contexts that began in English and ended in Egyptian Arabic (block 4, with sample stimuli demonstrated in Table 5). Taken together, our findings suggest that when presented with two structures with overlapping word orders, but different derivational properties leading to these word orders, this group of bilinguals seem to have converged on a unified structural representation, resembling that of English, rather than maintaining two distinct representations.⁵ Why might this be the case? In the next section we propose that the preference for convergence may stem from the optimization of congruent structures between the bilingual's languages, resulting in

⁵ Although in this paper we conclude that bilinguals may choose to converge on a one-to-one mapping, the specific mapping they converge on could vary depending on several factors, such as proficiency level. Our conclusions are drawn from the bilinguals we tested in this study, who are predominantly English-dominant. We acknowledge here that different profiles of English-Arabic bilinguals may exhibit varying optimization strategies, which could lead to different patterns of convergence.

a one-to-one mapping between derivational properties and surface form, as opposed to maintaining a many-to-one mapping.

6 On the role of optimization strategies and cross-linguistic similarities in bilingualism

In the preceding section, we demonstrated that when this population of bilinguals were confronted with structures with overlapping word orders but distinct derivations, they converged on a unified structural representation rather than maintaining two. This prompts the question: why did convergence across both code-switched directions manifest as the preferred choice? In this section we suggest that while speakers who are competent in any set of given languages can allow for multiple mappings from derivation to surface order, some bilinguals may capitalize on the structural overlaps already present between their two languages (see [Baptista et al., 2016](#); [Baptista, 2020](#); [Labotka et al., 2023](#) for a thorough review of this literature), in an effort to reduce many-to-one mappings oftentimes to just one (see [Polinsky and Scontras, 2020](#) for a review on common strategies within heritage bilinguals).

On this topic, linguists have long hypothesized that cross-linguistic similarities among languages in contact can affect language acquisition (particularly, transfer) in ways that can be facilitative or non-facilitative, whether in the context of second language (L2) acquisition ([Seibert Hanson and Carlson, 2014](#); [Tolentino and Tokowicz, 2014](#)), simultaneous bilingualism ([Marian and Spivey, 2003](#); [Bullock and Toribio, 2004](#); [Kroll et al., 2015](#)), third language (L3) acquisition ([Berkes and Flynn, 2012](#); [Alonso and Rothman, 2017](#); [González Alonso et al., 2021](#); [Pereira Soares et al., 2022](#)), or multilingualism leading to language creation (e.g., pidgin or Creole) ([Corne et al., 1999](#); [Mufwene, 2001](#); [Kihm, 2003](#); [Aboh, 2015](#); [Baptista, 2020](#)).

When we examine the role of cross-linguistic influence on bilingual language acquisition, we find that at times, such influences can result in innovative structures that were not there prior to contact but at other times, cross-linguistic influences can lead to the enhancement of features/properties that are already shared across the two languages, a phenomenon termed *congruence*. In fact, scholars who have closely examined the role of congruence in Creole formation ([Corne et al., 1999](#); [Chaudenson, 2001](#); [Kihm, 2003](#); [Baptista, 2020](#)) have consistently proposed that the similarities (the congruent features) that speakers perceive between the languages in contact are often favored to participate in the emergence and development of a new language. For example, [Baptista \(2020\)](#) in particular examined 19 grammatical (and lexical) domains across 20 contact languages to illustrate how morphosyntactic and semantic features may be more likely to be selected into the grammatical makeup of a given Creole when they *preexist* and are shared by some of the source languages present in its linguistic ecology.⁶ This means that when confronted with multiple options, learners often operationalize L1/L2 syntactic mappings whenever possible, which may then result in a structure

that is common to both languages, and devoid of the marked interpretation found in only one language. For instance, [Toribio \(2004\)](#) has shown how Spanish-English simultaneous bilingual speakers optimize the grammar of their two languages by using structures that they share, such as passivization via A-movement in (11), which could be considered as deviating from the monolingual Spanish norm but [Toribio \(2004\)](#) emphasizes that these passive constructions are not real innovations, as they can be also found in monolingual Spanish though much less frequently.

(11) Prompt: Quién hace el pastel? El pastel
“Who makes the cake? The cake”

Response: **El pastel es hecho por Cecilia.** “The cake is made by Cecilia.”

