Book Review

Handbook of Japanese Psycholinguistics
(*Handbooks of Japanese Language and Linguistics, v. 9*)
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1．Introduction

How do we acquire knowledge of language and how do we comprehend and produce language? The collection of papers in the Handbook under the present review seeks to answer these questions in the relatively young but fast growing field of Japanese psycholinguistics. Edited by Mineharu Nakayama, this Handbook, part 9 in the series of *Handbooks of Japanese Language and Linguistics* co-edited by Masayoshi Shibatani and Taro Kageyama, concerns acquisition and "processing" of Japanese as a first language (L1) and a second language (L2), where "processing" involves both comprehension and production. The topics discussed include, but are not limited to, phonology, morphology, semantics, syntax, prosody, discourse, language impairment, electromagnetic brain response, learning models, L1 influence, and the complex interplay among these factors.

In the early years of psycholinguistic research, much attention was paid to investigations on head-initial languages such as English and other European languages. However, as the field has progressed in search of the universal mechanisms of language acquisition and processing, the importance of empirical data from non-European languages has come to be recognized more widely. Japanese is one of the most well-studied of these languages. One characteristic advantage of studying Japanese comes from its head-final status and word order variations. Consider a typical SOV sentence in (1).

(1) Hanako ga   Taro o   hometa.

　　 Hanako Nom Taro Acc praise-Pst

　　 'Hanako praised Taro.'

In fact, even though the sentence appears to be simple, it is temporarily ambiguous: the sentence could continue as one with a bi-clause structure, such as (2).

(2) Hanako ga   Taro o   hometa   sensei ni   atta.

　　 Hanako Nom Taro Acc praise-Pst teacher Dat meet-Pst

　　 'Hanako met the teacher who praised Taro.'

When processing online, does the parser start working immediately after the start of the sentence, or does

it wait until the end? The head-final status of Japanese has provided a good testing ground for theories of incremental processing.

Also, famously, Japanese, as well as many other head-final languages, is relatively flexible in terms of word orders. The scrambled OSV version of (1) is given below.

(3) Taro o   Hanako ga   hometa.

Taro Acc   Hanako Nom praise-Pst

'Hanako praised Taro.'

Scrambling can be used to manipulate word orders, but this phenomenon itself is also interesting. As discussed in Chapter 13, many studies find that the non-canonical (scrambled) order is harder to process than the canonical order, and exploring the nature of this processing difficulty allows for investigation on a wide range of interacting factors in sentence comprehension (e.g. Case markers, thematic roles, information structure, and prosody) in the way that would not be possible in English and other head-initial languages.

Readers of this Handbook can familiarize themselves with important research questions, state-of-the-art experimental methodologies and insightful findings in the various subfields of psycholinguistics. The book will not only inform experienced researchers of recent theoretical and methodological advances in Japanese psycholinguistics, but also appeal to those looking to extend their work to the Japanese language. It will also be helpful for those in theoretical linguistics who are developing an interest in empirical research.

It is clearly not possible to sufficiently discuss all of the studies in this extensive Handbook within the limited space accorded to the present review. For this reason, I will examine some studies in more detail than others, as I believe they effectively demonstrate how studying Japanese acquisition and processing can offer important insights for the field of psycholinguistics. In the next section, I will introduce Part I, on the acquisition of Japanese. The section that follows offers highlights of Part II, on the processing of Japanese. The final section concludes this review by reminding readers of the importance of this collection of papers to the field of linguistics and psycholinguistics.

2．Acquisition of Japanese

Part I of the Handbook, on the acquisition of Japanese, contains 10 papers on language development, focusing on L1 and L2 acquisition of Japanese in children, adults and people with language impairment.

2.1. L1 Acquisition of Japanese

The topics discussed in the studies on L1 acquisition of Japanese cover a broad range, including phonological development (Chapter 1), acquisition of semantic concepts such as count/mass distinction (Chapter 2), acquisition by children with Specific Language Impairment (Chapter 3), development of Root

Infinitive (RI) analogues (Chapter 4), and narrative development from a sociolinguistic perspective (Chapter 6).

