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A Picture-Book Based Corpus Study on the Acquisition of *wh*-words in Japanese

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Abstract: Clancy (1989. Form and function in the acquisition of Korean wh-questions. *Journal of Child Language*, 16(2), 323–47) claims that the developmental order of *wh*-questions in first language acquisition follows the order: what = where < who < how = why < when. Forner (1979. The mother as LAD: interaction between order and frequency of parental input and child production. In A. Hastings & F. R. Eckman (Eds.), *Studies in first and second language acquisition* (pp. 17–44). New York, NY: Newbury House Publishers) further argues that a mother's order of introducing *wh*-questions might be influenced by her assumption of a child's cognitive development. Similarly, the target age for picture books might also reflect an adult's assumption of the child's cognitive development. Accordingly, this study investigates a Japanese picture book corpus to determine whether the order of appearance for *wh*-words mirrors that of Clancy's developmental order. As a result, the appearance of Japanese *wh*-words in the picture books were similar to Clancy's (1989. Form and function in the acquisition of Korean wh-questions. *Journal of Child Language*, 16(2), 323–47) order except for the question *dou* 'how'. Because *dou* and the English 'how' have different ranges of meaning, the data were reanalyzed which resulted in an order more similar to Clancy's. These results suggest that the target age of picture books reflect the adult's assumption of a child's cognitive development. Picture books might also influence a caregivers' order of introducing *wh*-words. In conclusion, this study implies external social factor such as picture books, together with other factors, might influence the children's *wh*-developmental order.

Keywords: *wh*-developmental order, Japanese picture books, child's cognitive development, decision tree analysis, adult's assumption

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1 Introduction

The developmental sequence of *wh*-questions has long been studied in English (Bloom et al. 1982; Brown 1968; Ervin-Tripp 1970; Ingram 1971; Smith 1933; Tyack and Ingram 1977), German (Wode 1971), Serbo-Croatian (Savić 1975), Korean (Clancy 1989) and Japanese (Miyata 2009; Okubo 1967), and these cross linguistic studies have found many similarities in the developmental sequences for production. Furthermore, even when investigating the comprehension of *wh*-questions by children (Cairns and Hsu 1978; Clancy 1989; Ervin-Tripp 1970) and controlling for the level of syntax and vocabulary (Tyack and Ingram 1977), certain developmental sequences or strategies were observed. Accordingly, there appears to be a shared developmental sequence for child acquisition of *wh*-questions.

This developmental sequence has been explained from the framework of several different perspectives: cognitive development (Ingram 1971; Okubo 1967); syntax, semantics complexity and discourse (Bloom et al. 1982); and the frequency and order of parental input (Clancy 1989; Forner 1979). While Rowland et al. (2003) argued that the frequency and order of parental input were the strongest factors determining *wh*-development, Savić (1975) investigated the utterances of *wh*-questions by a child-parent pair and concluded that the order and frequency of the adults were not related to the order and output frequency of the children, thus creating disagreement regarding the role of the parents.

However, because Savić did not statistically analyze her data and instead relied on subjective interpretations, Forner (1979) reanalyzed Savić's data by calculating correlation coefficients and added longitudinal data (German) taken from her own son. Thus, Forner (1979), in contrast to Savić, found that the child's output correlates with the mother. Specifically, the order in which the mother first introduces a *wh*-questions and its frequency influence the child's production. Importantly, Forner (1979) also claimed that the mother's order is influenced by the child's cognitive development, as shown below in Figure 1. In

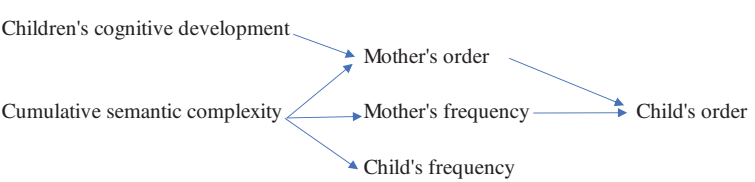

Figure 1: Possible correlation determinants between mother-child speech and child speech (Forner 1979: 41).

sum, the mother somehow senses the level of the child's cognitive development, which unconsciously affects her own order.

Clancy (1989) claimed that there appears to be a fixed pattern of *wh*-development in first language acquisition based on the previous studies of English (Bloom et al. 1982; Cairns and Hsu 1978; Ervin-Tripp 1970; Ingram 1971; Tyack and Ingram 1977), German (Wode 1971, Serbo-Croatian (Savić 1975), Japanese (Okubo 1967), and her own study on Korean *wh*-questions: what = where < who < how = why < when. In her study, Clancy (1989) recorded the conversations of two Korean child-parent pairs for one year and analyzed the correlation of parental input with the children's acquisition; this revealed that the children's order of *wh*-questions was related to the parental frequency and order. However, Clancy (1989: 342), making similarities to Forner (1979), emphasized the importance of the cognitive state of the child for *wh*-acquisition and de-emphasized the role of parental input as an independent factor influencing the developmental order. Instead, she argued that cognition and input work together shape the order. In summary, Clancy supported Forner's model (1979) such that a mother's order may be influenced by a child's cognitive development.