(cf., Clitic Left Dislocation: *El pastel lo hace Cecilia* “Cecilia makes the cake”)

([Toribio, 2004](#), p. 166)

The congruence of the Spanish and English passive leads to the preferential use of that structure over others. This is an optimization strategy as a result of pattern matching. Such one-to-one mapping is part of an arsenal of optimization strategies observable in the grammars of various bilingual populations. Specific to heritage language acquisition, [Albirini et al. \(2011\)](#) found that Egyptian heritage/English-dominant speakers overproduce the SVO word order even in contexts where VSO is preferred, presumably due to the congruence of SVO word order between Egyptian Arabic and English. Additionally, [Scontras et al. \(2017\)](#) found that Mandarin heritage/English-dominant speakers prefer surface scope over inverse scope interpretations in doubly quantified sentences in both languages, although English allows both interpretations equally. A similar sensitivity to cross-linguistic similarities can also be observed in bilingual child language acquisition. [Austin \(2020, p. 216–218\)](#) provides an excellent overview of the current research that examines how bilingual children exploit the overlaps between their two languages. She notes that there is a growing consensus in the field that bilingual children can identify their two languages as separate linguistic systems from the very start of language acquisition and scholars are also coming together in identifying some key factors that promote cross-linguistic influences in the two grammars of young children. Such factors include (but are not limited to) full or partial surface word order overlap. [Austin \(2020\)](#) highlights the researchers who examined the role of word order overlap in favoring cross-linguistic influences leading to the emergence of a novel grammar in children. For instance, when investigating bilingual children acquiring German and English, [Döpke \(1998\)](#) found that these children produced SVO word order more frequently than monolingual children acquiring German, even when the environment required SOV order. In all these studies, children overproduced a word order that crucially overlapped with their other language, leading them to overextend the use of the word order that their two languages share, analogous to the passive construction in the English/Spanish bilinguals that [Toribio \(2004\)](#) reported. [Müller](#)

⁶ Although [Baptista \(2020\)](#) focuses on the effects of optimization strategies in Creole emergence, we find that this proposal patterns with a broader

observation according to which language-neutral *optimization strategies* are employed when languages come into contact in general.

(1998) accounted for the over-production of SVO word order by proposing that when children are confronted with several competing syntactic structures that yield a similar interpretation, they may opt for the grammatical option that can be found in both languages, increasing its frequency compared to the monolingual child, thereby yielding one-to-one mapping of the two languages in that particular domain. This points to the optimization strategy they exploited by availing themselves of the structural overlap between their two languages.

In our study we argue that the congruent word order resulted not only in surface word order similarities but also in converging derivational properties. Here, the preference for convergence stems from the optimization of congruent structures between the bilingual's languages, resulting in a one-to-one mapping between derivational properties and surface form, as opposed to maintaining a many-to-one mapping. Specifically, we propose that the emergence of this novel derivational strategy in which heritage Egyptian Arabic/English dominant speakers treat both code-switch directions as instances of wh-movement may be attributed to optimization strategies, whereby speakers seem to operationalize syntactic mappings from both of their languages whenever feasible. This process ultimately yields a structure that is common to both English and Egyptian Arabic.

7 Conclusion

The objective of this paper has been to investigate Egyptian-Arabic/English bilinguals' sensitivity to two structures that display overlapping word orders across their two languages but are argued to have different derivational properties in their formation. We paid particular attention to filler-gap dependencies with and without resumptive pronouns in Egyptian Arabic, a language argued to have grammatical resumptive pronouns base generated at the tail end of nominal A-bar dependencies, and English, a language argued to have intrusive resumptive pronouns inserted post-syntactically due to illicit movement operations, as with syntactic islands. The findings of our experimental data from code-switched filler-gap dependencies suggest that when presented with two structures with overlapping word orders, but different derivational properties leading to these word orders, this population of bilinguals seem to have converged on a unified structural representation, resembling that of English, rather than maintaining two distinct representations.