In this section, I will introduce Takuya Goro's paper (Chapter 5) in more detail, as it illustrates well how findings from languages like Japanese can make an interesting contribution to the exploration of the universal mechanism of language acquisition. Goro discusses the acquisition of scope relations from the perspectives of learnability theory. When the three components of the language acquisition process (productivity of the learner, unavailability of negative evidence, and arbitrariness of constraints) are all present, a learnability paradox will occur (cf. Pinker (1989)). What this means is that, without negative evidence, it is impossible for a learner to be fully productive and still be able to learn arbitrary constraints at the same time. In the case of scope acquisition, because there is very limited, if any, availability of negative evidence, if we want to prevent the occurrence of a learnability paradox, it must be the case that either learners are unproductive (denial of productivity) or rules are not arbitrary (denial of arbitrariness). Findings from languages such as Japanese, which exhibits different linear word orders from languages like English, better reveal aspects of scope acquisition and present interesting case studies. With complex scope relations, either one of two acquisition processes is possible. Children could start from experiencing 'freedom of scope (productivity)' with a wider range of acceptable scope relations, and then narrow down to those scope relations which are actually present in the adult grammar; or they could start as 'conservative learners (arbitrariness)' with the smallest possible subsets of arbitrary rules and then gradually come to accommodate more possibilities as they receive more adult language input.

Goro then reviewed his research projects that examined these two logical possibilities by investigating on two types of scope phenomena in Japanese. One involved quantifier scope interaction in scrambled sentences.

(4)　Taroo-dake-ga　　huransugo-mo supeingo-mo hanasu.

　　　Taro-only-Nom　French-also　　Spanish-also　speak

　　　'Only Taro speaks both French and Spanish.'

(5)　Huransugo-mo　　supeingo-mo$_i$ Taroo-dake-ga　t_i hanasu.

　　　French-also　　　Spanish-also Taro-only-Nom　　speak

　　　Lit. 'Both French and Spanish, only Taro speaks.'

(Nakayama et al. (2015: 235-236))

In the canonical ordering of (4), the sentence describes a situation where Taro speaks both French and Spanish, and no one else speaks both: it is thus possible someone exists who speaks either of them. The conjuction falls under the scope of *dake* 'only' in this "normal" scope relation. However, the scrambled version of (5) is different: this sentence describes a situation where Taro is the only person who speaks French or Spanish, with no one else speaking either of them. The conjunction takes a wider scope than *dake*

'only' here (the "inverse" scope relation). In his truth-value judgement experiment on this type of quantifier scope interaction, in a situation where *dake* 'only' takes the widest scope, whereas adults mostly rejected a scrambled sentence such as (5) children were more lenient about rejecting such inverse scope readings. This indicates that children are more productive and accept freer scope relations than adults. Goro concluded that, in this case, children start off with freer scope readings and narrow down their grammar in the course of their development.

Curiously, however, Goro's findings on his other study, involving the scope of the logical connectives -*ka* 'or' and -*mo* 'and' in negative sentences, indicated the opposite learning process.

(6) Butasan-wa   ninzin ka piman-o   tabe-nakat-ta.

pig-Top   carrot or pepper-Acc   eat-Neg-Pst

Lit. 'The pig didn't eat the carrot or the pepper.'

(7) Butasan-wa   ninzin-mo piman-mo   tabe-nakat-ta.

pig-Top   carrot-also pepper-also eat-Neg-Pst

Lit. 'The pig didn't eat both the carrot and the pepper.'

(Nakayama et al. (2015: 248))

In a truth-value judgment task, in a situation where the pig had eaten the carrot but not the green pepper, (6) is consistently acceptable and (7) is not, for adults. However, the children's data showed a strikingly different pattern than adults, accepting (6) only 25% of the time. These results indicate that, for processing this type of scope relation, children are more conservative than adults and only accept scope relations that would yield subset truth-conditions. The implication here is that language may have arbitrary language-specific scope constraints that cannot be acquired by productivity. These findings taken together, Goro concludes that scope acquisition cannot be explained in terms of a single general learning mechanism. It does not seem that children singlehandedly and successfully extend one learning strategy to other cases of scope relations, and more research is needed in order to better understand the nature of learning strategies and constraints on learning principles.