There is a considerable amount of research regarding how picture book reading benefits language growth and boosts vocabulary. For example, Sénéchal, LeFevre, Hudson, and Lawson (1996: 520) state that "the language used by mothers during shared book reading is richer and more varied than that used during mealtime, toy play, or dressing". Moerk (1985) also highlights the importance of shared picture book reading because, via this activity where attention is guided by the mother, children are able to initiate the process of forming representations of the form and structure for linguistic knowledge prior to formal language instruction.

Furthermore, for picture book reading, language growth has been found to be related to the frequency of reading specific lexical items (Snow and Goldfield 1983), the increased rate of asking open-ended questions (Whitehurst et al. 1988) and the joint attention between the caregiver and the child. Moreover, for children approximately 1;6, 2;0, and 2;6, the percentage of distribution of speech for story-reading time in a day was found to be 5.4%, 4.8%, and 5.0%, respectively (Wells and Gordon 1985: 116); Sénéchal and LeFevre (2001) even suggest that children might learn two out of five new words a day from listening to a storybook. Whitehurst et al. (1988: 552) claimed that, by "asking questions, giving feedback, and adjusting questions to the developmental level of the child", parents are able to teach language via the process of reading picture books to their children. If parents are adjusting their feedback and questions, it can be ascertained that they must also be assessing their child's developmental level. Moreover, as Moerk (1985: 550) claimed, a young child understands

language mainly in the here and now, with environmental nonverbal support. Pictures provide such external cues in a nearly ideal form, and they are always readily available. Therefore, picture books can be very beneficial for children to learn language.

In summary, it can be assumed that the shared activity of reading a picture book between a parent and child is a pillar of language development for the child; as such, investigating *wh*-words in picture books might help better the understanding of *wh*-acquisition within the scope of Forner's (1979) model (i. e. cognitive perception).

While the target ages of picture books are decided by the authors and the publisher, these suggested ages might also reflect an adult's assumption of the cognitive development of children. Importantly, parents might also be susceptible to the influence of these picture books when gauging their own child's cognitive development. Accordingly, it is of empirical interest to investigate *wh*-words in picture books to determine how target ages reflect adults' assumptions of children's cognitive development and if these assumptions mirror Clancy's (1989) acquisition order.

1.1 Current study

Wh-words in Japanese picture books were investigated based on the recommended target age using a *Decision Tree Analysis* (e. g. Breiman et al. 1984) to determine whether adults' assumptions of children's cognitive development are represented in picture books. In this study, children were not studied. Instead, we limited our investigation how picture books with different target ages reflect the acquisition order proposed by Clancy (1989). We hypothesize that the appearance of *wh*-words in picture books will mirror the adults assumptions of children's cognitive development and a result in an order similar to Clancy's acquisition order.

2 Corpus study

2.1 Materials

The materials for this study were Japanese picture books with different target ages. *Fukuinkan Shoten* is a Japanese publisher that publishes Japanese picture books. The firm indicated recommended target ages on its picture books and has monthly picture book magazines for the first to the third year of preschool and kindergarten

in Japan, approximately ages 3;0 4;0, and 5;0 at the start of the school year, respectively. Therefore, both picture books and monthly picture book magazines published from *Fukuinkan Shoten* were used. Because the recommended target ages are often written as 'from ages 2 to 4', we grouped the books as for target age 2 because the publisher recommended them to children 2;0 and above.

Because (1) infants from approximately 7.5 months begin to segment words (Jusczyk 1999), (2) approximately slightly before 12 months, children can begin to recognize pictures as representations of lexical items or real world objects (Moerk 1985) and (3) at approximately 17 to 20 months, children can begin to discriminate sounds in speech to connect sounds to meaning for vocabulary learning (Kajikawa and Imai 2006), we limited the range or target ages to one-to-five.

We asked *Fukuinkan Shoten* how it determined the appropriate target ages for its books. The publisher responded that it does not have a specific vocabulary list or specific rules for deciding target ages. Instead, the publisher occasionally requests its authors to write books for a specific target age range or decides the age during meetings after a picture book is written. Accordingly, it appears that *Fukuinkan Shoten* might assume that these books are suitable for certain ages and that the target ages are simply approximate indicators. However, the publisher's judgments might also reflect how adults sense a child's linguistic and cognitive development, especially if an author or a publisher has experienced child-rearing.