In an attempt to account for our results, we proposed that the preference for convergence may be due to the optimization of congruent structures between the bilingual's languages, resulting in a one-to-one mapping between derivational properties and surface form, as opposed to maintaining a many-to-one mapping. More precisely, we propose that the emergence of this novel derivational

strategy in which heritage Egyptian Arabic/English dominant speakers treat both code-switch directions as instances of wh-movement may be attributed to optimization strategies, whereby speakers seem to operationalize syntactic mappings from both of their languages whenever feasible. This process ultimately yields a structure that is common to both English and Egyptian Arabic.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by University of Michigan International Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

YS: Writing – original draft, Writing – review & editing. MB: Writing – original draft, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. The publication fees were funded by MB's faculty research funds.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Aboh, E. O. (2015). *The Emergence of Hybrid Grammars: Language Contact and Change*. Cambridge: Cambridge University Press. doi: 10.1017/CBO9781139024167

Al-Aqarbeh, R., and Sprouse, J. (2023). Island effects and amelioration by resumption in Jordanian Arabic: an auditory acceptability-judgment study. *Syntax*. doi: 10.1111/synt.12262

- Albirini, A., Benmamoun, E., and Saadah, E. (2011). Grammatical features of Egyptian and Palestinian Arabic Heritage speakers' oral production. *Stud. Second Lang. Acquis.* 33, 273–303. doi: 10.1017/S0272263110000768
- Alexiadou, A., and Lohndal, T. (2018). Units of language mixing: a cross-linguistic perspective. *Front. Psychol.* 9:394167. doi: 10.3389/fpsyg.2018.01719
- Alexopoulou, T., and Keller, F. (2007). Locality, cyclicity, and resumption: at the interface between the grammar and the human sentence processor. *Language* 83, 110–160. doi: 10.1353/lan.2007.0001
- Almeida, D. (2014). Subliminal wh-islands in Brazilian Portuguese and the consequences for syntactic theory. *Rev. Abridin.* 13, 55–93. doi: 10.5380/rabl.v13i2.39611
- Alonso, J. G., and Rothman, J. (2017). Coming of age in L3 initial stages transfer models: deriving developmental predictions and looking towards the future. *Int. J. Bilingual.* 21, 683–697. doi: 10.1177/1367006916649265
- Aoun, J., Choueiri, L., and Hornstein, N. (2001). Resumption, movement, and derivational economy. *Linguist. Inq.* 32, 371–403.
- Aoun, J., and Li, Y. (2003). Essays on the *Representational and Derivational Nature of Grammar: The Diversity of wh-constructions*. Cambridge: MIT press. doi: 10.7551/mitpress/2832.001.0001
- Asudeh, A. (2011). "Towards a unified theory of resumption," in *Resumptive Pronouns at the Interfaces*, ed. A. Rouveret (Amsterdam: John Benjamins Publishing Company), 121–187. doi: 10.1075/lfab.5.03asu
- Austin, J. (2020). "Cross-language contact in the developing grammars of bilingual children," in *The Routledge Handbook of Language Contact*, eds. E. Adamou and Y. Matras (London: Routledge), 201–220. doi: 10.4324/9781351109154-14
- Baptista, M. (2020). Competition, selection, and the role of congruence in Creole genesis and development. *Language* 96, 160–199. doi: 10.1353/lan.2020.0005
- Baptista, M., Gelman, S. A., and Beck, E. (2016). Testing the role of convergence in language acquisition, with implications for creole genesis. *Int. J. Bilingual.* 20, 269–296. doi: 10.1177/1367006914552459
- Bates, D., Mächler, M., Bolker, B., and Walker, S. (2015). Fitting linear mixed-effects models using lme4. *J. Stat. Softw.* 67, 1–48. doi: 10.18637/jss.v067.i01
