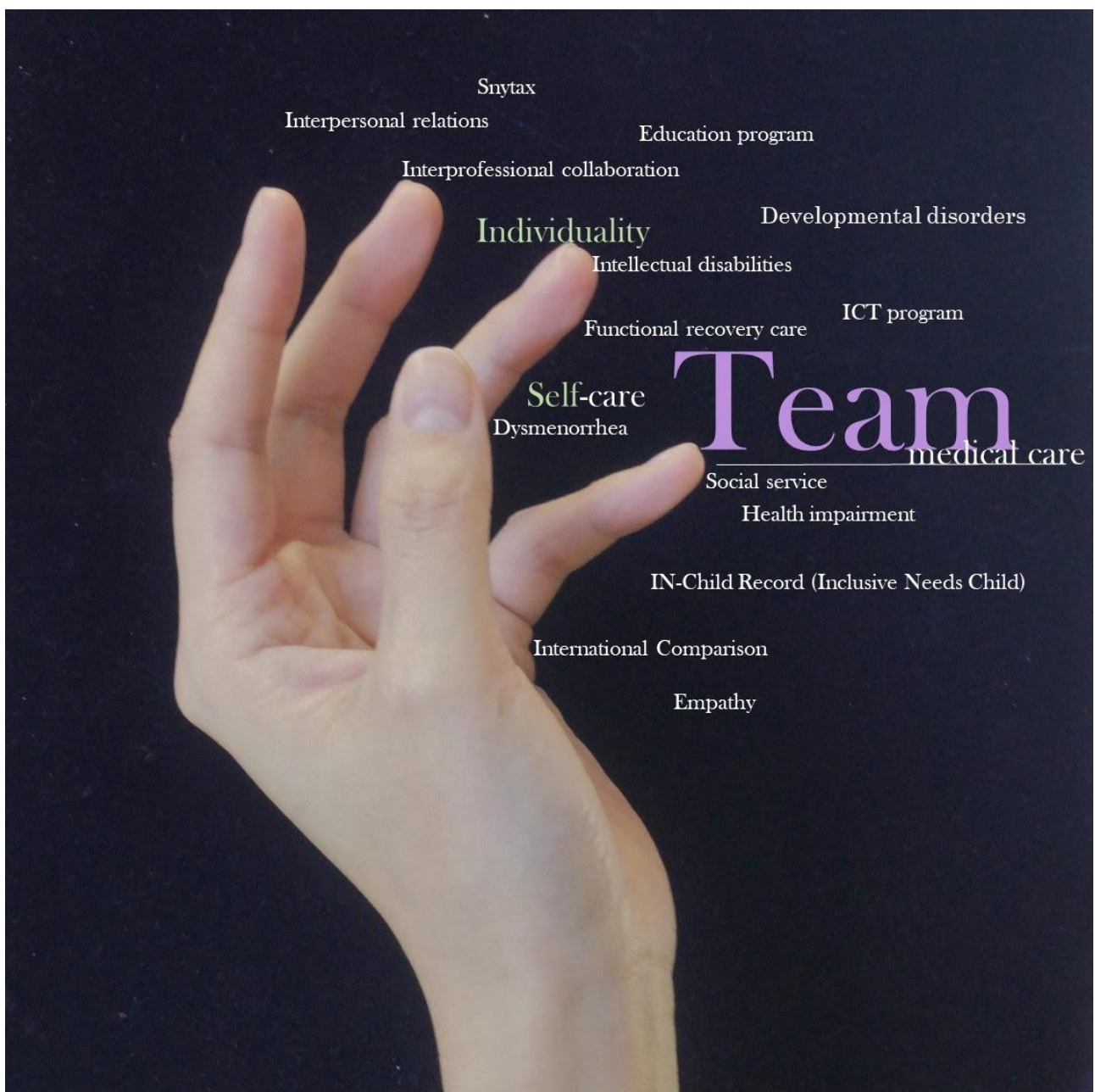


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REVIEW ARTICLE

Review of Studies on Syntactic Development in Children and Adults with Intellectual and Developmental Disorders: Comparing Japanese and International Studies