Books introduced in *Nihon Tosho-syuppan* brochures, a wholesaler company of books, were also used as a reference for picture books with different target ages. Additionally, these brochures were used because *Fukuinkan Shoten* does not regularly categorize ages beginning from age 1. Thus, picture books in the brochures by *Nihon Tosho-syuppan* were primarily used to supplement the target ages of *Fukuinkan Shoten*. Because books with a target age of 1 were difficult to find, picture books belonging to the same series recommended for age 1 by *Nihon Tosho-syuppan* were also included in this study.

A total of 345 picture books were included in the present corpus search. The number of books per target age is as follows: age 1 = 47; age 2 = 82; age 3 = 71; age 4 = 77; and age 5 = 68. Importantly, for a decision tree analysis, the number of books in each age range does not need to be completely equal.

2.2 Methods

In this study, six *wh*-words belonging to Clancy's (1989) suggested acquisition order were investigated in a corpus search of Japanese picture books: *nani* 'what', *doko* 'where', *dare* 'who', *dou* 'how', *naze* 'why', and *itsu* 'when'. Additionally, *wh*-words in indirect interrogative questions in the picture books

were also counted. There are at least three *wh*-words that mean 'which': *dore, dochira, and dono*, and the Japanese equivalent to 'whose' is *dareno* (the Hepburn system of romanization of Japanese is used in this paper). However, because Clancy argued that other *wh*-words', such as 'which' and 'whose', appearance varies depending on the language, we decided to not include them. *Wh*-words such as *nanko* 'how many', *ikura*/*doredake* 'how much', and *donna/donoyouna* 'what kind of' were classified as different kinds and were not included in *dou* 'how' nor *nani* 'what' in this study.

The meanings of Japanese *wh*-words depend on the context in many cases. For example, *dochira* can mean 'which', 'who' or 'where' depending on the usage and the context. *Dochira* as used in (1) means 'which', 'who' in (2), and 'where' in (3) (note. COP means copula, INF means infinitive, VOL means volitional, DP means discourse particle and NPST means non-past, PLT means polite, DP means discourse particle).

(1) *Dochira ni shiyou kana*
(*dochira*.which COP.INF do.VOL DP)
'Which one should (I) get?'

(2) *Dochira sama desu ka*
(*dochira*.who SUFFIX COP.PLT.NPST DP.Q)
'Who are (you)?'

(3) *Dochira e o dekake desu ka*
(*dochira*.where to PLT go.out.INF COP.PLT.NPST DP.Q)
'Where (are) you going?'

Both (2) and (3) are polite ways to express *dare* 'who' and *doko* 'where'. In the same manner, *doushite* was counted depending on the context. *Doushite* usually means *naze* 'why' because *doushite* is used for requesting a reason. In some exceptional cases, *doushite* was counted as 'how' if *doushite* means the same as *douyatte 'how'*. Additionally, *nande* usually means 'why', but in the case such as (4) below, it was counted as 'what' because in this case from the context of the story, *nande* was a combination of *nani* and *de* which had phonetic change making it *nande*. Therefore, it was important to count *wh*-words within a given context.

(4) *demo nan-de koshiraerun desu kane*
(But what-with make.NPST COP.PLT.NPST DP.Q)
'but with what (should we) make?'

In the picture books which were used in this study, other usages of the *wh*-words were the polite form, impolite form, dialectal and older expressions. The polite form of 'how' is *ikaga* and 'who' is *donata* along with *dochira*. The impolite forms of 'who' are *nanimono* and *doitsu*. In Kansai dialect, 'how' can be expressed as *donai* and it is commonly known by Japanese public. Another rare case was *doko* and which has a phonetic change to *dokee* which means *'to where'* (dialectal speech). Older expressions were *nashite* and *nantoshite* meaning 'why.' Moreover, some Japanese *wh*-words such as *nani* 'what', *doko* 'where', *dare* 'who' and even *dou* 'how' can be omitted if the speaker or writer thinks listeners or readers understand the question by the context (i. e. shared understanding). In this research, those elliptical sentences without *wh*-words were not counted and only *wh*-words which appeared in the sentences were counted. As we can see in Table 1, there were many varieties of Japanese *wh*-words in the picture books.

Table 1: Japanese wh-word categories and token examples.

wh	words	examples
nani	what	*nani, naani, nan~, nani ~ ...*
doko	where	*doko, dochira* (polite)
dare	who	*dare, daare, donata* (pilite), *dochira* (polite), *nanimono* (impolite), *doitsu* (imploite)
dou	how	*dou, dou~, ikaga(polite), donai (dialect)*
naze	why	*nande, naze, doushite, dooshite, nandatte, nashite* (old), *nantoshite* (old)
itsu	when	*itsu*

For the corpus search, *wh*-words were only counted if they appeared in the picture book (i. e. 0 or 1) and were not counted as individual tokens in the books. As stated above, a total of 345 picture books were included in the corpus search. Therefore, 2,070 columns of data were collected from these texts.

