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Acquiring Syntactic Variability: The Production of *Wh*-Questions in Children and Adults Speaking Akan

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This paper investigates the predictions of the Derivational Complexity Hypothesis by studying the acquisition of *wh*-questions in 4- and 5-year-old Akan-speaking children in an experimental approach using an elicited production and an elicited imitation task. Akan has two types of *wh*-question structures (*wh*-in-situ and *wh*-ex-situ questions), which allows an investigation of children's acquisition of these two question structures and their preferences for one or the other. Our results show that adults prefer to use *wh*-ex-situ questions over *wh*-in-situ questions. The results from the children show that both age groups have the two question structures in their linguistic repertoire. However, they differ in their preferences in usage in the elicited production task: while the 5-year-olds preferred the *wh*-in-situ structure over the *wh*-ex-situ structure, the 4-year-olds showed a selective preference for the *wh*-in-situ structure in *who*-questions. These findings suggest a developmental change in *wh*-question preferences in Akan-learning children between 4 and 5 years of age with a so far unobserved u-shaped developmental pattern. In the elicited imitation task, all groups showed a strong tendency to maintain the structure of *in-situ* and *ex-situ* questions in repeating grammatical questions. When repairing ungrammatical *ex-situ* questions, structural changes to grammatical *in-situ* questions were hardly observed but the insertion of missing morphemes while keeping the *ex-situ* structure. Together, our findings provide only partial support for the Derivational Complexity Hypothesis.

Keywords: Akan, wh-questions, wh-in-situ, wh-ex-situ, derivational complexity, language acquisition

INTRODUCTION

One of the essential components of a child's cognitive and social development is the acquisition of their native language(s). Acquiring a language is a complex phenomenon and research on this has become of great theoretical interest to linguists and developmental psychologists as well as for applications in diagnosis and treatment by speech therapists. This paper deals with a specific aspect of the acquisition of syntax, that is, the acquisition of *wh*-questions, by taking a cross-linguistic approach to children acquiring Akan—an understudied African language. So far, children's acquisition of *wh*-questions and yes/no questions has been investigated across many languages, such as English (Brown, 1968; Tyack and Ingram, 1977; Capdevila i Batet, 1993; Stromswold, 1995; Valian and Casey, 2003; Pozzan and Valian, 2017), French (Strik, 2012), and German (Wimmer et al., 2017). Cross-linguistic studies in this area are particularly revealing since languages show some variability in the structural properties of *wh*-questions, however this variability seems to be limited by quite strong structural conditions. Therefore, the acquisition of *wh*-questions provides an excellent

window into the interplay of linguistic structure, the exposure to language-specific properties, and general cognitive mechanisms in the acquisition of a central structure in language (De Villiers, 1995). So far, research on the acquisition of *wh*-questions has focused on the order of learning different *wh*-words or phrases and the frequency of their usage in children of different ages see (Smith, 1933; Klima and Bellugi, 1966; Tyack and Ingram, 1977; Gazdar, 1981; Bloom et al., 1982; Hanna and Wilhelm, 1992; Stromswold, 1995; Thornton, 1995). However, the current study is devoted to the acquisition of structural aspects of question formation.

Structural Variation in the Formation of Wh-Questions

Languages of the world differ in many ways, including their phonology, morphology, and syntax. From a syntactic perspective, languages may differ in terms of headedness, placement of *wh*-words in *wh*-questions, or case assignment, among other things. For the current study, differences between languages in terms of the placement of *wh*-words or *wh*-phrases in the formation of *wh*-questions are at the center of interest. In this area, two groups of languages can be identified: 1) languages that require the *wh*-word to be moved to the left periphery of the sentence (*ex-situ* languages) and 2) languages in which *wh*-words remain in their base-generated position (*in-situ* languages).

In some languages, the placement of the *wh*-word at the left periphery of the sentence is obligatory. An example of such a language is English (see 1a). Although fronting of the *wh*-word is the norm in English *wh*-questions, there are instances where the *wh*-word appears in non-initial position. However, this option is only possible in pragmatically highly restricted functions, for example in echo questions like (1b), which signal some surprise about or non-understanding of a previous utterance by the speaker.

(1) a. **What** did Nancy buy?

 b. Nancy bought **what?**

In contrast, *wh*-words obligatorily reside in their canonical position and do not undergo any movement in so-called *in-situ* languages. Many languages with large numbers of speakers are classified as *in-situ* languages, for example Japanese, Mandarin, and Cantonese. In (2), from Mandarin Chinese, the *wh*-word *shénme* 'what' is base generated and remains in that position without any overt movement.

(2) Húfēi mǎi-le **shénme**? (Bayer and Cheng, 2015, p. 2)
 Hufei buy-PERF what
 'What did Hufei buy?'

However, a *wh*-word can also appear at the beginning of a sentence in Mandarin Chinese: this can occur in cleft constructions and other topicalized sentences (see Cheung, 2008; Cheung, 2014 for details), but is not obligatory since *in-situ wh*-placement is possible in the same constructions.

Beyond these classic *ex-situ* or *in-situ* languages, there are also languages with greater and contextually less restricted variability in the placement of *wh*-words when forming *wh*-questions. Examples of such languages are French and Akan. French has both *in-situ* and *ex-situ wh*-questions with or without verb movement. This optionality offers speakers a range of alternatives in forming *wh*-questions (Zuckerman and Hulk 2001; Hamann, 2006; Jakubowicz, 2011; Prévost et al., 2014): a) the *wh*-word can remain in the base-generated position (see 3a), b) the *wh*-word can be moved to the beginning of the question to the specifier position of a Complementizer Phrase (that is, Spec of CP; see 3b and 3c), c) the *wh*-word and the verb/auxiliary can be moved to a pre-subject position (inversion; see 3c) or d) the *wh*-word can be moved to Spec CP while the auxiliary or the verb remains in the post-subject position (see 3b) without any inversion (see Zuckerman and Hulk, 2001) and references therein for a detailed analysis of French).

(3) a. Tu as fait ça **comment**?
 You have done that how
 'How did you do that?'

 b. **Comment** tu as fait ça?
 How you have done that
 'How did you do that?'

 c. **Comment** as-tu fait ça?
 How have-you done that
 'How did you do that?'

The variability in French *wh*-question formation makes the language interesting for a "thorough investigation of syntactic competence" (Hamann, 2006, p. 143) in children. The presence of this variability in the child's input allows us to test specific questions about the trajectory of children's acquisition of *wh*-questions, that is, does this order reflect the frequency of the alternatives as children find them in their input or do structural properties independent of input frequency play a role and do children use structures that do not correspond to the adult grammar (e.g., partial movement and *wh*-copying)? So far, research questions like these have primarily been explored with data from French-speaking children (Hamann, 2000; Zuckerman, 2001; Zuckerman and Hulk 2001; Plunkett, 2004; Hamann, 2006; Jakubowicz, 2011, and references therein).

Most of these studies have reported that French-speaking children initially prefer to use *wh*-in-situ questions while *wh*-ex-situ questions are largely absent from their utterances (Crisma, 1992; Hamann, 2000; Hamann, 2006, and references therein). These findings have come from both analyses of spontaneous speech (Crisma, 1992; Hulk, 1996; Hamann, 2000) and experimental studies (Zuckerman and Hulk 2001; Hamann, 2006). For instance, Zuckerman and Hulk (2001) found in an experimental study that 4- to 5-year-old children used more *in-situ wh*-questions than adults—especially in argument compared to adjunct questions. Furthermore, children avoided the use of subject-verb inversion although this type of question was frequently produced by the adults tested in the same study. Children with developmental language disorders have been found to show a stronger preference for *wh*-in-situ questions

than typically developing children across a wide age range up to 9 years of age (Hamann, 2006).