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ABSTRACT

It is known that people with intellectual and developmental disorders (IDD) have more deficits in syntactic than other linguistic abilities. However, only a few studies on the syntactic development of people with IDD have been conducted in Japan. As a result, basic studies, accumulated data and the development of assessment methods have been deficient in Japan compared to other countries. This review compared international research findings with studies conducted in Japan. The results indicated that various factors affect the acquisition of syntactic knowledge, including the type of disability and the educational environment, which have not been sufficiently investigated. Based on the results, we have discussed the need to conduct future studies in Japan. It is suggested that future studies need to undertake the following tasks. (1) Developing scales for assessing language development to objectively and comprehensively evaluate syntactic development. (2) Investigating factors affecting syntactic development in people with IDD from perspectives other than the mental age (MA) and intelligence quotient (IQ), including the type of disability, life experience, and cognitive development, among others. (3) Investigate syntactic development in IDD people based on their stage of development, i.e., before or after acquiring grammar.

<Key-words>

intellectual disabilities, syntax, language development, language disorder

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I. Introduction

People that understand Japanese can at least comprehend “content words” and “function words” (Teramura, 1982) and they can interact using the spoken language in daily conversational settings based on this understanding. In the Japanese language, postpositional particles, which are one type of function words, play a critical role in refining sentences and improving listeners and readers comprehension (Saito, 2001; Yokoyama, 2008).

Language development and communication in children with IDD show delays in comprehending and expressing different language components, such as phonemes, syntax, morphemes, meanings, and pragmatics, among others, which is caused by a delay in the development of symbolic functions (Ishida, 2010; Otomo, 2001). The syntactic development of IDD children shows especially significant delays than would be expected based on MA and mean length of utterances (MLU). Moreover, IDD children compared to typically developing (TD) children with the same level of MA and MLU have significantly lower scores for morphologically and syntactically complex skills, such as understanding function words and passive sentences (Ito, 1998; Rondal, 1995).

Delays in syntactic development are expected to result in difficulties in understanding others’ referential intentions and feeling, as well as discrepancies in communication between speakers and listeners. These may cause problem behaviors and difficulties in social participation. Abe & Kuribayashi (2010) investigated communication conditions between children with intellectual disabilities as well as developmental disorders and day-care staff. They suggested that poor communication between staff and children resulting from the communication methods used by staff that was unsuitable for these children caused problem behaviors in children. Therefore, it is important to obtain data on effective methods of teaching languages to people with IDD and to support them effectively.

There are fewer studies on the syntactic development of people with IDD conducted in Japan compared to other countries. Therefore, this study examined the findings of previous studies conducted in other countries, where many basic studies have been undertaken, data accumulated, and different scales for assessing language development have been developed. Moreover, studies conducted in other countries were compared with the findings of Japanese studies. Based on the results, future research needs of Japan are discussed. Additionally, the research on the syntactic development of people with IDD is discussed.

II. Method

1. Data collection method

We searched PubMed, ERIC, CiNii, and J-STAGE, with the keywords “intellectual

disabilities/syntax,” “intellectual disabilities/sentence structure,” and “intellectual disabilities/postpositional particles.” As a result, 20 articles were obtained from PubMed, 126 from ERIC, 22 from CiNii and 183 from J-STAGE, a total of 351 articles (the last search date was July 31, 2018) among which 146 were written in English and 205 in Japanese.

Articles investigating Autism Spectrum Disorders (ASD), Down Syndrome (DS), and Williams Syndrome (WS) were also searched by the same procedures, and 194 articles on ASD (165 in English, 29 in Japanese), 337 on DS (150 in English, 187 in Japanese), and 90 on WS (82 in English, 8 in Japanese), a total of 621 articles were obtained among which 972 (351 + 621) were on people with intellectual and developmental disorders. Moreover, documents were identified from reference lists. Consequently, 66 (34 in English, 32 in Japanese) articles were extracted for the study.