2.3 Results

The results of the appearance of *wh*-words in each age group are shown in Table 2.

A decision tree analysis (a classification tree analysis) using the target age and *wh*-words as factors was conducted (IBM SPSS Statistics Version 22) using the chi-squared automatic interaction detector (CHAID) algorithm. In this analysis, if a factor is statistically significant, the line will branch and look like an

Table 2: The appearance of wh-words per age group.

target age	*nani* 'what'	*doko* 'where'	*dare* 'who'	*dou* 'how'	*naze* 'why'	*istu* 'when'	number of books
1	5	7	9	5	0	0	47
2	22	12	9	14	3	0	82
3	17	12	7	15	6	1	71
4	51	18	12	30	16	1	77
5	37	30	14	36	14	3	68

inverted tree. The strongest factors are displayed higher up in the tree, and non-significant factors are not shown (see Tamaoka et al. 2016 for the use of classification tree analyses applied for the Japanese language). The present decision tree was conducted in the way that appearance (0 or 1) is predicted by the independent factors of target-ages from 1 to 5 and six *wh*-words. Because target-age is the major focus, the target-age was specified as the first branch. The results of the decision tree analysis are shown below in Figure 2.

The risk of this decision tree analysis was 18.10, where risk is the percentage of possible errors made by decision tree analysis. This number indicates that 81.90% (100%–18.10%) of data were correctly classified in this analysis.

The highest order factor was set to be the target age as represented by the first split in the tree. When the target age of picture books was ages 4 or older, the appearance of *wh*-words was significantly higher than those of ages 1, 2 and 3. In the delineation of target ages 1, 2 and 3, *nani* 'what' appeared most often. This finding was followed by *doko* 'where', *dare* 'who', and *dou* 'how', which all came together with similar frequency. This finding was then followed by *naze* 'why' and lastly *itsu* 'when', which rarely appeared. In the delineation of target ages 4 and 5, *nani* 'what' appeared most often, then *dou* 'how' came second most often. These observations were followed by *doko* 'where'. Then *dare* 'who' and *naze* 'why' appeared together at approximately the same frequency. Again, *itsu* 'when' appeared as the least frequent. In the delineation of *doko* 'where', the percentage of appearance was significantly different between age 4 and age 5. Temporal questions, such as *nanji* 'what time', were not viewed in any of the books in this study. See Figures 3 below for the percentage of the *wh*-words appearance and a comparison with Clancy's (1989) findings (Order I).

Order I: Clancy (1989) and the result of first decision tree analysis

a. Utterances by children (Clancy) what = where < who < **how** = why < when
b. Picture books Age 1,2,3 what < where = who = **how** < why < when
Age 4,5 what < **how** < where < who = why < when