In general, *in-situ wh*-questions are considered to be less complex and it is assumed that their processing is less costly than the processing of *ex-situ wh*-questions. Children's initial preference for the *in-situ* structure has been linked to their less developed working memory capacity (Prévost et al., 2014). Accounts attributing a role to linguistic theory have suggested that the complexity of a question structure is especially related to the movement operations involved. This suggestion has been elaborated in the Derivational Complexity Hypothesis proposed by Jakubowicz (2004), Jakubowicz (2005).

Derivational Complexity Hypothesis

Children's language acquisition is constrained by their limited working memory capacity (Bloom, 1990) and processing difficulties that arise as a result of computational and derivational complexities. Based on the proposal that children's language development is constrained by economy considerations (Chomsky, 1995), Jakubowicz (2004) proposed the Derivational Complexity Hypothesis (DCH). The DCH claims that during language development in both typically developing children and children with atypical language development, "less complex derivations are input convergent, that is, correctly spelled out or pronounced before more complex ones" (Jakubowicz and Strik, 2008, p. 106). In this account, complexity is defined as a measure of the Derivational Complexity Metric (DCM, see 4) based on the notion of the operations of internal and external merge as captured in the following clauses:

(4) Derivational Complexity Metric (Jakubowicz, 2005)
  a. Merging α_i *n* times gives rise to a less complex derivation than merging α_i *(n+1)* times.
  b. Internal merge of α gives rise to a less complex derivation than internal merge of $\alpha+\beta$.

Internal merge results in a structure in which an element is moved from one position in a sentence to a different position within the same syntactic construction (see Chomsky, 2001; Citko, 2005). On the other hand, external merge combines two different elements into one structure. This type of merge is equivalent to the notion of base generation, where elements occur in their original or canonical position.

Concerning language acquisition and the development of *wh*-questions, the DCM makes the following claims: children are sensitive to the number of times that a *wh*-word must merge during a derivation in order to satisfy a computational requirement. Also, the learner is sensitive to the number of constituents that can undergo internal merge when deriving a *wh*-question (see Jakubowicz and Strik, 2008; Jakubowicz, 2011). This suggests that *wh*-questions that do not undergo internal merge of the *wh*-element or only a smaller number of internal merges will be used earlier during language acquisition than questions with a higher number of internal merges (Jakubowicz and Strik, 2008). Thus, the use of *in-situ wh*-questions and those without verb movement should precede

the use of other structures in child language. The DCH is applied to the current study because it makes specific predictions for the developmental trajectory of children learning Akan.

The Akan Language and Typology of Wh-Questions

This study contributes to the research on the development of *wh*-questions in children with novel data from Akan, which is an understudied language as far as language acquisition is concerned. Akan is interesting to look at since it also has considerable optionality in the formation of *wh*-questions, as *in-situ* and *ex-situ* questions are both used without any known obvious restrictions on the contextual appropriateness of one structure or the other.

Akan is a Kwa language of the Niger-Congo group of languages. It is a tone language with both lexical and grammatical tones. The canonical word order in Akan is SVO (see 5).

(5) Papa no soma-a Abɔfra no
    Man DEF send-PST child DEF
    'The man sent the child.'

In Akan *wh*-questions, the *wh*-word can occur in its base-generated *in-situ* position (6a) or at the beginning of the sentence in the Spec CP position (6b).

(6) a. Maame no di-i **deɛn**
       Woman DEF eat-PST what
       'What did the woman eat?'
    b. **Deɛn** na Maame no di-iɛ
       what FOC woman DEF eat-PST
       'What did the woman eat?'

In addition to movement, Akan *ex-situ wh*-questions have two structural properties that are different from the *in-situ* structure. First, there is an obligatory insertion of the clitic morpheme *na* (Marfo and Bodomo, 2005), which is often described as a focus marker (see Boadi, 1974; Saah, 1988; Saah, 1995; Boadi, 2005; Saah, 2010). This morpheme always occurs after the *wh*-word in *ex-situ* questions. Second, the use of a resumptive pronoun (RP) may be obligatory. The RP replaces a moved noun phrase in its base position, and it is co-indexed with its antecedent (Saah, 1995; Boadi, 2005; Saah, 2010). The RP is obligatory in *ex-situ who-*questions (see example 7b). It has been argued in the literature on Akan (e.g., Saah, 1995) that the RP is also present in *ex-situ what*-questions (see example 8), but in this case, it is covertly realized (that is, not phonetically pronounced). There are therefore no gaps at extraction sites in Akan (Saah, 1988; Saah, 1995; Saah, 2010). The realization of the RP as covert or overt is determined by the animacy status of the antecedent. A RP is covertly realized when its antecedent is [non-animate] and it is overtly realized when the antecedent is [+ animate] (Saah, 1995; Saah, 2010).

(7) a. Maame no bɔ-ɔ **Hwan**
    Woman DEF hit-PST who
    'Whom did the woman hit?'

   b. **Hwan** na maame no bɔ-ɔ **no**[1]
      who FOC woman DEF hit-PST RP
      'Whom did the woman hit?'

(8) a. Maame no noa-a **deɛn**
    Woman DEF cook-PST what
    'What did the woman cook?'

   b. **Deɛn** na maame no noa-ae Ø
      What FOC woman DEF cook-PST RP
      'What did the woman cook?'

Two different analyses have been proposed for the formation of *ex-situ wh-*questions in Akan. The first analysis assumes that the *wh-*element undergoes movement from its base position to the spec CP of the matrix clause. Based on this analysis, the DCM predicts that the *ex-situ* structure will be more complex than the *in-situ* structure because the *ex-situ* structure involves an internal merge while the *in-situ* structure merely involves external merge. The second analysis is motivated by the presence of the RP in the *ex-situ wh-*questions. In relative clauses, the presence of a RP has been described as a result of the absence of movement (Demirdache 1991; Shlonsky, 1992; Alexopoulou, 2006). Accordingly, *ex-situ wh-*questions with RP in Akan, can be considered as involving no movement (Saah, 1995). Based on this second analysis the DCM does not predict differences in terms of complexity between *ex-situ wh-*questions structure with RP and *in-situ wh-*questions.

However, following Boadi (2005), and Lartey (2016, 2019) we adopt the theoretical assumption that the *wh-*word undergoes movement from the base-generated position to the left periphery of the sentence in Akan *ex-situ wh-*questions. This is motivated by the fact that the clitic morpheme *na* is obligatory following the fronted *wh-*word in *ex-situ* questions (Marfo and Bodomo, 2005). Most importantly, as noted by Marfo and Bodomo (2005), this obligatory clitic morpheme also occurs in other structures that are generally assumed to involve movement, for example focus initial constructions. Following this analysis, we hypothesize Akan *ex-situ* questions to be structurally more complex than *in-situ* questions in line with the first analysis presented above.

The Present Study

Based on the claims of the DCM, our assumption for *wh-*questions in Akan is that the *in-situ* and *ex-situ* structures have different levels of complexity. The *in-situ wh-*structure only undergoes external merge at VP as a complement of the verb and is thus considered the least complex derivation. In contrast, the *ex-situ wh-*structure undergoes two merge-operations: first, an internal merge by moving the *wh-*phrase to the Spec CP position, and second, an external merge by the insertion of the clitic morpheme which is obligatory whenever a

wh-word moves to Spec CP. Based on the DCH, we therefore expect that *in-situ wh-*questions will have a developmental advantage compared to *ex-situ* questions in Akan-learning children. However, according to the alternative analysis *ex-situ wh-*questions with RP in Akan are assumed to involve no movement (Saah, 1995). This analysis predicts no higher structural complexity for *ex-situ* compared to *in-situ wh-*questions and therefore no developmental advantages for the latter.

