

IN AKAN, VIOLATION OF ISLAND CONSTRAINTS CANNOT BE REDUCED TO SENTENCE PROCESSING

Helen Goodluck, Kofi Saah, and Frank Tsiwah
University of York, University of Ghana, and Groningen University

1. Introduction

Can restrictions on the structures into which a question word can refer – such as the complex NP constraint, the adjunct constraint and the wh-island constraint in English – be the result of constraints on sentence processing? I.e. are island constraints not needed in the syntax per se, and can be derived from independently needed principles of parsing? There are at least four logically possible positions with respect to this question:

Position 1 All putative restrictions in every language can be reduced to parsing effects.

Position 2 Restrictions in languages such as English can be reduced to parsing effects.

Position 3 Restrictions in languages such as English on putative movement operations can be reduced to parsing effects, but other restrictions – for example the dictates of the Binding Theory – cannot be.

Position 4 Syntax is syntax and parsing is parsing: the syntactic rules of a language are independent of parsing effects.

In this paper, we will argue in favor of Position 4 based on a comparison between Akan and English.

2. Akan

Akan is a Kwa language, spoken in Ghana. It is SVO; its word order is broadly similar (although not identical) to that of English. Wh-questions can be formed by placing the question phrase at the left edge in a focus position, or by leaving the wh-phrase *in situ*. *In situ* questions do not have an echo interpretation. When a question is formed by placing the question word in focus position, a resumptive pronoun occupies the position of the questioned phrase. This resumptive pronoun is null in the case of inanimate antecedents in sentence final position (Saah 1992), as in the example (2), and phonetically overt in the case of animate antecedents, as in the example (4),

(1) Kofi k̄ā s̄ Ama dii akutu no.
Kofi said that Ama ate orange the
'Kofi said that Ama ate the orange'

(2) Den na Kofi k̄ā s̄ Ama dii e?
What FOC Kofi said that Ama ate e
'What did Kofi say that Ama ate?'

- (3) Kofi kãã sɛ Ama huu kyerekyerɛni no.
Kofi said that Ama saw teacher the
'Kofi said that Ama saw the teacher'
- (4) Hwan na Kofi kãã sɛ Ama huu no no?
Who FOC Kofi said that Ama saw him/her CD
'Who did Kofi say that Ama saw?'
- (FOC = Focus; CD = clause determiner)

2. Previous work on Akan

Boadi (1990) analysed Akan as using wh-movement; however, Saah (1992) and Saah and Goodluck (1995) argued on the basis of the fact that island violations are freely permitted that the wh-phrase is base-generated in its surface position, and linked to the site of the (overt or null) resumptive pronoun by a mechanism of pronominal binding.

- (5) Den na, wo huu onipa ko a otawaae?
What FOC you saw person SP REL 3sg:cut
'What did you see a person that cut?'
- (6) Den na Ama kanee Graphic ansa na ɔrekyerɛw?
What FOC Ama read Graphic before 3sg:wrote
'What did Ama read the Graphic before she wrote?'
- (7) Den na obisae sɛ hena na ɔfae?
What FOC 3SG:asked that who FOC 3SG:took
'What did she ask who took?'
- (SP = specificity marker; REL = relative clause marker)

3. Recent studies of English

Island constraints have been shown to be lessened by a complex D(iscourse)-linked wh-phrase (see, for example Cinque 1990),

- (8) ??A chi ti chiedi quanti soldi hai dato?
To whom do you wonder how much money you gave?
- (9) A quale dei tuoi figli ti chiedi quanti soldi hai dato?
To which of your children do you wonder how much money you gave?

Hofmeister and Sag (2010) argue that island constraints, specifically the Complex NP Constraint (CNPC), can be reduced to effects of sentence processing, based on their findings that: (i) island effects are stronger with a simple wh-phrase than with a complex wh-phrase; and (ii) island effects are ameliorated when extraction is from an indefinite NP as opposed to a plural NP,

- (10) I saw who/which convict Emma doubted reports/a report that we had captured in a nationwide FBI man hunt.