2. Inclusions and exclusions criteria

Studies were included in this review if they met the following criteria: (1) The subject were children or adults with intellectual or developmental disorders; (2) Studies were on syntactic development; (3) Articles were in English or Japanese. On the other hand, articles were excluded if (1) The subject were not children or adults with intellectual or developmental disorder.; (2) Did not include studies on syntactic development; and (3) Articles were not written in English or Japanese.

III. Findings of international studies

1. Language development scales for evaluating syntactic functions

Different indices and standardized tests have been developed in countries outside Japan for comprehensively assessing syntactic development. Moreover, researchers have been used these tests and indices to examine people with IDD and classify them according to disability types including ASD, DS, and WS (Channell, McDuffie, Bullard, et al., 2015; Chapman, Schwartz & Kay-Raining, 1991; Karmiloff-Smith, Grant, Berthoud, et al., 1997; Volterra, Capirci, Pezzini, et al., 1996). Of these, the Test for Reception of Grammar-2 (TROG-2; Bishop, 2003) has been used in six studies. Auditory abilities for syntactic comprehension can be simply evaluated by using TROG-2, which allows participants to choose a picture they consider to be the most appropriate for representing a word or a sentence that was verbally indicated by an examiner. Moreover, MLU (Brown, 1973), which is an essential index for assessing expressive aspects of language has been standardized for English-speaking countries. MLU has been used in nine studies. The developmental age (DA) of the respondent can be estimated by MLU values. In Japan, however, MLU has been inadequately standardized because there are different opinions about the division of grammatical morphemes (Otomo, 2010). Many other scales for assessing language development have been used overseas, including the Test for Auditory

Comprehension of Language-4 (TACL-4; Carrow-Woolfolk, 2014), Goldman Fristoe Test of Articulation-3 (GFTA-3; Goldman & Fristoe, 2015), and Clinical Evaluation of Language Fundamentals-Preschool-2 (CELF-P2; Wiig, Secord & Semel, 2004), among others.

In Japan, attempts have been made to develop scales to assess language development by evaluating syntactic aspects of language (Miyata, Otomo & Nishizawa, 2004; Saito, 2002; 2003). However, only two standardized tests have been developed in Japan to date: J. COSS (Nakagawa, Koyama & Suga, 2010) and the Syntactic Processing Test for Children-Revised (STC; Fujita & Miyake; 2016). In addition, the LC scale, LCSA (Otomo, Hayashi, Hashimoto, et al., 2013; 2012), S-S Test (Kodera, Kurai & Satake, 1998), and the Syntactic Processing Test of Aphasia-Revised (STA; Fujita & Miyake; 2000) that have been developed in Japan also include items for assessing syntactic aspects of language. However, these scales can only evaluate some grammatical abilities, and not overall grammatical abilities. Furthermore, the LC scale mainly assesses syntactic comprehension, whereas the LCSA assesses syntactic comprehension from the perspective of syntax/pragmatics, and the use of postpositional particles, auxiliary verbs, and conjunctions. Other tests, such as the S-S Test evaluate the expression of lexical bundles, whereas the STA assesses sentence structures based on the conjugation of verbs.