We tested these predictions in two experiments. The first one was an elicited production task in which children were invited to ask questions about specific entities displayed in a picture. The second one was an elicited imitation task in which the participants' task was to repeat either grammatical or ungrammatical questions that were presented by the experimenter. The questions to be produced involved argument (*what* and *who* object questions) and adjunct questions (*where*) as previous research has shown differences in children's acquisition of argument and adjunct questions (Zuckerman and Hulk 2001; Lassotta et al., 2016). Further, a comparison between the performance for *what-* and *who-*questions would be specifically revealing about the two alternative linguistic analyses since the DCM would not predict any differences between these two question types while the alternative analysis may, due to the overt presence of the RP in the *who-* but not in the *what-*questions. As mentioned above, both the *in-situ* and *ex-situ* question structures are commonly used by Akan-speaking adults with no contextual limitations, so that children probably receive regular input of both of these structures. Since adults' preference for one of the question types has not been investigated so far, Akan-speaking adults were also tested in the experiments. Therefore, the present study not only adds to our knowledge on the acquisition of optionality in *wh-*questions, but it is also informative about the use of different question structures in adult speakers of Akan.

STUDY 1: QUESTION ELICITATION TASK

Methods

Participants

Forty-four Akan-speaking children and 22 adult native speakers (range: 24–48 years) of Akan participated in this study: twenty-one 4-year-olds (M = 4.4 years; SD = 3.30; range: 4;0–4;11) and twenty-three 5-year-olds (M = 5.3 years; SD = 3.64; range: 5;0–5; 11). All children were recruited from two different kindergarten and primary schools in Ghana. Oral reports by parents and teachers indicated that none of the children had any hearing difficulty, articulation problems, or showed any other sign(s) of atypical development. Teachers and parents gave written informed consent that their students and children could participate in the experiment. No child was tested without the full approval of either the teacher or the parent. The adult group was comprised of parents either of children who participated in the study or of children who attended the same school but were not included in the study because they fell outside the age range. In addition, teachers from the children's schools participated. The

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[1]The definite marker and the resumptive pronoun (RP) in Akan have the same form (*no*). The RP in Akan is extensively discussed in Saah (1995), Saah (2010), Boadi (2005), and references therein.

headmaster of each school informed parents about our study and if they agreed to take part in the study, we contacted them to arrange a meeting. About 20% of the adult participants were monolingual speakers of Akan. The others were English-Akan bilinguals and English-Akan-Ewe multilinguals. These participants typically speak Akan in their daily life, which is the dominant language of the region and the community where we conducted our study. Monolingual speakers are rarely encountered in Ghana, which is a multilingual country with over fifty spoken languages (Bodomo et al., 2009; Boll-Avetisyan et al., 2020).

Stimuli

Pictures were used as visual stimuli to elicit the production of questions that involved three different *wh*-pronouns: *hwan/hena* 'who', *(ɛ)deɛn* 'what', and *(ɛ)hen/henfa* 'where'. The *what*- and *who*-questions were all object questions. Forty-five pictures with corresponding sentences (prompts; see examples 9–11) were used in this elicitation task. Following a paradigm introduced by Crain and Thornton (1998), the prompts were meant to elicit specific questions from the participants which they should address to the second experimenter present during the experiment, whose name was Kwame. Each of the three interrogative pronouns was tested with 15 pictures and the corresponding prompts.

(9) Bisa Kwame baabi a ɔkra no ɛhyɛ
Ask Kwame location that cat DEF be.locate
'Ask Kwame about the location of the cat.'
(10) Bisa Kwaame adeɛ a papa no re-pia
Ask Kwame thing that man DEF PROG-push
'Ask Kwame about the thing that the man is pushing.'
(11) Bisa Kwaame deɛ maame no re-dware no
Ask Kwame the person woman DEF PROG-bath RP
'Ask Kwame about the person the woman is bathing.'

None of the verbal prompts involved a *wh*-word. The pictures used to elicit *what*-questions showed at least one animate entity (an Agent) involved in some activity with an object (e.g., a man pushing a car). For *who*-questions, the pictures showed two animate entities: an Agent and a Theme/Patient engaged in some form of activity (e.g., a woman bathing a baby). For *where*-questions there was one animate entity at a given location and the task of the participants was to ask about the location of the animate entity (e.g., a cat hiding in a box).

Procedure

Both children and adults were tested individually, either in the schools or at home. The experiment was run in two sessions. Each session lasted for about 15 min. There was a break of at least 5 min between the two sessions to give the children the chance to take a little rest, visit the washroom, and also to be attended to in other ways. Written informed consent was obtained before the experiment began. A language background questionnaire only for the children was also filled in by the parent/caretaker or teacher after completion of the informed consent form. The language

background questionnaire was used to gain information about the language(s) spoken by the child, and potential hearing or articulation problems. The experiment began with a practice session to ensure that participants became familiarized with the procedure. All instructions for the experiment were read out loud to the participants by the researcher in the Akan language. Participants were instructed to ask questions based on the pictures that were shown on the computer screen and the verbal prompt that accompanied the visual presentation. Visual stimuli were presented on a MacBook Pro laptop using the OpenSesame program (3.2.6 Kafkaesque Koffka release) while the sentence prompts were presented verbally by the researcher. Participants sat next to the experimenter and both faced the computer screen during stimulus presentation and recording of the participants' responses. The participants' responses were audio recorded using Audacity (version 2.3.1.0) installed on the MacBook Pro laptop. An external microphone was connected to the laptop to aid the recording. We used the same procedure to test both children and adults, except that in the case of adults the experiment was carried out in only one session. The 45 experimental trials were presented in a mixed order.

Coding and Scoring

All audio recordings were transcribed by two native speakers of Akan. The coders annotated each participant's response as either an *in-situ* or an *ex-situ* wh-question. An answer was coded as an *in-situ* wh-question if the *wh*-word occurred in its base-generated position. An answer was coded as an *ex-situ* wh-question if the *wh*-word occurred at the beginning of the question and preceded the clitic morpheme *na*.

RESULTS

Responses that were not appropriate concerning the presented picture and prompt were excluded from further analysis. The incorrect responses were responses where participants used the wrong *wh*-word (i.e., *who*-questions were produced as *what*- and *where*-questions, *what*-questions were produced as *where*- and *who*-questions, and *where*-questions were produced as *what*-questions), or null responses where participants did not respond at all. The excluded responses amounted to 10.4% of the total responses given. Overall, the two child groups and the adults produced a total of 2,666 (89.8%) correct *in-situ* and *ex-situ* responses across the three pronoun conditions. Adults produced 969 correct responses: 322 (33.2%) *in-situ* questions and 647 (66.8%) *ex-situ* questions. The 4-year-olds produced 761 correct responses: 339 (44.5%) *in-situ* and 422 (55.5%) *ex-situ* questions. The 5-year-olds produced 936 correct responses: 563 (60.1%) *in-situ* questions and 373 (39.9%) *ex-situ* questions. Both adults and children produced a considerable high number of both *ex-situ* and *in-situ* wh-questions (**Figure 1**).