Hofmeister and Sag do not specify completely what causes these effects, but they do imply that movement is not at the root of island effects. There has been a debate about whether working memory/structural complexity can account for such effects (Hofmeister, Casasanto and Sag 2012; Sprouse, Wagers and Philips 2012a, 2012b). Yoshida, Kazanina, Pablos and Sturt (2014) show that there is a contrast between (11) and (12),

- (11) His managers revealed that the studio that notified Jeffrey Stewart about the new film selected a novel for the script, but Annie did not seem to be interested in this information.

- (12) He revealed that the studio that notified Jeffrey Stewart about the new film selected a novel for the script, but Annie did not know which one.

There were significantly longer reaction times at the word *Stewart* in (11) than in (12). Yoshida et al. argue that this is the result of formation of a dependency relation between *his* and *Jeffrey Stewart* in (11), a dependency that is blocked for *he* and *Jeffrey Stewart* in (12). (A female pronoun in place of *his/he* controlled for differences in the structures). Since the establishment of reference in (11) involves penetrating a complex NP (an island for wh-movement) this result argues against structural complexity as the source of island effects. Thus, it argues in favor of Position 3 above (and hence also against Positions 1 and 2).

4. The nature of D-linking effects

Goodluck (2005) and Donkers et al. (2013) show that (for children and adults respectively), the facilitating effect of D-linking is eliminated/lessened when a specific NP (e.g. *which giraffe*) is replaced by a more generic NP (e.g. *which animal*). Hofmeister and Sag (2010) used relatively specific D-linked phrases, which may have had a facilitating effect due to density of information. In the studies we report below, we also selected relatively specific D-linked phrases.

5. More Akan

In written judgement studies, we compared the ratings of English and Akan speakers. The scale was 0-5 (0 = Not good; 5 = Good).

5.1 Study 1

We tested six English-speaking subjects and six Akan-speaking subjects. We asked for judgement of declaratives, questions with a simple wh-phrase and questions with a complex (D-linked) wh-phrase (*Which/Den* NP), and CNPC and adjunct (*before/ansa na*) constraint violations. In the case of complex NPs, additional conditions in which the effect of definiteness of the NP that the wh-phrase targeted was varied. The materials were similar to those in Saah and Goodluck (1995), i.e. all question words were inanimate. The questionnaires contained four tokens of the conditions, except the +/-definite conditions, of which there were six tokens.¹ The materials were arranged in a Latin Square to prevent any subject responding to more than one token of a given sentence frame. Examples are given in Table 1.

Table 1: Sentence types tested in Study 1.

		CNPC with definite head
English	Base	David greeted the guest that won the prize.
	-DL	What did David greet the guest that won?
	+DL	Which prize did David greet the guest that won?
Akan	Base	David kyiaa ɔhɔhɔ no a onyaa abasobɔdeɛ no David greeted guest the Rel. 3ps:won prize the
	-DL	Dɛn na David kyiaa ɔhɔhɔ no a onyaaɛ no? What FOC David greeted guest the Rel. 3ps:won CD
	+DL	Dɛn abasobɔdeɛ na David kyiaa ɔhɔhɔ no a onyaaɛ no? Which prize FOC David greeted guest the Rel. 3ps:won CD
		CNPC with variant in definiteness of head
English	+Def	What did John read the story that Mary had stopped?
	-Def	What did John read a story that May had stopped?
Akan	+Def	Dɛn na John kaan aɛm no sɛ Mary agyae no? What fOCJohn read story the that Mary had stopped CD
	-Def	Dɛn na John kaan aɛm sɛ Mary agyae no? What fOCJohn read story that Mary had stopped CD

¹ CNPC with definite head and adjunct constraint violations in Table 1 contained two examples of reference into the structure [wh[_{IP} ...[island]]] and two examples of reference into [wh[_{IP} ... [IP ...[island]]]]. No difference in the length of the material intervening between the Wh- and the site within the island was found, and the materials are collapsed in Table 2 below.