2. Studies on types of disabilities

1) Syntactic development of people with ASD

It has been suggested that children with ASD face problems in syntactic aspects of language including the use of the perfect tense and passive sentences. (Ricks & Wing, 1975; Pierce & Bartolucci, 1977; Tager-Flusberg, 1981). Tager-Flusberg (1981) stated that “ASD children’s active and passive, biased and reversible sentence comprehension is lower than in TD children matched for Vocabulary Age (VA).” Moreover, Perovic, Modyanova, & Wexler (2013) indicated that comprehension of reflexive pronouns, such as “Bart’s dad is touching himself,” in ASD children was significantly lower than in TD children with similar nonverbal IQ and grammatical comprehension. Also, it is generally considered that ASD children cannot utter grammatically complex sentences (Capps, Losh & Thurber, 2000; Eigsti, Bennetto & Dadlani, 2007). Eigsti, Bennetto, & Dadlani (2007) suggested that “syntactic delays in autism might reflect conceptual, rather than grammatical delays.” Furthermore, ASD children compared to TD children make more mistakes in using grammatical morphemes, including the use of the third person singular and the past tense. ASD children also make unique mistakes, such as omissions or echolalia (Roberts, Rice & Tager-Flusberg, 2004). Additionally, it has been reported that even people with ASD having a normal level of intellectual functioning have low complex syntax scores (Durrleman, Hippolyte, Zufferey, et al., 2015; Rama & Lisa, 2016).

2) Syntactic development of people with DS

The vocabulary and syntactic development of children with DS proceeds in parallel with their cognitive development, whereas the development of semantic aspects of language is age dependent (Chapman, Schwartz & Kay-Raining, 1991; Miller, 1988). On the other hand, semantic and syntactic expressions of DS people are significantly delayed compared to their cognitive development (Chapman, Seung, Schwartz, et al., 1998; Finestack & Abbeduto, 2010). The development of syntax in DS children is not only late compared to TD children, but it also does not show the expected development pattern relative to the development of vocabulary. Moreover, DS children have severe deficits in syntactic development of (Miller, 1988). Channell, McDuffie, Bullard, et al. (2015) reported that “people with DS were less likely to use adverbs and verbs in their stories than their cognitively matched TD peers,” suggesting the possibility of a “specific weakness in phonological memory” and “a difficulty in abstract learning,” which might affect the acquisition of verbs.

Different studies conducted in outside Japan have focused on grammatical morphemes. These studies have indicated that DS people have more morphological/syntactic deficits than deficits in vocabulary and pragmatics (Atake & Ito, 2012; Miles & Chapman, 2002; Ring & Clahsen, 2005; Stathopoulou & Clahsen, 2010). For example, Buckley (1999) reported that DS children tend to omit grammatical morphemes, such as articles, be-verbs, pronouns, and prepositions. Eadie, Fey, Douglas, et al. (2002) analyzed utterances of DS children in play settings and compared their expression of grammatical morphemes with MLU matched TD children. They demonstrated a difference in language acquisition based on the type of grammatical morpheme; such that the expression of regular past tense and the third person singular was less common in DS compared to TD children, whereas no differences were found in the expression of the irregular past tense.

3) Syntactic development of people with WS

Language development of children with WS is looks more optimistic than their cognitive development. For example, the vocabulary development of children with WS is generally extremely positive (Bellugi, Lichtenberger, Jones, et al., 2000), because their comprehension and production of syntax is intact, and the comprehension of passive/conditional sentences is good (Bellugi, Bihrlé, Jernigan, et al., 1990; Bellugi, Wang & Jernigan, 1994; Osborne & Mervis, 2007). On the other hand, Volterra, Capirci, Pezzini, et al. (1996) compared WS children and TD children of matched MA using the Peabody Picture Vocabulary Test (PPVT) and TROG. This study indicated that WS children “look similar to normal controls in lexical comprehension, but they appear to perform more poorly in grammatical comprehension.” Moreover, comprehension levels of passive sentences in WS children were significantly lower than in TD children (Perovic & Wexler, 2010). Furthermore, WS children were poor at comprehending and using grammatical morphemes (Karmiloff-Smith, Grant, Berthoud, et al., 1997; Eliseo,

Verónica, Maite, et al., 2017). These findings were different from those of Bellugi, et al. However, it is generally known that people with WS have good verbal short-term memory (Mervis, Robinson, Bertrand, et al., 2000) and TROG-2 results could be related to the good verbal short-term memory of WS (Mervis & John, 2010; Robinson, Mervis & Robinson, 2003). Therefore, it is possible that the above-described differences are the result of verbal short-term memory of people with WS

IV. Research conducted in Japan

Studies reported in Japanese were searched and identified using CiNii and J-STAGE based on the types of disability that was investigated in each study. We could find no studies related to WS. Therefore, research conducted in Japan on IDD, ASD, and DS are described.