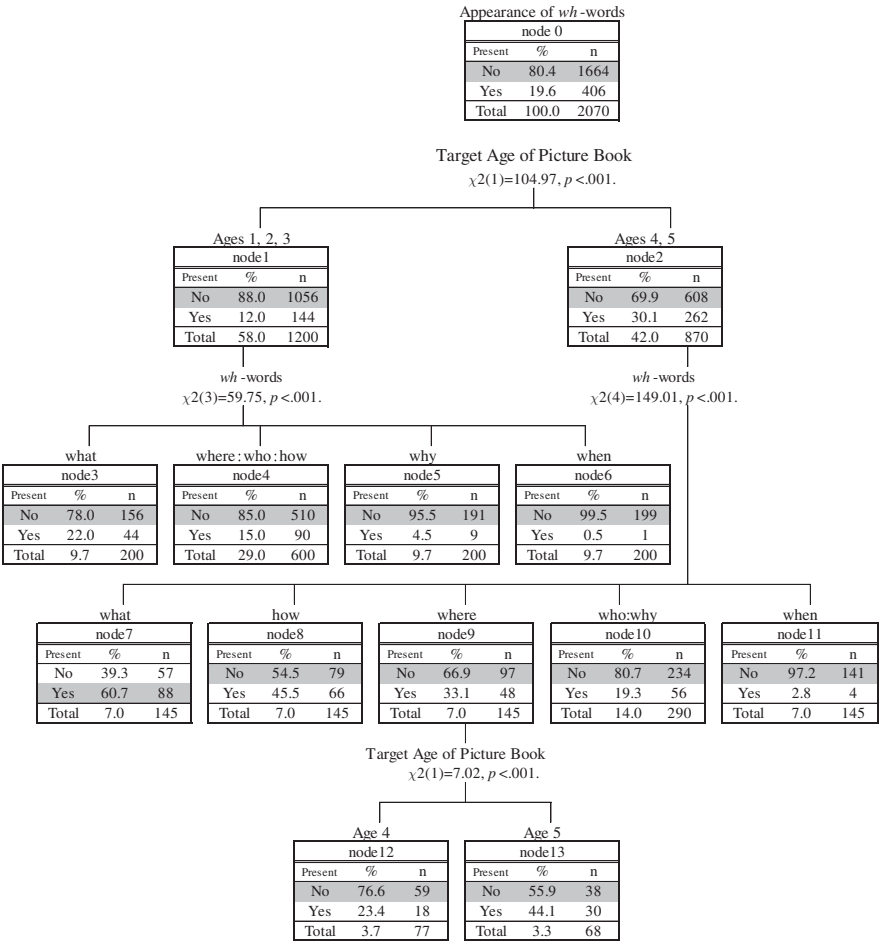

Figure 2: Decision tree analysis.

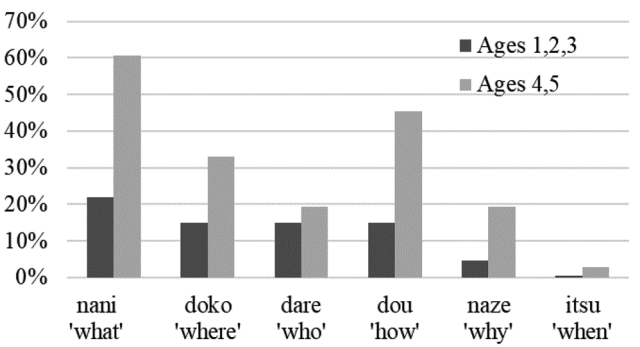

Figure 3: Graph of the appearance for *wh*-words.

When this order is compared with Clancy's order, *dou* meaning 'how' appears very often in this sample of Japanese picture books. However, the Japanese *dou* and English 'how' have different ranges of meaning, which might explain the difference in order. While the Japanese *nani* is nearly equivalent to English 'what', the Japanese *dou* can have both the meaning of 'what' or 'how', depending on the context. For instance, if one inquiries about the quantity or procedure of something, *dou* has an equivalent meaning to the English 'how'. However, *dou* could mean the English 'what' as in example (6) and 'how' and 'what' depending on the context as in example (7a) and (7b).

(6) *Dou* *omou*.
(*dou*.what think.NPST)
'What do (you) think?' / 'How do (you) think?' (lit.)

(7) *Dou* *suru*.
(*dou*.what/how do.NPST)

(7a) 'What should (we) do it?'

(7b) 'How should (we) do it?'

Other languages also have a different range of meaning for *wh*-words. For instance, Forner (1979: 27) noted that the English phrase 'What does the cow say?' is expressed as *Wie macht die Kuh*? in German, and the exact translation would be 'How makes the cow?'. While Clancy (1989: 325) also noted that, in Korean, *ettehkey* is usually translated into English as 'how', occasionally it could mean 'what' in English. For instance, *ettehkey twaysse* 'What happened then?' (lit. 'How did it become').

While Clancy's order was based upon the previous studies of many languages, those languages had a more one-to-one translation with that of the meanings in English than did Japanese. Accordingly, *dou* was recounted to also include the English meaning 'how'. Expressions meaning 'what' were included with *nani*. The second decision tree was conducted in the same manner as the first decision tree. The results of appearance of *wh*-words in each age group are shown below in Table 3, and the results of decision tree analysis are shown in Figure 4 below. The risk of this decision tree analysis was 15.60. This number indicates that 84.40% (100%–15.60%) of data were correctly classified in this analysis.

Again, the highest order factor was set to be the target age as represented by the first split in the tree. After the target age reached 4, appearances of *wh*-words

Table 3: Reanalyzed appearance of wh-words per age group.

target age	*nani* 'what'	*doko* 'where'	*dare* 'who'	*dou* 'how'	*naze* 'why'	*itsu* 'when'	number of books
1	10	7	9	1	0	0	47
2	25	12	9	7	3	0	82
3	26	12	7	4	6	1	71
4	56	18	12	16	16	1	77
5	47	30	14	17	14	3	68