Table 1, continued

		Adjunct
English	Base	Ann read the Daily Mail before she wrote the letter.
	-DL	What did Ann read the Daily Mail before she wrote?
	+DL	Which letter did Ann read the Daily Mail before she wrote?
Akan	Base	Ann kaan Graphic no ansa na ɔtwereɛ letɛ no Ann read Graphic the before 3ps:wrote letter the
	-DL	Dɛn na Ann kaan Graphic no ansa na ɔtwereɛ? What focAnn read Graphic the before 3ps:wrote
	+DL	Dɛn letɛ na Ann kaan Graphic no ansa na ɔtwereɛ? Which letter focAnn read Graphic the before 3ps:wrote

The results are given in Table 2, in terms of the mean score for each condition.

Table 2: Mean scores (/5) per language per condition.

CNPC +/- DL			
	Base Declarative	-D-linked <i>what</i>	+D-linked <i>which NP</i>
English	3.83	1.04	0.71
Akan	4.38	1.71	2.21
CNPC +/- Definite			
	+Definite	-Definite	
English	0.74	1.17	
Akan	1.75	1.42	
Adjunct			
	Base Declarative	-D-linked <i>what</i>	+D-linked <i>which NP</i>
English	3.94	0.21	0.54
Akan	3.88	2.83	2.96

For reference into complex NPs, there are no significant differences between the two languages, although the reference of a complex wh-phrase to a site within a relative clause approaches significance ($t(10) = 1.99$, $p = .075$). There are also no significant differences for reference into a definite vs. indefinite NP; however, there is an ‘anti-definiteness’ trend in Akan, with higher scores for reference into a definite NP than for reference into an indefinite NP, something that the two Akan-speaking authors concur with.

In the case of questioning from within an adjunct clause, both the questioning of a simple wh-phrase and a complex wh-phrase produces a substantial difference between the two languages (Base: $t(10) = 0.11$, n.s.; -D-linked wh-phrase: $t(10) = 10.14$, $p = .0001$; +D-linked wh-phrase: $t(10) = 4.72$, $p = .0008$).²

5.2 Study 2

The subjects were six English-speaking subjects and six Akan-speaking subjects, different from those tested in Study 1. This study tested violations of the wh-island constraint. Four tokens of each condition were presented to each subject, using a Latin Square design to prevent any subject responding to more than one token of a sentence frame. Examples of each condition are given in Table 3. The results are given in Table 4, in terms of the mean score (/5) for each condition.

For both questions with a simple wh-phrase and a complex wh-phrase, there was a significantly higher acceptance of linking a wh-phrase to a position in an embedded question in Akan, as compared to English (No island: $t(10) = 1.52$, n.s.; Wh-island, -D-linked: $t(10) = 3.54$, $p < .006$; Wh-island, +D-linked: $t(10) = 3.09$, $p < .02$).

² It might be supposed from the data in Table 2 that Akan speakers for whatever reasons were more willing to accept sentences than English speakers. Other conditions in our study argue against that possibility. We tested sentences with overt vs. null pronouns; as mentioned above, an overt pronoun is ungrammatical in sentence final position in Akan when its antecedent is inanimate. The scores for overt pronoun sentences were: English 4.17 and Akan 2.97 ($t(10) = 2.55$, $p < .03$). We also tested word order violations in the two languages. The mean for English was .70 and for Akan was 1.00; this difference is not significant ($p > .60$).

Table 3: Sentence types tested in Study 2

D-linked <i>who</i>-questions, no island	
English	Who did the old lady remember that she should buy a gift for?
Akan	Hwan na aberewa no kae se esese ɔɔ akyɛdeɛ ma no? Who FOC oldlady the remember that should she:buy gift for him/her
-D-linked <i>who</i> questions, wh-island	
English	Who did the old lady remember what she should buy for
Akan	Hwan na aberewa no kae se den na esese ɔɔ ma no? Who FOC old lady the remember that what FOC should she:buy for him/her
+D-linked question phrase, wh-island	
English	Which child did the old lady remember what she should buy for?
Akan	Den abofra na aberewa no kae se den na esese ɔɔ ma no Which child FOC old lady the remember that what FOC should she:buy for him/her