Scope phenomena are known to vary across languages and are some of the most interesting research topics in theoretical linguistics. Goro bases his characterization of this complex phenomena on solid theoretical syntactic and semantic considerations of the scope ambiguity, and lays out a well thought out discussion and the theoretical implications of his findings on children's scope processing from learnability perspectives. The contrasting experimental findings from the two studies concretely demonstrate how complex scope processing in young children can be and how studying the acquisition of Japanese can provide important insights into the theory of universal language acquisition mechanisms.

2.2. Japanese in the L2 Acquisition

As pointed out in Shirai's overview paper (Chapter 7) on Japanese psycholinguistic research in the field of second language acquisition (SLA), psycholinguistic approaches in SLA research are advancing rapidly. As shown in Chapter 8, many factors may affect the acquisition of a second language and how early or late each of the grammatical components of a second language can be acquired varies. Studies from neuroscientific perspectives have also been published rapidly in recent years, as introduced in Chapter 10, allowing us to know more on the time course and types of brain response to certain properties of perceived language strings. Although there are many other important points in these papers, in this subsection I would like to introduce more details of Chapter 9, Gabriele and Sugita-Hughes' paper on the L2 acquisition of Japanese tense and aspect.

Gabriele and Sugita-Hughes' paper discusses the L2 acquisition of Japanese tense and aspect (as observed in the '-*ta*' and '-*teiru*' distinction), particularly in light of the Aspect Hypothesis (cf. Andersen and Shirai 1996, Sugaya and Shirai 2007). The Aspect Hypothesis in second language acquisition predicts that learners are limited with respect to their use of temporal and aspectual grammatical forms and, more specifically, predicts that the order of acquisition of tense and aspectual information encoding depends on the semantic type of the verb (for example, achievement verbs such as *tuku* 'arrive' and accomplishment verbs such as *kaku* 'write'). With this in mind, they reviewed a few of their research studies that investigated the influence of learners' L1 in the acquisition of Japanese tense and aspect. In one study (Gabriele 2009), a perception experiment was conducted on English-speaking L2 learners of Japanese. In a Story Compatibility judgment task, participants were presented with test sentences of achievement verbs and accomplishment verbs. Each verb was paired with simple past tense and -*teiru* aspectual markers. An example pair with the achievement verb *tuku* 'arrive' is given below.

(8) Simple Past: Hikooki-wa kuukoo ni   tukimasita.

　　　　　plane-Top   airport-Loc   arrived-Pol

(9) Te-iru: Hikooki wa kuukoo ni tui-te-imasu.

　　　　plane-Top   airport-Loc arrive-teiru-Pol

(Nakayama ed. (2015: 376))

Each of the test sentences was presented after a story that either depicted the completion or incompletion of the event, and the participants were asked to judge whether or not the test sentence was compatible with the preceding story. For achievement sentences like (8)-(9), the native speakers were expected to accept the test sentence with the Complete Story (*The plane is at the airport*) because the achievement verb occurring with -*teiru* should be construed with a resultative (or perfective) interpretation. For this reason, the same sentence should be rejected with the Incomplete Story (*The plane is still in the sky approaching the airport*). As for the accomplishment sentences, on the other hand, their -*teiru* form is interpreted as progressive and

should be accepted in the Incomplete Story. The data patterns found in this experiment actually demonstrated an interesting contrast between the L2 learners and native speaker controls. English-speaking L2 learners of Japanese showed native-like performance with simple past sentences, and also had little difficulty in accepting the resultative interpretation of achievement *-teiru* sentences with the Complete Story. However, with the Incomplete Story, the performances of L1 and L2 speakers differed. Whereas native speakers successfully rejected the achievement *-teiru* (*Hikooki wa kuukoo ni tui-te-imasu*, 'The plane has arrived'), many L2 learners of Japanese (even those with high proficiency) incorrectly accepted such sentences. The L2 learners seemed to have difficulty in ruling out the progressive interpretation of *-teiru*, which is allowed by their L1 grammar. In a follow-up study (Gabriele and McClure 2011), they used the same experimental paradigm to test Chinese-speaking L2 Japanese learners and found that they showed native-like data patterns in all categories: they accepted the achievement *-teiru* sentences with the Complete Story but not with the Incomplete Story.