1. Syntactic development of people with IDD

Matsumoto (1989) examined sentence comprehension strategies of IDD people using the movement method, which consists of moving an object by listening to a sentence, and the picture card selection method. The results indicated that more participants used probability strategies when using the movement method, although visual clues were also used in both procedures, suggesting that information processing process differed between the two techniques. The study by Matsumoto (1989) highlights difficulties in analyzing data on language comprehension. Moreover, Matsumoto (1993) indicated that IDD people using probability strategies had lower digit span scores than those using lexical-ordering strategies or case-particle strategies, suggesting that working memory plays an important role in sentence comprehension. Furthermore, there were no differences in digit span scores between participants using lexical-ordering strategies and case-particle strategies. However, the former needs a larger working memory capacity (Matsumoto, 1999; 1993). Matsumoto (1999) discussed this issue and suggested that participants using case-particle strategies had acquired “patterns of mental sentences” (Matsumoto & Furutsuka, 1994) and did not need to memorize each case particle, thereby possibly reducing working memory load.

Takeo & Ito (2014) examined the comprehension of passive sentences in IDD children by classifying passive sentences into direct or indirect sentences. Indirect sentences has the nuance that a subject had suffered some damage or inconvenience, whereas the indirect sentences do not have this nuance. The results of the classification indicated significantly lower indirect passive sentence scores in IDD children suggesting difficulties in comprehending the meaning of such sentences, which is indicative of some damage or inconvenience, whereas syntactic complexity might not have affected their comprehension.

Kishaba (1998a) suggested that the three active sentence comprehension strategies;

semantic, lexical-ordering, and postpositional particle strategies, might be acquired during the preoperational period, which is one cognitive developmental stage suggested by Piaget. On the other hand, children would have to reach the concrete operational period and acquire decentration in order to comprehend passive sentences.

Ooki & Ikeda (1985) reported on the acquisition of two-word utterances by IDD children. TD children mainly focus and talk about human actions from an early age, whereas IDD children often tend to speak about things other than people, possibly because they have difficulties in abstracting the actions of other people and abstracting people. On the other hand, Ooki & Ikeda (1985) advocated that the abridged consciousness of own and others actions, delays in the abstraction of own and others actions, as well as difficulties in distinguishing the self and others as “actors,” among other reasons, could be more important explanations of language delays of IDD children. Moreover, Ike (1979) examined the process of acquiring postpositional particles by IDD children and suggested that the low abstraction abilities of IDD children might cause a delay in the acquisition of postpositional particles. It is possible that cognitive development including the development of interest in and attention to surrounding objects and sounds could play a more important role in development. It is also known that cognitive development is related to language acquisition during the early period (Amano & Seto, 1985; Ogura, 2006; 1999) and that IDD children have significant delays in cognitive development. As a result, cognitive foundations of IDD children might be insufficient, resulting in the problems discussed above. Therefore, in addition to developing an understanding of vocabulary, it would be important to improve nonverbal cognitive abilities that are essential for language acquisition.

Also, individual differences in the syntactic development of IDD children have been reported. Miyata, Otomo, & Nishizawa (2004) suggested that MA and DA assessed by developmental tests might not always reflect the level of linguistic expression. For example, an IDD child with the psycholinguistic age (PLA) and DA levels lower than a three-year-old child who nevertheless had better grammatical abilities than an IDD child with the PLA/DA level of a three-year-old child has been reported. Furthermore, Kishaba (1998b) investigated an IDD child that could comprehend “GA” and “O” case particles in Japanese and could process reversible sentences by using these case particles. This suggested that IDD children using case-particle strategies might not always comprehend and use “GA” and “O.”