Table 4: Results of study 2

	No island -D-linked	Wh-island -D-linked	Wh-island +D-linked
English	3.88	1.08	1.67
Akan	4.42	3.08	2.88

6. Experiment on wh-island in English (unpublished)

Looking at the results with +/- D-linked phrases in Tables 2 and 4, we do not see any consistent pattern of greater acceptability of +D-linked phrases. Study 2 was based on a judgement experiment carried out in English. Akan has no infinitival complements, and so these were not included in Study 2. In the original English experiment, we tested extraction from both infinitival and tensed complements with a wh-island. Although the

overall difference between plus and minus D-linked phrases was significant, there was considerable variation among individual subjects. Table 5 gives the number of subjects who had the expected (+D-linked questions better than -D-linked questions) and the opposite (-D-linked questions better than +D-linked questions) patterns of response.

Table 5: Experiment on English Wh-island:
Variation in response patterns

	Complement	
	-Tense	+Tense
Expected	11	8
Opposite	2	5
No Difference	3	3

Thus although there was an overall difference of D-linking in the direction of more ready acceptance of +D-linked phrases, this was not invariant for individual subjects.

7. Observations

We can make the following observations:

- i) The number of subjects is small, but the general difference between English and Akan is quite strong with respect to acceptance of conditions that violate islands.
- ii) The effects of D-linking are not evident/much smaller.
- iii) We don't understand D-linking much, and so (for the time being) it should be treated with caution with respect to larger conclusions about mechanisms of grammar.

8. Conclusion

The semantics of question formation are (in the absence of evidence to the contrary) the same in English and Akan, and the linear order of questions in the two languages is also (more or less) the same. The parsing principles to the extent that we know about them are also the same – for example, Akan has been argued to obey the Active Filler Principle, dictating that the first possible opportunity is taken for linking a question word to a position in the structure that follows (Saah and Goodluck 1995). We believe that our data are thus most compatible with Position 4 in the introduction: the syntactic mechanisms that a language uses are independent of the principles of parsing. Only a difference in the basic mechanism can account for the difference found between the two languages. Other properties of the input – in particular D-linking of the question phrase

– have a lesser effect or no effect. With a larger number of subjects, we may see an effect of D-linking, but this does not detract from the importance of our result with only a small number of subjects. In sum, we adopt a position similar to that of Truswell (2011): there is a basic effect of the syntactic mechanism used, with may be overlaid by other factors, but which cannot be replaced by such factors.

References

- Boadi, L. 1990 Questions in Akan. *Frankfurter Afrikanistische Blätter* 2, 70-92.
- Donkers, Jantien, John Hoeks and Laurie Stowe 2013 D-linking or set-restriction? Processing *Which*-questions in Dutch. *Language and Cognitive Processes*, 28, 9-28.
- Goodluck, Helen. 2005 D(iscourse)-Linking and question formation: Comprehension effects in children and Broca's aphasics. In A. M. Di Sciullo (Ed.) *UG and external systems: Language, brain and computation*, 185-192. Amsterdam: John Benjamins.
- Hofmeister, Philip., Laura S. Casasanto, and Ivan Sag 2012 How do individual differences relate to the acceptability judgements? A reply to Sprouse, Wagers and Philips. *Language* 88, 390-400.
- Saah, Kofi 1992 Null object construction in Akan. *MITWPL*, 17.
- Saah, Kofi and Helen Goodluck 1995 Island effects in parsing and grammar: Evidence from Akan. *The Linguistic Review* 12, 381-409.
- Sprouse, Jon, Matt Wagers and Colin Philips 2012a A test of the relation between working memory capacity and syntactic island effects. *Language* 88, 82-123.
- Sprouse, Jon, Matt Wagers and Colin Philips 2012b Working memory capacity and island effects: A reminder of the issues and the facts. *Language* 88, 401-407.
- Truswell, Robert. 2011 *Events, Phrases and Questions*. Oxford: Oxford University Press.
- Yoshida, Masaya, Nina Kazanina, Leticia Pablos, and Patrick Sturt 2014 On the origin of islands. *Language, Cognition and Neuroscience*, 29, 761-770.