- Belazi, H. M., Rubin, E. J., and Toribio, A. J. (1994). Code switching and X-bar theory: the functional head constraint. *Linguist. Inq.* 25, 221–237.
- Beltrama, A., and Xiang, M. (2016). Unacceptable but comprehensible: the facilitation effect of resumptive pronouns. *Glossa* 1:29. doi: 10.5334/gjgl.24
- Berkes, É., and Flynn, S. (2012). "Enhanced L3... Ln acquisition and its implications for language teaching," in *Cross-Linguistic Influences in Multilingual Language Acquisition*, ed. D. Gabrys-Barker (Berlin: Springer Berlin Heidelberg), 1–22. doi: 10.1007/978-3-642-29557-7_1
- Boersma, P. (2001). Praat, a system for doing phonetics by computer. *Glott. Int.* 5, 341–345.
- Bullock, B. E., and Toribio, A. J. (2004). Introduction: convergence as an emergent property in bilingual speech. *Biling.: Lang. Cogn.* 7, 91–93. doi: 10.1017/S1366728904001506
- Cann, R., Kaplan, T., and Kempson, R. (2005). Data at the grammar-pragmatics interface: the case of resumptive pronouns in English. *Lingua* 115, 1551–1577. doi: 10.1016/j.lingua.2004.07.004
- Chaudenson, R. (2001). *Creolization of Language and Culture*. Routledge.
- Chomsky, N. (2008). "On phases," in *Foundational Issues in Linguistic Theory: Essays in Honor of Jean-Roger Vergnaud*, eds. R. Freidin, C. P. Otero, and M. L. Zubizarreta (MIT Press). doi: 10.7551/mitpress/9780262062787.003.0007
- Corne, D., Dorigo, M., Glover, F., Dasgupta, D., Moscato, P., Poli, R., et al. (eds.). (1999). *New Ideas in Optimization*. New York, NY: McGraw-Hill Ltd.
- Declerck, M., Koch, I., Duñabeitia, J. A., Grainger, J., and Stephan, D. N. (2019). What absent switch costs and mixing costs during bilingual language comprehension can tell us about language control. *J. Exp. Psychol. Hum. Percept. Perform.* 45:771. doi: 10.1037/xhp0000627
- Döpke, S. (1998). Competing language structures: the acquisition of verb placement by bilingual German-English children. *J. Child Lang.* 25, 555–584. doi: 10.1017/S0305000998003584
- Ferreira, F., and Swets, B. (2005). "The production and comprehension of resumptive pronouns in relative clause "island" contexts," in *Twenty-first Century Psycholinguistics*, ed. A. Cutler (New York, NY: Routledge), 263–278.
- Fox, D., and Pesetsky, D. (2005). Cyclic linearization and syntactic structure. *Theor. Linguist.* 31, 1–46. doi: 10.1515/thli.2005.31.1-2.1
- Gibson, E. (1998). Linguistic complexity: Locality of syntactic dependencies. *Cognition* 68, 1–76. doi: 10.1016/S0010-0277(98)00034-1
- Gibson, E. (2000). The dependency locality theory: a distance-based theory of linguistic complexity. *Image Lang. Brain* 2000, 95–126. doi: 10.7551/mitpress/3654.003.0008
- González Alonso, J., Puig-Mayenco, E., Fábregas, A., Chaouch-Orozco, A., and Rothman, J. (2021). On the status of transfer in adult third language acquisition of early bilinguals. *PLoS ONE* 16:e0247976. doi: 10.1371/journal.pone.0247976
- González-Vilbazo, K., and López, L. (2012). Little v and parametric variation. *Nat. Lang. Linguist. Theory* 30, 33–77. doi: 10.1007/s11049-011-9141-5
- Grimstad, M. B., Riksem, B. R., Lohndal, T., and Áfarli, T. A. (2018). Lexicalist vs. exoskeletal approaches to language mixing. *Linguist. Rev.* 35, 187–218. doi: 10.1515/tr-2017-0022
- Heestand, D., Xiang, M., and Polinsky, M. (2011). Resumption still does not rescue islands. *Linguist. Inq.* 42, 138–152. doi: 10.1162/LING_a_00032
- Hofmeister, P., Casasanto, L. S., and Sag, I. A. (2012). How do individual cognitive differences relate to acceptability judgments? A reply to Sprouse, Wagers, and Phillips. *Language* 88, 390–400. doi: 10.1353/lan.2012.0025
- Kihm, A. (2003). "Inflectional categories in creole languages," in *Phonology and Morphology of Creole Languages*, ed. I. Plag (Tübingen: Max Niemeyer Verlag), 333–363. doi: 10.1515/9783110929560.333