We analyzed the data with R (R Core Team, 2018) using Generalized Mixed Effects Model with the glmer function from the package lme4 (Bates et al., 2015). Our model comparisons were tested using the likelihood ratio test. The lowest Akaike
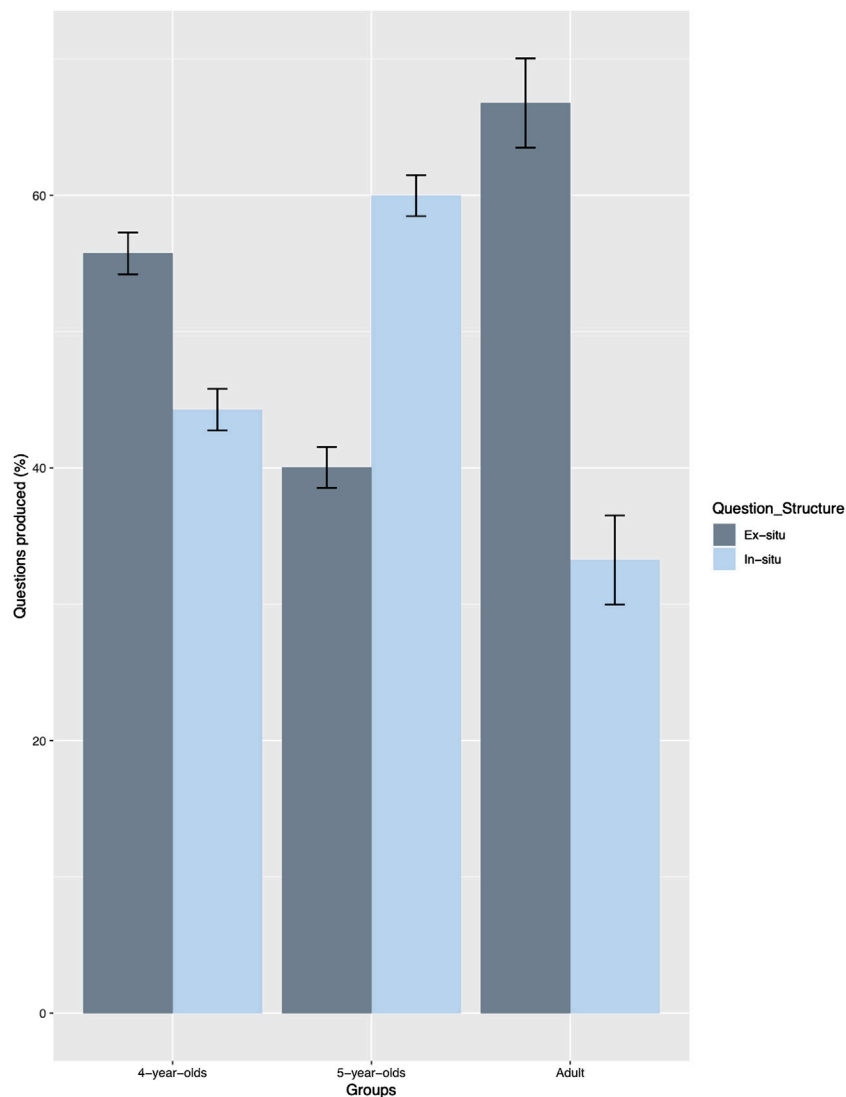
FIGURE 1 | Percentages of in-situ and ex-situ questions produced by the three different age groups. Error bars indicate a 95% confidence interval.
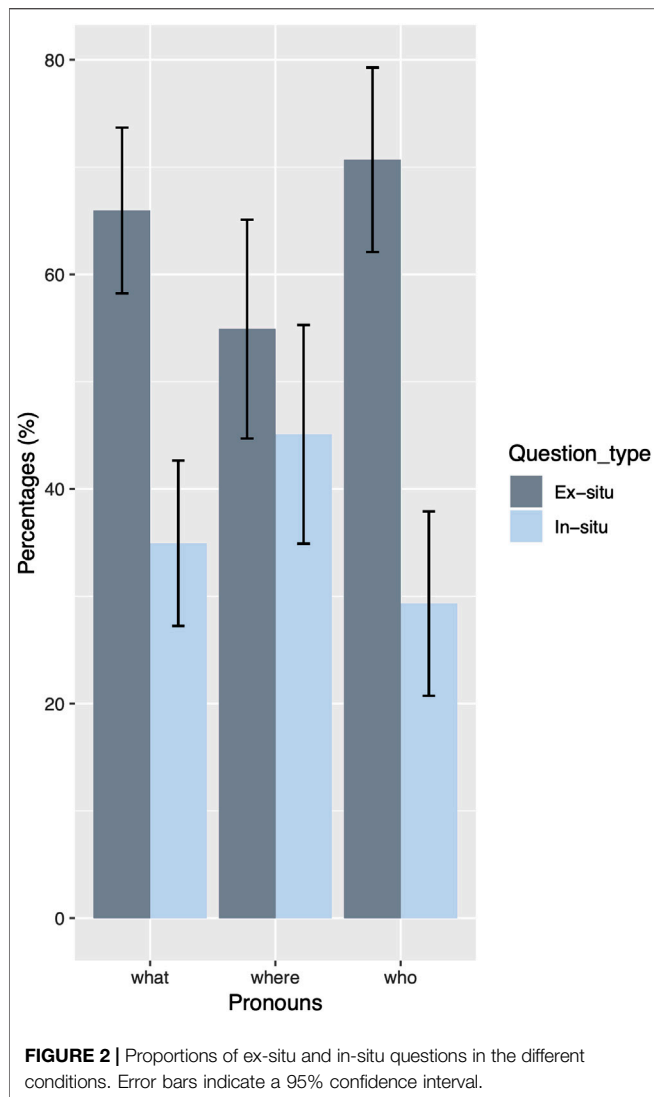
Information Criterion (AIC, Akaike, 1998) and the significant difference in the Chi-square test were used to determine the best fitting model using the anova function. The model with Condition (*what-* and *where-* and *who-*questions) and age (4-years, 5-years and adults) as fixed factors (coded as categorical variables), and participants and items as random factors was the best fitting model. In this model, response type (*in-situ* structure or *ex-situ* structure) were entered as dependent variable where *in-situ* structure is coded as 0 and *ex-situ* structure as 1. We used contrast coding, which sets the 4-year-olds and *what-*questions as the reference groups for age and condition respectively. Thus, the intercept contains the reference level for age and condition. **Table 1** provides a summary of the best fitting model. Compared to the best fitting model, the model with interaction of age and condition as fixed factors and participant and item as random factors showed that there is no interaction of age and condition as the Chi-square test result is not significant (χ^2 (4) = 4.915, p = 0.296). The main effect of

age on participants' choice of structure shows that the 5-year-olds used significantly more *in-situ* structures than the 4-year-olds. However, adults' use of the *in-situ* structure differs only marginally from the 4-year-olds. The effect of condition on participants' choice of structure revealed a significant difference between *what-*questions and *where-*questions and between *what-*questions and *who-*questions (**Figure 2**).

TABLE 1 | Summary of model output on response type in experiment 1.

Fixed effects	Estimate	SE	z-value	Pr(>|z|)
Intercepts	0.3081	0.255	1.209	0.227
5-year-olds	−0.7490	0.338	−2.214	<0.05*
Adults	0.6230	0.343	1.815	0.069
Where-questions	−0.2864	0.104	−2.749	<0.01*
Who-questions	0.2490	0.111	2.251	<0.05*

FIGURE 2 | Proportions of ex-situ and in-situ questions in the different conditions. Error bars indicate a 95% confidence interval.

A post-hoc pairwise comparison with the emmeans package (Lenth, 2020) in R confirms that the 4-year-olds and adults do not differ significantly in their amounts of *in-situ* questions produced (β = −0.623, SE = 0.343, z.score = −1.815, p = 0.165). However, the 4- and the 5-year-olds differ marginally in their production of *in-situ* questions (β = 0.749, SE = 0.338, z.score = 2.214, p = 0.067), while the 5-year-olds produce significantly more *in-situ* questions than the

TABLE 2 | Model summary on exact repetition in the grammatical and ungrammatical conditions in experiment 2.

Fixed effects	Estimate	SE	z-value	Pr(>|z|)
Intercept	7.4392	0.8545	8.706	<0.001***
5-year-olds	−1.8994	1.5171	1.252	<0.5
Adults	−2.4141	0.9974	−2.420	<0.05*
Ungrammatical	−9.1072	0.8294	−10.981	<0.001 ***
5-years:Ungrammatical	−0.9155	1.4845	−0.617	= 0.54
Adults:Ungrammatical	−4.1355	1.5333	−2.697	<0.01 **

adults (β = −1.372, SE = 0.335, z.score = −4.096, p < 0.001). Post-hoc pairwise comparisons with the emmeans package (Lenth, 2020) in R showed that participants produced fewer *in-situ* questions in *who*-questions than in *where*-questions (β = −0.535, SE = 0.111, z.score = −4.841, p < 0.001) and also fewer *in-situ* questions in *what*-questions than in *where*-questions (β = 0.286, SE = 0.104, z.score = 2.749, p < 0.05). Only a marginal difference occurred between *what*- and *who*-questions (β = −0.249, SE = 0.111, z.score = −2.251, p = 0.063).