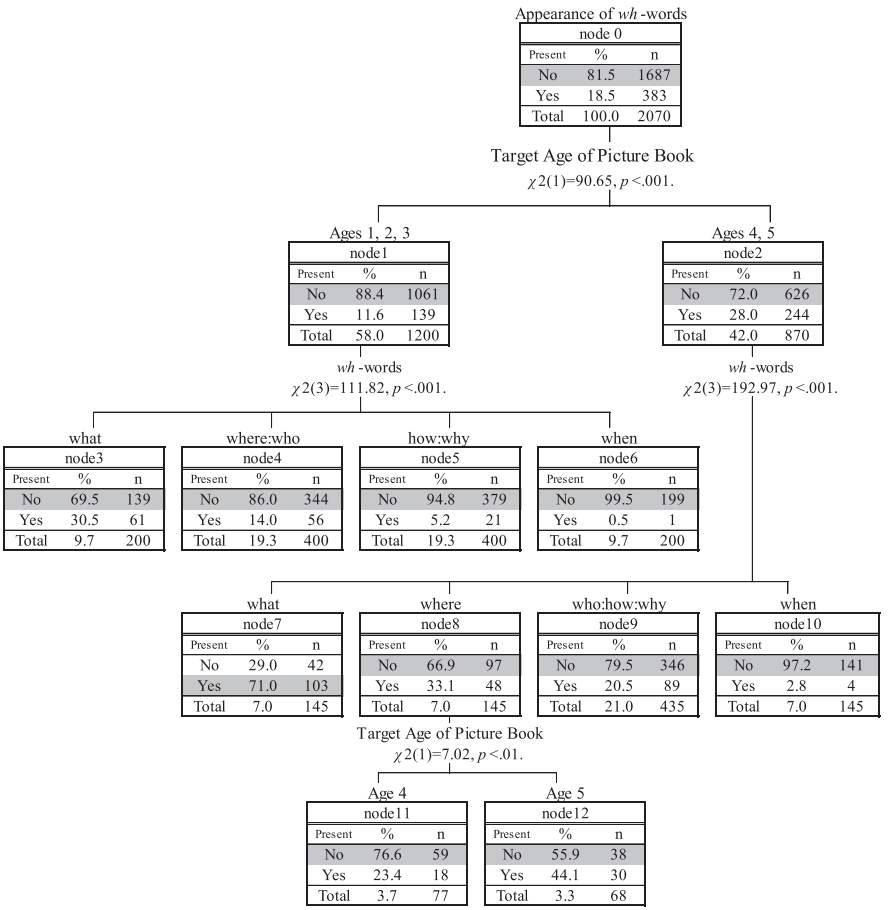

Figure 4: Reanalyzed decision tree analysis.

were significantly higher than those under 3. In the delineation of target ages 1, 2 and 3, *nani* 'what' appeared most often. This was followed by *doko* 'where' and *dare* 'who' which appeared at approximately the same rate. This observation was followed by *dou* 'how' and *naze* 'why', which also appeared at approximately the same rate, these were different from previous decision tree analysis. Again, *itsu* 'when' rarely appeared. In the delineation of target ages 4 and 5, the results changed. This time, *nani* 'what' appeared most often as it did previously. This occurrence was then followed by *doko* 'where' then *dare* 'who', *naze* 'why', and *dou* 'how', which all appeared at approximately the same frequency. Again, *itsu* 'when' had the lowest frequency. The graph of results for the second decision tree analysis is shown in Figure 5 below.

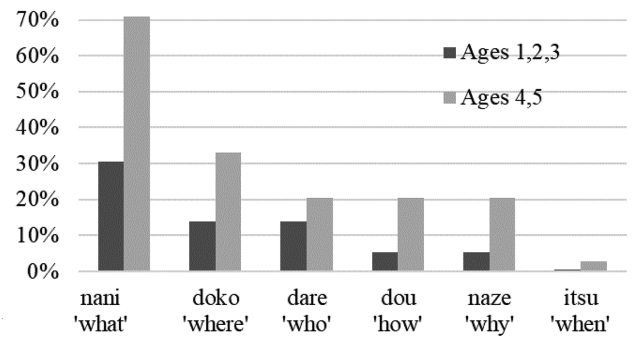

Figure 5: Graph of the reanalyzed appearance for *wh*-words.

Order II: Clancy (1989) and result of second decision tree analysis

a. Utterances by children (Clancy) what = where < who < **how** = why < when
b. Picture books Age 1,2,3 what < where = who < **how** = why < when
Age 4,5 what < where < who = **how** = why < when

Overall, although the result is not exactly the same as the *wh*-acquisition order proposed by Clancy (1989), the order of *wh*-words in the second analysis appeared similar to it. The ordering position of *dou* 'how' has changed (see Order I and Order II).

3 Post-hoc analysis

In the present study, because *wh*-words include some form of polite, impolite, dialectal, old expressions, a post-hoc analysis was conducted for *wh*-words in

picture books. Only basic *wh*-words were coded as 0, whereas other wh-words' forms (polite, impolite, dialectal, old expressions) were coded as 1 to determine any age difference effects. In the post-hoc decision tree was conducted in the way that appearance of basic and non-basic *wh*-words (0 or 1) is predicted by the independent factors of target-ages from 1 to 5.

The result of this analysis is shown in Figure 6. Picture books with target age under 2 differed significantly with those for 3 or above. Only 0.8% of the picture books with target ages under 2 had non basic *wh*-words, while for those above Age 3 appeared in 8.8% of the books. The risk of this post-hoc decision tree analysis was 5.80. This number indicates that 94.20% (100% −5.80%) of data were correctly classified in this analysis.