- Kluender, R. (2004). "Are subject islands subject to a processing account," in *Proceedings of WCCFL, Vol. 23* (Somerville, MA: Cascadilla Press), 475–499.
- Koopman, H., and Sportiche, D. (1982). Variables and the Bijection principle. *Linguist. Rev.* 2, 139–160.
- Kroll, J. F., Dussias, P. E., Bice, K., and Perrotti, L. (2015). Bilingualism, mind, and brain. *Annu. Rev. Linguist.* 1, 377–394. doi: 10.1146/annurev-linguist-030514-124937
- Kush, D., Lohndal, T., and Sprouse, J. (2018). Investigating variation in island effects: a case study of Norwegian wh-extraction. *Nat. Lang. Linguist. Theory* 36, 743–779. doi: 10.1007/s11049-017-9390-z
- Labotka, D., Sabo, E., Bonais, R., Gelman, S. A., and Baptista, M. (2023). Testing the effects of congruence in adult multilingual acquisition with implications for creole genesis. *Cognition* 235:105387. doi: 10.1016/j.cognition.2023.105387
- Lewis, R. L., and Vasishth, S. (2005). An activation-based model of sentence processing as skilled memory retrieval. *Cognit. Sci.* 29, 375–419.
- Loebell, H., and Bock, K. (2003). Structural priming across languages. *Linguistics* 41, 791–824. doi: 10.1515/ling.2003.026
- López, L., Alexiadou, A., and Veenstra, T. (2017). Code-switching by phase. *Languages* 2:9. doi: 10.3390/languages2030009
- MacSwan, J. (2009). "Generative approaches to codeswitching," in *Cambridge Handbook of Linguistic Codeswitching*, eds. B. Bullock, and A. Toribio (Cambridge: Cambridge University Press), 309–335. doi: 10.1017/CBO9780511576331.019
- MacSwan, J. (2013). "Code switching and linguistic theory," in *Handbook of Bilingualism and Multilingualism*, eds. T. Bhatia, and W. Ritchie (Annapolis, MD: Blackwell), 323–350. doi: 10.1002/9781118323282.ch13
- Marian, V., and Spivey, M. (2003). Competing activation in bilingual language processing: within- and between-language competition. *Biling.: Lang. Cogn.* 6, 97–115. doi: 10.1017/S1366728903001068
- McCloskey, J. (2006). "Resumption," in *The Blackwell Companion to Syntax*, ed. M. Everaert, and H. van Riemsdijk (Hoboken NJ: Wiley), 94–117. doi: 10.1002/9780470996591.ch55
- McInerney, A. (2023). The argument/adjunct distinction does not condition islandhood of PPs in English. *Linguist. Inq.* 1–13. doi: 10.1162/ling_a_00511
- McInerney, A., and Sugimoto, Y. (2022). On dissociating adjunct island and subject island effects. *Proc. Linguist. Soc. Am.* 7, 5207–5207. doi: 10.3765/plsa.v7i1.5207
- Morgan, A. M., and Wagers, M. W. (2018). English resumptive pronouns are more common where gaps are less acceptable. *Linguist. Inq.* 49, 861–876. doi: 10.1162/ling_a_00293
- Mufwene, S. (2001). The Ecology of Language Evolution. *Cambridge Approaches to Language Contact*. Cambridge: Cambridge University Press. doi: 10.1017/CBO9780511612862
- Müller, N. (1998). Transfer in bilingual first language acquisition. *Biling.: Lang. Cogn.* 1, 151–171. doi: 10.1017/S1366728998000261
- Myers-Scotton, C., and Jake, J. L. (2017). Revisiting the 4-M model: Codeswitching and morpheme election at the abstract level. *Int. J. Bilingual.* 21, 340–366.
- Pereira Soares, S. M., Kupisch, T., and Rothman, J. (2022). Testing potential transfer effects in heritage and adult L2 bilinguals acquiring a mini grammar as an additional language: an ERP approach. *Brain Sci.* 12:669. doi: 10.3390/brainsci12050669
- Pfaff, C. W. (1979). Constraints on language mixing: Intrasentential code-switching and borrowing in Spanish/English. *Language* 55, 291–318. doi: 10.2307/412586
- Phillips, S. F., and Pyllkkänen, L. (2021). Composition within and between languages in the bilingual mind: MEG evidence from Korean/English bilinguals. *Eneuro* 8, ENEURO.0084-21.2021. doi: 10.1523/ENEURO.0084-21.2021
- Polinsky, M., and Scontras, G. (2020). Understanding heritage languages. *Biling.: Lang. Cogn.* 23, 4–20. doi: 10.1017/S1366728919000245