DISCUSSION

The elicited production task tested the production of *wh*-questions in Akan-speaking children and adults. Overall, we found that the children as well as the adults used both types of structures in this task although with slight differences in their proportions. The comparison between the groups showed that the 4-year-olds did not differ from adults in their amounts of *in-situ* questions, but they produced marginally fewer in situ-questions than the 5-year-olds. However, 5-year-olds differed from adults in their question formation: they produced significantly more *in-situ* questions than adults. Overall, this pattern suggests that 4-year-olds and adults show a preference for producing *ex-situ* questions while the 5-year-olds show a reverse pattern—although statistically verified only in comparison to adults.

So, far the results of our study allow for several conclusions. The results from our adult group clearly suggest that adult speakers of Akan have a preference for producing *ex-situ* compared to *in-situ* questions in the elicited production task applied in our experiment. We had no clear expectation which structure would be preferred by the adults, but the results are clear-cut. Interestingly, this is in line with what other studies report for French adults and raises the question why overall there seems to be a preference for the structurally more complex *in-situ* variant. With respect to language acquisition, two quite remarkable findings emerge from our data. The first one is that even in the youngest age group both structures are produced, suggesting that children at this age have both structures in their linguistic repertoire. In addition, in this younger age group no evidence for a preference for the less complex *in-situ* structure could be found, – a result that is not in line with the predictions of the DCH (Jakubowicz, 2004; Jakubowicz, 2005) which predicts an initial stronger preference for the less complex *in-situ* structure. Contrary to the DCH, the 4-year-olds showed a tendency to produce the *ex-situ* structure albeit only in *who*- and *what*-questions. Surprisingly, children's preferences for one question structure or the other seems to be drifting with age as the 5-year-olds showed a higher tendency along a preference for the *in-situ* questions. With this pattern they were different from the adults but marginally different from the younger children. Before we discuss these surprising findings more closely, we will first report the results from our second task to examine how robust this pattern is across different tasks.

The preference for *in-situ* vs. *ex-situ* questions was also modulated by the *wh*-word: the *what*- and *who*-questions more often were realized as *in-situ* structures than the *where*-questions while no difference occurred between the *what*- and the *who*-questions. This may suggest that a

preference for *in-situ* vs. *ex-situ* questions in Akan may be affected by the status of a question as an argument or an adjunct question. This resembles findings from French speaking adults who judged the acceptability of *in-situ* and *ex-situ* adjunct and argument simple questions as slightly different (Lassotta et al., 2016). In this study, argument *ex-situ* and *in-situ* argument questions did not differ significantly in their acceptability, but adjunct *ex-situ* questions were more often judged as acceptable than *in-situ* questions. However, the data from Akan seem to go into the other direction since the difference between *ex-situ* and *in-situ* structure seems to be smaller in the adjunct questions compared to the argument questions.

STUDY 2: QUESTION REPETITION TASK

To check whether the structure preference observed in the first study was connected to the experimental materials and procedure used or could be verified with another method, we conducted an elicited imitation task. Here, participants were presented with grammatical and ungrammatical *wh*-questions and asked to repeat and correct them if they considered them incorrect. Previous studies have shown that elicited imitation tasks are able to reveal young children's grammatical knowledge in two ways: first, grammatical sentences are more often repeated literally than ungrammatical sentences and second, ungrammatical sentences are often changed to their grammatical counterpart (e.g., Höhle et al., 2001). Accordingly, two questions were pursued with the current experiment: First, if both question structures are part of the participants' linguistic repertoire, grammatical questions should be repeated exactly more often than ungrammatical questions, independent of the specific structure (*in-situ* vs. *ex-situ*). Second, the ungrammatical questions used in this study could be corrected in two different ways, resulting in either the *in-situ* or the *ex-situ* structure. The choice between these alternative corrections should therefore also be informative about the preferred question structure in the children of the ages tested and in the adults.

Methods
Participants
All children and adults who had participated in the experiment from Study 1 also took part in this experiment. No additional participants were recruited.

Stimuli
Fifty-four questions (30 grammatical and 24 ungrammatical ones) were constructed for this study. We focused on the same three *wh*-pronouns that were used in Study 1. For each pronoun, there were ten grammatical questions: 5 with the *in-situ* structure and 5 with the *ex-situ* structure, making a total of 30 stimuli across the three pronoun conditions. *In-situ* grammatical questions began with a noun and ended with the *wh*-word under investigation (see 12), which reflects the canonical SVO order in Akan. *Ex-situ* grammatical sentences began with a *wh*-word and ended with a

verb (for *what-* and *where*-questions (see 13a)) or a RP (for *who*-questions (see 13b)).

(12) Abɔfra no re-di deɛn
  child DEF PROG-eat what
  'What is the child eating?'
(13) a. ɛdeɛn na abɔfra no re-di
  what FOC child DEF PROG-eat
  'What is the child eating?'
  b. Hwan na maame no bo-o no
  who FOC woman DEF beat-PST RP
 'Whom did the woman beat?'

All ungrammatical questions were based on the *ex-situ* structure, that is, the structure with an initial *wh*-word. To make them ungrammatical, the clitic morpheme *na*, which is obligatory in Akan *ex-situ* questions, was omitted (see 14a–c). In the case of *who*-questions (see 14c), the obligatory RP was also omitted.

(14) *a. ɛhen(fa)_____abɔfra no wɔ
  Where child DEF be.locate
  'Where is the child?'
  *b. Deɛn _____ Kofi di-i
  What Kofi eat-PST
  'What did Kofi eat?'
  *c. Hwan ___ Kofi bo-o _____
  Who Kofi beat
  'Whom did Kofi beat?'

If corrected, the ungrammatical questions could be changed in two ways into their grammatical counterparts: either by replacing the structure with an *in-situ* question or by keeping the *ex-situ* structure and adding the clitic morpheme *na* and the RP in the case of a *who*-question.

Procedure
Participants were tested individually directly after the completion of the experiment from Study 1. This second experiment lasted for approximately 10 min. All participants were instructed to repeat the questions and were told that they should correct them if they hear one that they think is incorrect. All grammatical and ungrammatical sentences were presented by the experimenter. The participants' responses were audio-recorded using Audacity (version 2.3.1.0) installed on a MacBook Pro laptop. The MacBook Pro laptop was connected to an external microphone to support the recording. The 54 experimental stimuli were pseudo-randomized so that participants would not hear two or more questions from the same pronoun condition, or two or more grammatical or ungrammatical questions consecutively. Participants were allowed to make self-corrections as many times as they wanted whenever they realized that they had made a mistake. However, they were never prompted by the experimenter to reconsider their response.
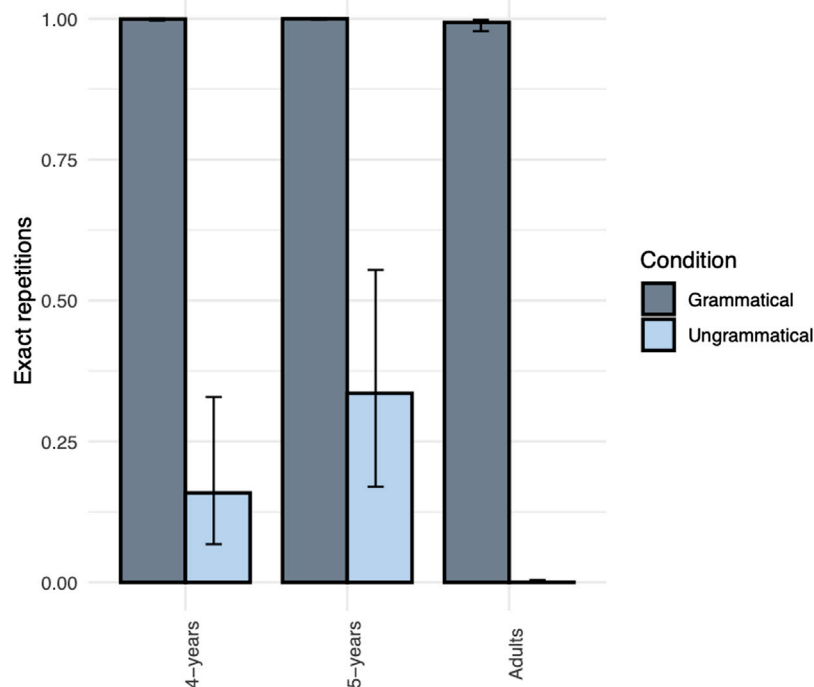
FIGURE 3 | Proportions of exact repetitions produced in the grammatical and ungrammatical conditions by the different groups. Error bars indicate a 95% confidence interval.