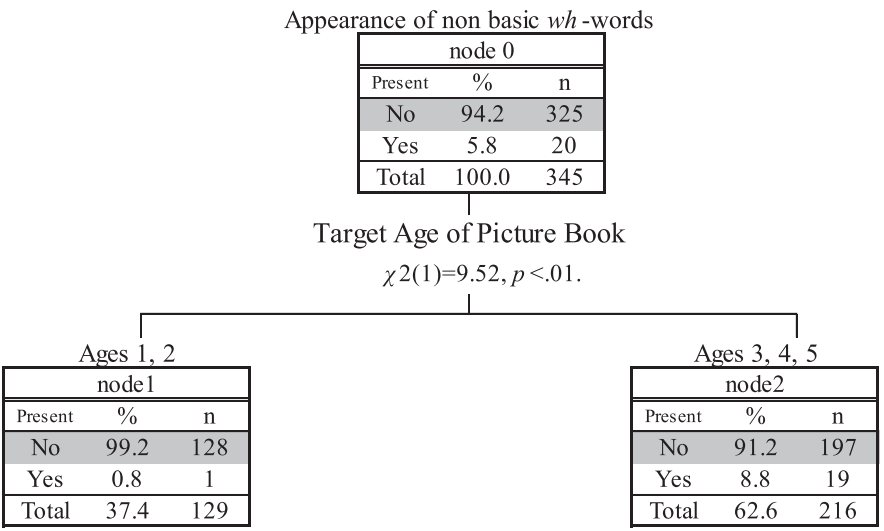

Figure 6: Post-hoc analysis of appearance for non-basic Japanese *wh*-words.

As such, children older than 3 are exposed to a greater variety of Japanese *wh*-words and their usages and they might begin to acquire these non-basic *wh*-words and usages around this time.

4 Discussion

W*h*-words in Japanese picture books with different target ages were analyzed to determine whether they reflect adults' assumption of children's cognitive

development. By classifying *wh*-words, it was seen that there were considerable variations among the kinds of the words, such as, polite, impolite, dialectal and old *wh*-word usages. From the post-hoc -analysis (Figure 6), picture books targeting children older than age 3 contained a great variety of these non-basic Japanese *wh*-words.

From the first decision tree analysis (Figure 2), the frequency order of *wh*-words in picture books with target ages 1, 2, and 3 was *nani* 'what' < *doko* 'where' = *dare* 'who' = *dou* 'how' < *naze* 'why' < *itsu* 'when'. In picture books with target ages 4 and 5, the frequency order was *nani* 'what' < *dou* 'how' < *doko* 'where' < *dare* 'who' = *naze* 'why' < *itsu* 'when'; this was somewhat similar to Clancy's order, except with *dou* 'how'. One explanation might be that *dou* has a different range of meaning in Japanese than in English. As such, *dou* was reanalyzed in accordance with the English *wh*-words 'what' and 'how'. From the second decision tree analysis, the frequency order of *wh*-words in picture books with target ages 1, 2, and 3 was what < where = who < how = why < when. In picture books with target ages 4 and 5, the frequency order was what < where < who = how = why < when. From the result of the second analysis, even though *nani* 'what' always appeared more than *doko* 'where' as with the fist analysis, *dare* 'who' appeared at the same frequency as *doko* 'where' for ages 1,2,3, and *dare* 'who' appeared at the same frequency as *dou* 'how' and *naze* 'why' in age 4 and 5, the re-analysis resulted in an order more similar to that of Clancy's.

This study suggests that external social factors, such as picture books, must match with the developmental order of *wh*-questions, and in turn, this order might reflect adults' assumption of children's cognitive development. In accordance with Rowland et al. (2003), the parental frequency and the order of *wh*-questions relate to acquisition. However, as Forner (1979) claimed, the child's cognitive development is influencing the mother's order of using *wh*-questions. In accordance with these premises, we agree with Slobin (1973) that cognitive development and linguistic complexity are interrelated factors for the general language development of the child. Specifically, as a child develops, their higher cognitive abilities allow for the form-to-meaning mapping of more complex grammar. Consequently, it is important for parents (or caregivers) to modify their output based upon the continuous assessment of their child's cognitive development. Thus, parents should be able to better activate their child's language development.

If we assume that children's *wh*-acquisition order reflects children's cognitive ability, it is interesting that picture books with different target ages were also similar to children's cognitive development. Specifically, the *wh*-words in picture books for different ages were found to order from concrete to abstract. Interestingly, 'when' questions appeared very late and were very rare. As such,

understanding time might be cognitively challenging to younger children. For instance, Hudson and Mayhew (2011) note that there is a general pattern for the learning of temporal expressions, and their meanings with younger children are only capable of being understood when using basic temporal terms (e. g. yesterday, tomorrow and today) and are not capable of being understood with more complex cyclical temporal expressions.