- Prince, E. (1990). "Syntax and discourse: a look at resumptive pronouns," in *Annual Meeting of the Berkeley Linguistics Society* (Berkeley, CA: Berkeley Linguistics Society), 482–497. doi: 10.3765/bls.v16i0.1719
- Radford, A. (2019). *Relative Clauses: Structure and Variation in Everyday English*, Vol. 161. Cambridge University Press.
- Riksem, B. R. (2018). Language mixing in American Norwegian noun phrases. *J. Lang. Contact* 11, 481–524. doi: 10.1163/19552629-01103005
- Ross, J. R. (1967). *Constraints on Variables in Syntax*. Unpublished dissertation. Cambridge: MIT.
- Rouveret, A. (2011). "Some issues in the theory of resumption: a perspective on early and recent research," in *Resumptive Pronouns at the Interfaces*, Vol. 5, 1–62.
- Sankoff, D., and Poplack, S. (1981). A formal grammar for code-switching. *Res. Lang. Soc. Interact.* 14, 3–45. doi: 10.1080/08351818109370523
- Santorini, B., and Mahootian, S. (1995). Codeswitching and the syntactic status of adnominal adjectives. *Lingua* 96, 1–27. doi: 10.1016/0024-3841(94)00026-1
- Schütze, C. T., and Sprouse, J. (2013). "Judgment data," in *Research Methods in Linguistics*, ed. L. Litosseliti (London: Bloomsbury Publishing), 27–50. doi: 10.1017/CBO9781139013734.004
- Scontras, G., Polinsky, M., Tsai, C. Y. E., and Mai, K. (2017). Cross-linguistic scope ambiguity: when two systems meet. *Glossa* 2, 1–28. doi: 10.5334/gjgl.198
- Sedarous, Y. (2022). *An experimental study on the syntax of English and Egyptian Arabic: A unified account of bilingual grammatical knowledge* (Doctoral dissertation). University of Michigan. Ann Arbor.
- Sedarous, Y. (2023). Codeswitching and the Egyptian Arabic construct state: evidence for the wordhood of a complex syntactic unit. *Linguist. Approaches Biling.* 13, 500–528. doi: 10.1075/lab.19015.sed
- Sedarous, Y., and Namboodiripad, S. (2020). Using audio stimuli in acceptability judgment experiments. *Lang. Linguist. Compass* 14:e12377. doi: 10.1111/lnc3.12377
- Seibert Hanson, A., and Carlson, M. (2014). The roles of first language and proficiency in L2 processing of Spanish clitics: global effects. *Lang. Learn.* 64, 310–342. doi: 10.1111/lang.12050
- Shlonsky, U. (1992). Resumptive pronouns as a last resort. *Linguist. Inq.* 23, 443–468.
- Sichel, I. (2014). Resumptive pronouns and competition. *Linguist. Inq.* 45, 655–693. doi: 10.1162/LING_a_00169
- Soltan, U. (2011). On strategies of question-formation and the grammatical status of the Q-particle huwwa in Egyptian Arabic wh-questions. *Univ. PA Work. Pap. Linguist.* 17:24.
- Sprouse, J., and Almeida, D. (2017). Design sensitivity and statistical power in acceptability judgment experiments. *Glossa* 2:14. doi: 10.5334/gjgl.236
- Sprouse, J., Caponigro, I., Greco, C., and Cecchetto, C. (2016). Experimental syntax and the variation of island effects in English and Italian. *Nat. Lang. Linguist. Theory.* 34, 307–344. doi: 10.1007/s11049-015-9286-8
- Sprouse, J., Wagers, M., and Phillips, C. (2012). A test of the relation between working-memory capacity and syntactic island effects. *Language* 88, 82–123. doi: 10.1353/lan.2012.0004
- Stepanov, A., Mušič, M., and Stateva, P. (2018). Two (non-) islands in Slovenian: a study in experimental syntax. *Linguistics* 56, 435–476. doi: 10.1515/ling-2018-0002
- Tolentino, L. C., and Tokowicz, N. (2014). Cross-language similarity modulates effectiveness of second language grammar instruction. *Lang. Learn.* 64, 279–309. doi: 10.1111/lang.12048
- Toribio, A. J. (2004). Convergence as an optimization strategy in bilingual speech: Evidence from code-switching. *Biling.: Lang. Cogn.* 7, 165–173. doi: 10.1017/S1366728904001476
- Truswell, R. (2007). Extraction from adjuncts and the structure of events. *Lingua* 117, 1355–1377. doi: 10.1016/j.lingua.2006.06.003
- Truswell, R. (2011). *Events, Phrases, and Questions*. Oxford: OUP Oxford. doi: 10.1093/acprof:oso/9780199577774.001.0001
- Tucker, M. A., Idrissi, A., Sprouse, J., and Almeida, D. (2019). "Resumption ameliorates different islands differentially," in *Perspectives on Arabic Linguistics XXX: Papers from the annual symposia on Arabic Linguistics, Stony Brook, New York, 2016 and Norman, Oklahoma, 2017*, Vol. 7 (Amsterdam: John Benjamins Publishing Company), 159. doi: 10.1075/sal.7.09tuc
- Woolford, E. (1983). Bilingual code-switching and syntactic theory. *Linguist. Inq.* 14, 520–536.