Coding and Scoring

All audio recordings were transcribed by two native speakers of Akan. Since participants were allowed to correct themselves whenever they deemed necessary, we coded only their last response. For all grammatical questions, the participants' responses were annotated as *exact repetition* when a literal repetition was produced, while a change from the *ex-situ* to the *in-situ* structure and vice versa was coded as a *switch*. In case of the ungrammatical questions, an insertion of the clitic morpheme for all question types and additionally the RP for only *who*-questions while maintaining the *ex-situ* structure was coded as *insertion*.

RESULTS

Figure 3 shows the percentages of *exact repetitions* in the grammatical and ungrammatical sentences produced by the three different groups.

A Generalized Mixed Effects Model with participants' responses as dependent variable (1 = exact repetition/0 = non exact repetition), Age of participants (4-/5-year-olds/Adults) and Condition (1 = Grammatical/0 = Ungrammatical sentences) as categorical fixed factors and their interactions. 4-year-olds responses to grammatical questions were assigned to the intercept. The random factors included participants and subjects with random slopes. The summary statistics of the best-fitting model are reported in **Table 2** and show a significant Intercept, a significant effect of Age (4-year-olds when compared to Adults), an

effect of Condition as well as an interaction between Age (4-year-olds and Adults) and Condition. To interpret the significant interactions, we ran Bonferroni adjusted pairwise comparisons with estimated group means using the 'emmeans' package in R. When comparing each age groups' performance on the grammatical questions with that on ungrammatical sentences we found that all groups were less likely to produce exact repetitions of ungrammatical than of grammatical sentences (4-year-olds: β = 9.11, SE = 0.829, z.score = 10.981, p < 0.0001; 5-year-olds: β = 10.02, SE = 1.452, z.score = 6.902, p < 0.0001; adults: β = 13.24, SE = 1.453, z = 9.111, p < 0.0001). The comparison between the age groups showed that the probability of participants responding with an exact repetition of the grammatical questions (rather than with a non-exact repetition) did not differ significantly by age (p > 0.05). However, we did find significant differences in participants' performance in the ungrammatical condition: both child groups were more likely to produce exact replications of the ungrammatical sentences than adults (4-year-olds—adults: β = 6.550, SE = 1.457, z.ratio = 4.495, p < 0.0001; 5-year-olds—adults: β = 7.534, SE = 1.466, z.ratio = 5.138, p < 0.0001). However, 4- and 5-year-olds did not differ significantly in producing exact repetitions in the ungrammatical condition (β = −0.984, SE = 0.663, z.ratio = −1.484, p = 0.4138).

Figure 4 presents the proportions of the three response types observed in the ungrammatical question condition. Remember, that the ungrammatical questions could be corrected in two ways to form a grammatical question: either by the insertion of the clitic morpheme *na* and the RP (in case of a *who*-question) while
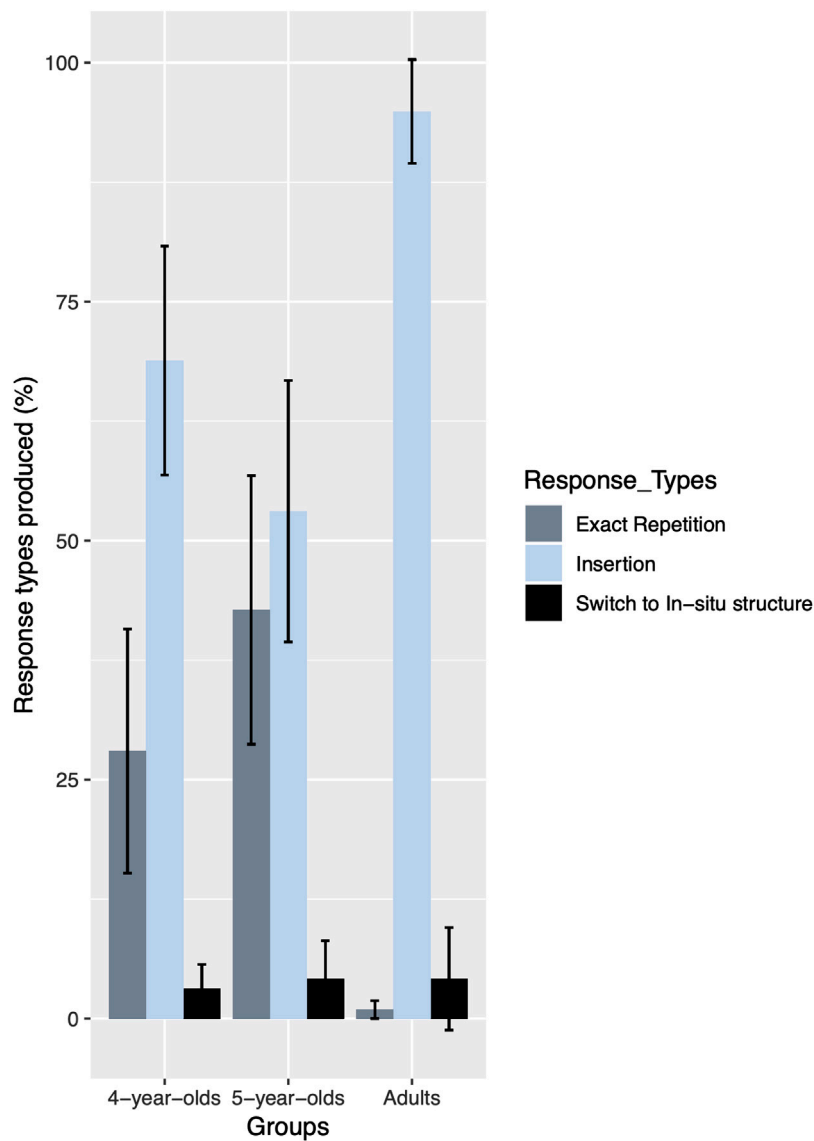
FIGURE 4 | Percentages of response types for the ungrammatical questions produced by the different groups. Error bars indicate a 95% confidence interval.

keeping the *ex-situ* structure or by a switch from the *ex-situ* to the *in-situ* question without the need to insert additional morphemes. To further explore the non-exact repetitions in the ungrammatical condition we ran a second Generalized Mixed Effects Model with the type of non-exact repetitions as dependent variable (1 = insertion/0 = switch) and Age of participants (4-/5-year-olds/Adults) as categorical fixed factors and their interactions. 4-year-olds responses to grammatical questions were assigned to the intercept. The random factors included participants and subjects with random slopes. The summary statistics of the best-fitting model are reported in **Table 3**. We found a significant effect of Intercept but no significant effect of Age. Also, none of the pairwise comparisons between age groups revealed significant differences ($p > 0.05$), suggesting that participants in all conditions were equally likely to produce

more insertions than switches when correcting an ungrammatical question.