2. Syntactic development of people with ASD

Nakagawa, Matsumoto, & Ito (2013) compared syntactic knowledge of active/passive sentences in ASD children with intellectual disabilities and TD children. They reported that the correct response rate of ASD children was significantly lower than TD children with the identical vocabulary age (VA). Moreover, the correct response rate for passive sentences was significantly lower than for active sentences in both groups. These

findings suggesting that ASD children have more deficits related to passive sentences than TD children corroborate Kumagai (1986) and Tager-Flusberg (1981), and support the idea that ASD children have difficulties in comprehending passive sentences. Nakagawa, Matsumoto & Ito (2013) suggested that the above findings could have resulted because of (1) difficulties in acquiring sentences with changes in verb forms according to case changes, (2) not acquiring knowledge of sentences including changes in noun phrases, and (3) congenital difficulties in changing the perspective, among others. Moreover, they suggested that the low correct response rate for active/passive sentence comprehension tasks in ASD children with intellectual disabilities could not be explained by VA, and that characteristics of syntactic difficulties were different for different people. Kumagai (1985) suggested that ASD children often made reversals of the subject and misused postpositional particles. For example, when seeing a picture expressing “*kuma ga hachi ni hitosashiyubi wo sasareta* (a bear was stung by a bee on the index finger),” they constructed the following sentences: “*kuma ga hachi ni hitosashiyubi wo sashiteiru*” or “*kuma ga hachi wo sasareta*.”

3. Syntactic development of people with DS

There is only one report on the syntactic comprehension of people with DS (Saito, 2002). Saito (2002) reported that DS children had a significant delay in acquiring grammatical comprehension morphemes and suggested that the comprehension of case particles and the voice might be rarely acquired before the MA of eight years.

Ayuzawa & Ikeda (1993) investigated the development of sentence structures in utterances made by school-aged DS children. The total number of sentences expressed by DS children was smaller than IDD children without DS having the same VA. Even when VA increased, they less often used complex sentences. Ayuzawa & Ikeda (1993) suggested the necessity to examine the specificity of cognitive processes in these children, and especially the correlations with serial processing. Issues related to serial processing were also examined by Tanaka (1985) and Hartley (1982). According to Tanaka (1985), speech acts of IDD children using picture cards indicate difficulties in understanding the picture content, i.e., forming the intention for making utterances, which requires simultaneous processing. Moreover, they have difficulties in connecting words in the order of the utterance, which requires serial processing, as well as forming/developing linear diagrams of sentences, which requires serial aspects of language. Ike, Saito & Kobayashi (1978) also reported similar characteristics in IDD children.

Watamaki (1999) reported on the development of postpositional particles in DS children and suggested that it was consistent with the order of acquisition in a TD child (Okubo, 1978). Moreover, the developmental order of postpositional particles/auxiliary verbs in DS children was identical to TD children. On the other hand, Saito (2002, 2003) suggested that the expression of case particles in DS children was significantly delayed compared to TD children. Moreover, that acquisition of case particles was unstable, and it

was difficult for them to acquire case particles before the MA of 7-8 years. Rikura & Kuroda (1989) also reported similar findings that the acquisition of postpositional particles in DS adults was delayed compared to people with developmental retardation with the identical MA. They acquired only “DE” between the MA of five years and three months of age and that of six years and three months of age. Furthermore, DS children first acquired sentence-ending particles and then acquired case particles. They had a strong orientation towards issues related to interpersonal meanings during the early stage of grammatical acquisition (Watamaki, 1999). The use of sentence-ending particles in IDD children tends to progress further than TD children with the same MA (Ike, Saito & Kobayashi, 1978). On the other hand, it is difficult for ASD children to use the sentence-ending particle “NE” (Satake & Kobayashi, 1987; Watamaki, 1997). It is generally considered that one of the characteristics of DS people is the development of proper sociality (Martin, Klusek, Estigarribia, et al., 2009; Mundy, Sigman, Kasari, et al., 1988), which might lead to the ease of acquiring sentence-ending particles. On the other hand, ASD people have problems in the development of sociality, which might be reflected in the acquisition of sentence-ending particles. Acquisition of sentence-ending particles is considered to have a strong correlation with sociality development.