This pattern of results can suggest the role of L1 transfer in L2 acquisition: English-speaking L2 Japanese learners make more errors in understanding the perfective interpretation of *-teiru* perhaps because they wrongly apply their L1 knowledge of progressive form (*-ing*) with achievement verbs that can depict events that are still in the process of completion in English. However, as Gabriele and Sugita-Hughes themselves acknowledge, there are many other possible influences concerning the acquisition of the *-teiru* aspectual marking. For example, in the follow-up experiment with the Chinese-speaking learners, even though they showed native-like performance in the achievement *-teiru* interpretation, more errors were made in another context involving the past form of *-teiru* (*-teita*), the result that Gabriele and McClure (2011) attributed to the interaction of specific properties of L1 and the target L2. Other possible factors to consider include the type of input and the order of instructions, as suggested in Ishida (2014),[1] distinction between lexical and grammatical aspect encoding, as well as the nominal system of Japanese with respect to event depiction. Also, according to the results of online processing studies (e.g. Long et al. 2010), learners may face limitations in their L2 acquisition due to the type of aspectual information available to them online, and this may be influenced by their L1. Various factors seem to interact in the acquisition of tense and aspect, and it is far from clear-cut to presume that the experimental findings in Gabriele (2009) are instantiations of L1 transfer; yet, the carefully controlled psycholinguistic experiments reviewed in this Chapter and discussions illustrate the importance of investigating L2 acquisition of Japanese in psycholinguistics.
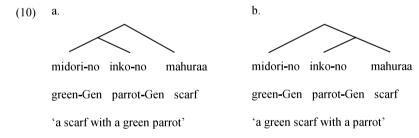
3. Japanese Language Processing

Part II of the Handbook is devoted to research on Japanese language processing. As briefly discussed in the Introduction, a great deal of consideration in the field of language processing has been given to

head-initial languages such as English. However, as suggested in Yamashita, Hirose and Packard (2010), evidence from languages with different structural configurations from those of European languages has become increasingly important today.

3.1. Japanese in L1 Processing

　　The topics discussed in the series of chapters on L1 Japanese processing are diverse. They include a view of Japanese language processing from a connectionist perspective (Chapter 12), typological differences in the processing tendencies of subject and object relative clause structures in Japanese (Chapter 14), and an overview of Event Related Potential (ERP) methodologies, which are used in identifying physiological responses to syntactic and semantic dissociations in English and Japanese (Chapter 15). While all of the papers here show that research findings from head-final, scrambling languages such as Japanese make important contributions to psycholinguistic research in general, I will discuss two of them in more detail. One on how prosody can affect language processing, and the other on how experimental research and syntactic research can work together.

　　Hirose's paper (Chapter 11) reviews the series of her work on the relationship between prosody and other factors in the processing of ambiguous structures in Japanese. She begins her paper with a discussion on the role of lexical accent in understanding branching ambiguity. An example is given below.

(10)　a.　　　　　　　　　　　　　　　　　b.

midori-no　inko-no　　mahuraa　　　　midori-no　inko-no　　mahuraa

green-Gen　parrot-Gen　scarf　　　　　green-Gen　parrot-Gen　scarf

'a scarf with a green parrot'　　　　　'a green scarf with a parrot'

(Nakayama ed. (2015: 427))

Hirose points out that the preference for the left-branching structure (10a) is expected when we assume incremental processing. The parsing starts immediately after the first element of the string, and it prefers not to revise the initially establsihed NP analysis on *midori-no inko* unless necessary. However, she observes that the presence or absence of lexical accent in the second noun (*inko*) may affect the overall pitch properties (or the prosodic structures) of the constituent and, actually, the left-branching preference can be reduced as a result. Whether or not this type of prosodic shift takes place in actual speech is subject to many other factors (such as speaker variations) and testing the possible effect of this shift on perception may not be as straightforward as one might imagine. Still, this discussion illustrates one way of how syntactic processing mechanism and non-syntactic influences, such as prosody, may interact with one another.

　　In fact, lexical accent is not the only factor responsible for this type of prosodic pitch changes. Hirose

looks into speech production of this branching ambiguity and shows how the visual context, designed to evoke the speaker awareness of the ambiguity, was found to elicit pitch changes; this is another way that prosody could influence processing tendencies.