We did not find any effect of age in this condition. Participants' corrections of the ungrammatical questions significantly involved the *insertion* of the clitic morpheme *na* (and a RP for *who*-questions) while keeping the *ex-situ* structure than *switching* to the *in-situ* structure for all age groups.

TABLE 3 | Model output of corrections in the ungrammatical *ex-situ* questions.

Fixed effect	Estimate	SE	z-value	Pr(>|z|)
Intercept	3.54794	0.40555	8.748	<0.001 ***
5-year-olds	−0.31187	0.33989	−0.918	<0.5
Adults	−0.02594	0.32224	−0.081	= 0.93

DISCUSSION

In this study we tested children's and adults' performance in an elicited imitation task in which grammatical *ex-situ* and *in-situ* questions as well as ungrammatical questions were presented to the participants. All ungrammatical questions contained an initial *wh*-word but missed the clitic *na* that obligatorily follows the pronoun in *ex-situ* questions and the RP that is obligatory in *ex-situ who*-questions. Three main findings were obtained. First, both child groups and the adult group produced a high number of exact repetitions when presented with a grammatical question as compared with when presented with ungrammatical questions. The fact that almost all grammatical questions were exactly repeated by all groups while the proportion of exact repetitions of ungrammatical questions was much lower is strong evidence that our participants are sensitive to the grammaticality vs. ungrammaticality of the questions and thus have the underlying syntactic knowledge. Additionally, the high number of exact repetitions of the grammatical questions does not suggest any difference between *ex-situ* and *in-situ* input structures in this task. Second, children produced more exact repetitions of ungrammatical questions than adults without any significant differences between the two child groups. While adults rarely produced exact repetitions of the ungrammatical questions both child groups showed some considerable amount of these ungrammatical reproductions. This may suggest that children at the age that we tested did not apply their grammatical knowledge as robustly as adults did in this task. Third, when correcting the ungrammatical questions all age groups responded with a clearly higher proportion of insertions compared to switches. These findings will be further discussed in the next section.

GENERAL DISCUSSION

This study has investigated the acquisition of *wh*-questions in Akan-speaking children. Akan is a language that shows a large degree of optionality between *in-situ* and *ex-situ* questions and is therefore an optimal candidate (in addition to previous research on French) to further test the predictions of the Derivational Complexity Hypothesis (DCH) and the Derivational Complexity Metric (DCM) as proposed by Jakubowicz (2004), Jakubowicz (2005). According to this theoretical framework, children are expected to initially prefer the less complex *in-situ* structure compared to the more complex *ex-situ* structure if their language allows both options. This study also tests the prediction that the *in-situ* and *ex-situ wh*-questions in Akan do not differ in terms of structural complexity (Saah, 1995) and therefore, children learning Akan will not favor one structure over the other on the basis that the *in-situ* structure is less complex than the *ex-situ* structure. To this end, we conducted two experiments: an elicited production task and a question repetition task with 4- and 5-year-old Akan-speaking children and adults. Based on the DCM and the DCH, we predicted that children will produce more *in-situ* than *ex-situ* questions in the elicited production task, and will more often change an *ex-situ* question to an *in-situ* question in the question repetition task.

Based on the alternative linguistic account which argues for equal complexity, we predicted that if the presence of RP in *ex-situ wh*-questions equally makes it less complex as *in-situ wh*-questions, then children will not show preference for either of the two *wh*-question structures. Both tasks were also conducted with adults since no previous studies on adult Akan speakers' preference for one structure or the other were available.

First, our results showed that Akan-speaking adults preferred the *ex-situ* over the *in-situ* questions in both of our studies: they produced more *ex-situ* questions in the elicitation task and maintained this structure in their corrections of ungrammatical *ex-situ* questions in the repetition task. Four-year old children showed a very similar pattern: they showed the same preference for the *ex-situ* structure as the adults in the elicitation task and in the repetition task. In contrast to the 4-year-olds, the 5-year-olds deviated from the adults' performance in one aspect: they produced more *in-situ* questions than adults did in the elicitation task while the difference to the 4-year-olds was not significant. However, in their choice of correcting the ungrammatical questions the 5-year-olds were not different from the other age groups as all age groups preferred the correction that maintained the *ex-situ* structure while inserting the missing grammatical morpheme(s). In general, these findings suggest an overall preference (except for the 5-year-olds in the elicitation task) for the *ex-situ* over the *in-situ* question in both of our tasks. This leads to the question why this is the case—especially if one assumes that according to the DCM (Jakubowicz, 2005) this structure is computationally more complex than the *in-situ* structure. Several points need discussion here.

First, it may be the case that our assumed linguistic analysis is not valid for Akan but that—as proposed by Saah (1995) - no movement is involved in Akan *ex-situ* questions as indicated by the occurrence of the RP. This is also in line with the prediction that there should be no differences between the *in-situ* and *ex-situ wh*-questions with RP, based on the alternative analysis. An indication in our data may support this prediction (i.e., the higher amount of *ex-situ* in the *who*-questions that have the overt RP) that we found across all three participant groups. However, the data from Zuckerman and Hulk (2001) from French adults and French-learning 4- and 5-year-olds using a similar elicitation task mirror our findings from Akan which does not support the assumption of crucial structural differences in the formation of *ex-situ* questions across the two languages.

Second, we cannot exclude task specific effects. The high rates of producing *ex-situ* questions could be attributed to syntactic priming. Many experiments on sentence production have shown that the choice of a structure by the participants in - for example - describing a picture is affected by the structure of a sentence produced before by the experimenter (e.g., Bock, 1986). These syntactic priming effects are already shown by 4- and 5-year-old children (Huttenlocher et al., 2004). Most relevant to our study, Hamann (2006) reports priming effects in French children's productions of *wh*-question in an elicited task with more *ex-situ* questions when the lead in presented by the experimenter contained an *ex-situ* structure (e.g., demande lui où il habite, ask him where he lives) compared to a neutral lead-in (e.g., demande lui quand; ask him when). Therefore, it is conceivable that

priming effects have covered any preferences for the *in-situ* structure in our Study 1 as in all prompts the element that the *wh*-word referred to occurred at the initial position of the embedded clause (see examples 9–11). However, the grammatical sentences in the elicited imitation study of Study 2 also provided no evidence of favoring the *in-situ* structure which could have led to switches from the *ex-situ* to the *in-situ* structure in the grammatical sentences. However, no such tendency occurred in our child data as children repeated the grammatical questions exactly as in the structure that they were presented with.

Implications of These Findings for the Acquisition of Question Formation in Akan

Our data do not provide evidence that Akan learning children show an overall strong preference for the one or the other question structure that would grossly differ from what we observed in the adult participants of our study. 4-year-olds did not differ significantly from adults in their proportions of *in-situ* questions and like adults they corrected the ungrammatical questions in most cases by the insertion of the missing morphemes which kept the *wh*-initial structure of the presented stimulus. Yet, the 4-year-olds also produced a high amount of *ex-situ* questions (numerically even more than *in-situ* questions) which clearly indicates that they have the structural knowledge that is necessary to produce both question types. These observed similarities between the 4-year-olds and the adults–also in relation to the responses to the different *wh*-pronouns for which no age effects were found - may suggest that 4-year-olds' question production mirrors the frequency relations that they observe in their speech input (if we assume that the adults' question use in our study reflects their daily use of questions and is not purely task induced).

This is in line with previous suggestions that children's acquisition of question formation is item related and does not necessarily generalize to all question types (Hamann, 2006). However, data from spontaneous child-directed speech in Akan would be necessary to obtain a better understanding of the input that children get and of the extent to which the distribution in the input predicts the distribution of the different question types in Akan-learning children's utterances. More research on this topic is definitely necessary.