Because caregivers, the authors of the picture books and the publishers might unconsciously notice the difficulty children have with certain temporal expressions; thus, they may not ask 'when' questions to younger children. In turn, children receive fewer inputs for 'when' questions, which might also delay the usage of these questions by children as well. As such, this possibility might be one example of a publisher or picture-book author assuming/perceiving what may be cognitively demanding for children of younger ages, which then influences the child's order.

While this study is able to make a specific claim that picture books mirror the order of acquisition for *wh*-words by children in Japanese, we also suggest that the order found in picture books might also influence the caregiver but with a lesser degree of certainty as we did not investigate this directly. However, in accordance with our assumptions, while caregivers are influenced directly from their own assumptions of the child's cognitive state (Forner 1979), they may also be indirectly influenced by this via picture books. Specifically, because authors and publishers must also assume the cognitive differences between children of varying ages to determine appropriate age ranges for their books, caregivers are exposed to the language used in the picture books during story-time (i. e. the sequential order of introduction). Accordingly, this finding may reinforce caregivers' inclinations regarding what language should be used for children at certain developmental stages. While this study only investigates certain *wh*-words in picture books, language complexity may also not be independent from cognitive assumptions. The publishers, authors of picture books and caregivers might also adjust language or grammatical complexity depending on the developmental stages of children. However, there is disagreement regarding whether grammatical complexity is affecting the developmental order of *wh*-questions. For instance, Rowland et al. (2003: 629) claimed that input frequency is a more powerful factor for influencing children's *wh*-developmental order, and *wh*-complexity and verb semantic generality (see Bloom et al. 1982) were not significant determinants. In addition, Forner (1979: 42) stated that "children produce what mothers say in the same relative order and with the same relative frequency. Neither the adult language, chance, or grammatical complexity could account for this relationship." Conversely, Bloom et al. (1982) stated that the syntactic functions of *wh*-questions, verb semantic generality and discourse

context are affecting the developmental sequence of *wh*-questions. Because this study only investigated *wh*-words in the picture books and did not investigate in detail language complexity for each *wh*-question, these aspects might be worthy of being investigated in future studies detailing language acquisition from picture books. For example, language complexity, whether it is syntax, semantics or both, might influence the determination of target ages of picture books as well.

Moreover, because this study only investigated Japanese picture books, future research in other languages is needed to confirm the general pattern of results found here supporting Clancy's order. It would be particularly interesting to investigate languages that have different ranges of meaning from English.

Another possible issue is the grouping of target ages in the decision tree analyses. For both, the analyses divided the target ages into two groups (i. e. the target ages 1, 2, 3 and 4, 5) instead of five individual separate target age groups. It goes without saying that the children's cognitive level of 1;0 and 3;0 should be very different as it can be seen in past studies focusing on the developmental sequence of *wh*-questions which found significant gains by the children within few years (e. g. Bloom et al. 1982; Okubo 1967; Tyack and Ingram 1977; Wode 1971). However, in this analysis, the differences of the appearance for *wh*-words were not significantly different between the target ages 1, 2, 3 and age 4, 5. A simple explanation for this is that the target ages are usually classified as "ages 3 to 5" or "ages 4 and above"; however, we classified the former as "age 3" and the later as "age 4." Therefore, there is possible overlapping of ages among our selected target ages. Moreover, as we asked the publisher, the target age is an approximate indicator. Accordingly, this finding might explain why in our study only two age groups were observed in each decision tree analysis, although the cognitive level of children should be somewhat different among the children within each age group. At the very least, the results also imply that, despite these overlapping ages, after the target age of 4, the appearance of *wh*-words in the picture books are significantly different than those under age 3.

Because it is understood that many children are read picture books by caregivers, (i. e. not only parents but also teachers at day care, preschool and kindergarten), the frequency of *wh*-words in picture books might also affect the language development of children. Thus, many factors appear to be interrelated, which influences *wh*-acquisition order, and external social sources, such as picture books, appear to be one of these factors. Therefore, in Forner's model (1979: 41), external social factors that affect the caregiver's order should be added. However, these external social factors should be included such that they are also affected by the children's cognitive development. This inclusion would allow influence from the child's cognitive development directly to a caregiver and indirectly from external sources. Additionally, Forner's model

includes the term "cumulative semantic complexity"; however, as we discussed here, it might not only be semantic complexity but also syntactic complexity. Therefore, "cumulative language complexity" might be a better means to express this term (and warrants investigation describing which factors comprise it). In conclusion, external social sources, such as picture books, should be considered factors that influence *wh*-development.

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