Not only the extent of the acquired vocabulary but also functions of acquired words are important for expressing sentences (Saito, 1988; 1989). Single-word expressions have three functions; (1) a demanding function, e.g., “Manma,” expressing “I want to eat,” (2) an emotional function, e.g., words accompanying actions and words expressing emotions or intentions, and (3) a display function, e.g., naming things and describing actions and conditions. Saito (1988) considered that the display function had a high possibility of developing into sentences, whereas the emotional function had a low possibility. Saito (1989) suggested that single-word expressions of DS compared to TD children include more words having emotional functions that may not lead to constructing sentences. Therefore, it is possible that syntactic development is affected by the functions of acquired words.

V. Future Research Needs of Japan

1. Assessment

Different scales on language development have been developed internationally to evaluate syntactic aspects of language. These include TROG-2, the Test for Auditory Comprehension of Language Fourth Edition (TACL-4), and MLU, among others. In Japan, on the other hand, the total number of studies on teaching, supporting, and evaluating syntactic aspects of language is small (Enomoto & Shimada, 2002; Oshiro, 2014). Moreover, effective methods of teaching, supporting, and evaluating syntactic development has not been established in Japan. Furthermore, there are only a few standardized scales for assessing language development. In addition, the existing

Japanese language development tests include items for assessing syntactic aspects of language, however, they cannot accurately and comprehensively evaluate grammatical abilities. Furthermore, as suggested by Matsumoto (2004), task sentences used as stimuli and assessment items differ in different fields of research, making it difficult to compare among different fields.

J. COSS, which was developed by referring to the Test for Reception of Grammar (TROG; Bishop, 1989) was recently published in Japan. It has enabled us to evaluate general grammatical comprehension abilities in the Japanese language. Children having hearing impairments, pervasive developmental disorders, and ASD have been analyzed by using J.COSS and the results have been discussed (Nakagawa, 2010; Nakagawa & Koyama, 2013; Nakagawa, Takei & Koyama, 2013). However, no studies have been conducted on IDD people. Therefore, it is necessary to examine the appropriateness of J.COSS for IDD people in the future.

There is also a need to develop scales for objectively and comprehensively measuring the language development of IDD children in Japan from the perspective of syntactic development. Moreover, comparison with TD children should be conducted by using these scales to investigate the characteristics of language development of IDD children. However, there are different types of grammar in the Japanese language. Therefore, the language can be understood even if the word order or grammar are not used correctly. As a result, there is a need to define grammatical abilities required in daily conversational settings before developing scales for assessing language development.

2. Factors affecting the syntactic development of IDD children

Different studies conducted from the perspective disability types have been reported internationally. In Japan, on the other hand, there are fewer studies on disability types. These include four ASD related studies and seven DS related studies, whereas no WS related studies have been reported. Moreover, Japanese studies dealing with IDD people include participants with other disabilities, such as DS and ASD, among others. Therefore, the syntactic development of IDD people has not been sufficiently investigated in Japan to date.

Previous studies have indicated that ASD children have difficulties in comprehending personal pronouns and passive sentences, as well as using sentence-ending particles, which might be caused by characteristics of ASD, including difficulties in changing the perspective (Okuda & Inoue, 2002) and problems in sociability. It has been suggested that DS children have deficits in auditory short-term memory (Jarrold & Baddeley, 1997) that might cause difficulties in acquiring vocabulary and grammatical morphemes, which may lead to deficits in syntactic development. Moreover, WS people have a wide range of vocabulary and do not have grammar, reading, or writing skills deficits (Hosokawa, 2003; Bellugi, Bihrl, Jernigan, et al., 1990). This gives the impression that they do not have any language delays of development. However, recent studies have indicated that the

syntactic development of WS people is not always adequate (Perovic & Wexler, 2010; Volterra, Capirci, Pezzini, et al., 1996), and they do have certain problems in language development. WS is a rare disorder afflicting one in 20,000-30,000 people (Hosokawa, 2003). Therefore, it is difficult to gather samples of WS people for research purposes and compare them with people with other disabilities. It is suggested that future studies investigate the syntactic development of WS children by using case studies.