Surprisingly, the 5-year-old Akan-speaking children were more different from the adults than the 4-year-olds as they produced significantly more *in-situ* questions than the adults and marginally more *in-situ* questions than the 4-year-olds in the elicitation study. However, their performance in the elicited imitation task was not different from the 4-year-olds - they showed the same pattern of preferring insertions of grammatical morphemes over structural switches in repairing the ungrammatical questions as the two other age groups.

Looking at the data from Study 1 in more detail suggests that the 5-year-olds not only produced more *in-situ* questions than the other two groups but that the relation of *in-situ* vs. *ex-situ* is numerically reversed in this group, i.e., that they prefer the *in-situ* over the *ex-situ* questions. Still, about 40% of their productions were *ex-situ* questions in the elicitation task suggesting that like

the 4-year-olds, the 5-year-olds have the linguistic competence for both question structures. The question then arises, why the 5-year-olds as a group show slightly different response patterns from the younger children as well as from the adults. Individual differences across the participants do not provide an explanation: Looking at the individual data from Study 1 shows that only 1 adult and 7 (out of 21) 4-year-olds produced numerically more *in-situ* than *ex-situ* questions while this was true for 14 (out of 23) 5-year-olds. Accordingly, the overall results from the 5-year-olds reflect a group-wide tendency and are not caused by a few single participants. Instead, we propose the 5-year-olds' performance may reflect an emerging uncertainty concerning potential semantic or pragmatic differences between the two structures. For example, Saah (1995) has proposed that *ex-situ* and *in-situ* questions in Akan are different with respect to their information structure. According to this approach *ex-situ* questions put a stronger focus on the *wh*-word than *in-situ* questions, which is also indicated by the obligatory occurrence of the focus marker *na* directly following the *wh*-word in the *ex-situ* questions. In line with other research showing that the conditions for pragmatically induced optionality are not easy to acquire for children (Sauermann and Höhle, 2018), we suggest that 5-year-olds may be in the process of figuring out these conditions and therefore may opt for the structurally less complex variant during this process. However, in the question repetition task, no advantage for the *in-situ* questions was observed in this age group—neither in their repetitions of the grammatical questions nor in their corrections of the ungrammatical questions. This difference in the performance of the 5-year-olds across tasks could indicate that the repetition task leaves less room for pragmatic considerations than the elicited production task. However, so far, our interpretation of the results of the 5-year-olds is speculative and more research on adults' use of question structures in Akan—especially on the potential functional differences between the two question types—would be necessary to better understand the children's performance. In any case, our results clearly show that Akan-learning children at the ages tested have both the *ex-situ* and the *in-situ* questions in their linguistic repertoires.

This conclusion is also strongly supported by the results from the question repetition task. The huge discrepancy in the number of exact repetitions between the grammatical and the ungrammatical questions found for the children and the adults suggests that 4- to 5-year-old Akan-speaking children are sensitive to the grammatical structure of questions in their language. This finding corroborates findings from other studies that show that sentence repetition tasks are a useful tool to investigate children's grammatical knowledge (e.g., Höhle et al., 2001; Valian and Aubry, 2005; Hamann, 2006). The performance for ungrammatical sentences is specifically interesting in this task since the way in which participants correct the sentences is highly informative about preferences for the choice of constructions when the language allows different options. In the current task participants were instructed to correct questions that they considered to be ungrammatical, but such corrections also occur spontaneously without explicit instruction even in younger children than the groups tested here (Höhle et al., 2001).

Theoretical Implication(s) of the Current Study for the DCH/DCM

The Derivational Complexity Metric (DCM) predicts that the *in-situ wh*-questions should be preferred over the *ex-situ* questions in Akan-speaking children. This prediction is based on the claim that *wh*-questions that involve no internal merge are less complex than those with one or more internal merges. Previous studies on French-speaking children have shown evidence for the role of the DCH/DCM in the acquisition of French. Data from Zuckerman and Hulk (2001) as well as from Hamann (2006) shows that French-speaking 4- to 5-year-old children still use more *wh*-in-situ questions and fewer subject-verb inversion than adults. Younger French-learning children around the age of 2 years have been found to show a clear dominance of *in-situ* questions over *ex-situ* questions in their productions, and French children with SLI have shown such a dominance even up to the age of 9 years (Hamann, 2006). Relatedly, Jakubowicz and Strik (2008) found that 4- and 6-year-old French-speaking children preferred to use *ex-situ* long distance *wh*-questions without verb movement.

Our own data on Akan are only partly compatible with these predictions. The fact that 5-year-olds produced more *in-situ wh*-questions than *ex-situ wh*-questions lends support to the DCM, which predicts that children will favor *wh*-questions that involve no internal merge or a lesser number of internal merge-operations of the *wh*-element. However, the fact that 5-year-olds but not 4-year-olds produced more *in-situ* questions than adults challenges the DCM, which predicts an initial emergence of or preference for the (less complex) *in-situ* structure. This prediction is based on the assumption that the *wh*-word that occurs at the left periphery of an *ex-situ wh*-question in Akan undergoes movement (internal merge). However, if one considers the assumption that the presence of a RP in the *ex-situ* structure makes it equally less complex as the *in-situ* structure (Demirdache 1991; Shlonsky 1992; Mccloskey, 2002; Alexopoulou, 2006), the DCM would not be applicable and no advantage for the *in-situ* structure in acquisition would be expected. The data from the 4-year-olds may be interpreted as supporting this alternative linguistic analysis but as mentioned above, similarities in the acquisition data from French and Akan do not support the assumption of different underlying structures in French and Akan *ex-situ* questions.

If developmental change is considered to reflect a decreasing influence of derivational complexity on children's performance, the differences observed between the 4- and the 5-year-old Akan-learning children are also not compatible with the DCM. However, these differences seem to align with the predictions of the alternative linguistic analysis which did not predict any developmental advantage for one structure over the other since this analysis considers both the *in-situ* and *ex-situ* structures to be equal in terms of complexity. In this respect Akan-learning children are not compatible with French-learning children, for whom a decrease in the production of *in-situ* questions was observed between 4- and 5-years of age (Zuckerman and Hulk, 2001) while our data show an increase of *in-situ* questions between 4- and 5-year-olds. Which cross-linguistic differences between Akan and French or which methodological details of the tasks used across different studies are relevant for these inconsistent findings are questions for further research. So far, the results from children acquiring Akan seem to diverge from the findings with French children and therefore question the cross-linguistic validity of the DCM as predicting the developmental trajectory in the acquisition of ex- and in-situ questions. One potential explanation for these cross-linguistic differences in development could be that a developmental shift from a preference for the less complex *in-situ* to the more complex *ex-situ* question occurs earlier in Akan-learning children than in French-learning children and therefore was not captured in the age range of our sample. As French has more options in question formation than Akan, such a scenario is not implausible. Therefore, research looking at question formation in younger Akan-learning children should also be a task for future research.

CONCLUSION

The current study presents findings from Akan-speaking children's acquisition of *wh*-questions based on an experimental elicited production task and an elicited imitation task. Our findings suggest a developmental change in *wh*-question structure preferences between the ages of 4 and 5 years. We assume that the 4-year-olds' adult-like pattern of performance reflects the frequency of the occurrence of the *ex-situ* and the *in-situ* structures in their input. The 5-year-olds, however, – unlike adults—show a preference for the *in-situ* questions. We suggest that this choice is not based on the potential structural differences between the two types of questions but reflects some uncertainty concerning the possible pragmatic functions of the two question types in Akan. That the 5-year-olds choose more often the *in-situ* option may support the assumption that this is the structurally less complex structure and therefore partially provide evidence for the Derivational Complexity Hypothesis.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

AUTHOR CONTRIBUTIONS

POO contributed to the design of the work, stimuli construction, data collection, analysis of the data, drafting of the work and

revising of the manuscript. BH contributed to the design of the work, interpretation of the data, drafting and revising of the manuscript.

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