Children having delays in cognitive development, such as ASD, DS, and WS, show unique developments in cognitive functions. It is important to examine correlations between the characteristic development of each cognitive domain in each disorder and syntactic development in detail. Not only symptoms and characteristics but also factors affecting the syntactic development of IDD children should be examined from the perspective of disability types, as has been undertaken in other countries.

On the other hand, previous studies have indicated that methods of acquiring syntactic knowledge and the process of syntactic development in children with identical types of disabilities differ (Kishaba, 1998b; Miyata, Otomo & Nishizawa, 2004; Nakagawa, Matsumoto & Ito, 2013). Syntactic development of IDD individuals cannot be explained only by the level of intellectual development or the characteristics of the disorder. Moreover, individual differences have been observed in the syntactic development of TD children as well as IDD children (Saito, 2002). Grammatical abilities have a strong correlation with reading. Family environment has a significant effect on children in lower grades, whereas the level of intelligence has a significant effect on children in higher grades (Uchiyama, 2010). It would be useful to examine the syntactic development of IDD children from the perspective of individual differences when investigating different factors affecting language acquisition, such as life experience, the frequency of using language, and the educational environment, among others, as well as for providing adequate support to IDD children.

Children with delays in intellectual development also show delays in syntactic development, which might be affected not only by the level of intellectual development and insufficient syntactic knowledge but also by other factors including traits of disorders and individual differences. It is considered necessary to examine factors affecting the syntactic development of IDD children from the perspective of disability types as well as individual differences.

3. Research methods

Previous studies have indicated that utterances of IDD children are short and simple. Even if they can speak in sentences, they have difficulties in acquiring grammatical morphemes, such as case particles and passive sentences. The Japanese language is an agglutinative language, and case particles play important roles. As a result, IDD children might have difficulties in maintaining smooth communications with others, because the comprehension of grammatical morphemes is essential for understanding the Japanese

language. comprehension of connections between words, i.e., semantic relationships, is important, and it is acquired before the acquisition of grammar. After the acquisition of grammar, children can express different meanings by attaching morphemes to words, such as “*hashiite inai* (not running)” and “*okorareru* (being scolded),” among others. As a result, it is necessary to examine the syntactic development of IDD children based on their developmental stage, i.e., before or after acquiring grammar.

It is suggested that the acquisition of vocabulary for producing a sentence in the period before acquiring grammar should be analyzed minutely (Saito, 1988; 1989) and examined from the perspective of case grammar, e.g., how to connect acquired vocabulary to syntactic development (Ooki & Ikeda; 1985). In the period after acquiring grammar, factors affecting the acquisition of grammatical morphemes, especially correlations with cognitive development should be investigated. Matsumoto (1999, 1993) has indicated that working memory plays an important role in sentence comprehension, whereas Volterra, Capirci, Pezzini, et al. (1996) suggested that grammatical comprehension of WS children was not well-developed, regardless of a well-developed auditory short-term memory. It is considered that sentence comprehension is related not only to working memory but also to the transition from short-term to long-term memory. If there are problems in the process of transition, grammatical information might not be transferred into knowledge.

Based on the above discussion, it is would be necessary to examine syntactic development in the spoken language of IDD children by dividing their language into periods before and after the acquisition of grammar from the perspectives of morphology and syntax. Furthermore, it is suggested that fundamental studies should be conducted on correlations with cognitive development to accumulate basic data.

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