She also discusses the role of constituent length in the resolution of relative clause ambiguity in Japanese. The results of her self-paced reading experiment manipulating the length (and hence the phonological size) of the constituents of a relative clause indicated that the prosodic cue is evoked in the perceiver's ambiguity resolution even in silent reading. This serves as an instantiation of Fodor's Implicit Prosody Hypothesis (Fodor (2002)), which predicts that even in silent reading, prosodic properties of the string are projected onto the perceiver's mind and influence syntactic parsing. Hirose's research program takes advantage of the head-final status of Japanese, as well as its prosodic (accentual) properties. The findings of the studies reviewed in this Chapter demonstrate not only how prosody plays an important role in sentence comprehension, but how prosody and the other components of grammar, such as syntax, phonology, or discourse, can be interrelated in language comprehension and production.

Another paper that I wish to introduce in more detail is one by Koizumi (Chapter 13). Based on the series of the research projects that he is involved in, Koizumi illustrates two types of experimental syntax investigation on word order processing. The first type, which he identifies as experimental syntax in a broad sense, aims to investigate how structural parsing tendencies can be characterized. Although both SOV and OSV word orders are possible in Japanese, they are not comparable in terms of their frequency of occurrences as well as the processing preference. Referring to the findings in Imamura and Koizumi (2011), Koizumi points out the SOV word order (e.g., *Hanako-ga Taroo-o home-ta*) is more frequent than the OSV word order (e.g., *Taroo-o Hanako-ga hometa*). Also, as described in the first section, many experimental studies report that the more frequent SOV word order is easier to process than the OSV. How can we explain this? Koizumi reviewed his experimental studies with Tamaoka and colleagues (Tamaoka et al. (2005)) that have evaluated the three logical possibilities (characterized as the Grammatical Functions Hypothesis, the Thematic Roles Hypothesis, and the Case Marking Hypothesis). A summary of his review is as follows. First, a reading and plausibility judgment study found that the canonical Subject-NonSubject word order is preferred even in a passive structure, suggesting that we can eliminate the Thematic Roles Hypothesis, since this would predict the opposite outcome. Another judgment study found that even when the subject NP has the dative case marker *-ni*, Subject-NonSubject order was still preferred, which is incompatible with the predictions made by the Case Marking Hypothesis. Taken together, Tamaoka et al. concluded that the Grammatical Functions Hypothesis is the most compatible with the behavioral data. In another study (Koizumi and Tamaoka (2006)), Koizumi also investigated the effect of word order variations involving adjuncts, in order to examine whether scrambling of and/or across an adverb would result in higher processing cost. Their findings suggested that scrambled structures incur a greater processing cost than canonical structures even

in the case of scrambling involving non-arguments. Further, another of his work (Imamura and Koizumi (2008)) found that word order preference interacts with discourse order preference: perceivers generally prefer the Given-New information structure order, but the difficulty in processing the less preferred New-Given order in the canonical syntactic order (SOV) was not as evident as that in the non-canonical (OSV) order in their experiments.

In the latter part of the paper, Koizumi discusses experimental syntax in a narrow sense: how experimental investigation can be employed in order to evaluate competing hypotheses in theoretical syntax. For example, empirical research on the hierarchy of functional projections can evaluate the cartographic approach to syntactic structure. He reviews one of his papers (Kimura, Kim and Koizumi (2005)) that presented empirical evidence to argue that in Japanese, tense and aspect seem to be base-generated in the same syntactic position, rather than the distinct positions associated with Tense and Aspect positions respectively, and that the strongest position of the cartographic approach is thus not maintainable. Empirical evidence was also given in that paper that evaluated competing syntactic analyses of the Subject in the Japanese OSV sentences.

Koizumi and colleagues' work in the experimental syntax of word order variation reviewed in this Chapter involves not only Japanese but also Kaqchikel, a Mayan language, where VSO is found to be the basic word order. The range of studies presented in this Chapter is based on careful examination of syntactic analyses and their detailed predictions, and his research program will certainly continue to make important contributions to a better understanding of the nature and characterization of word order variation in human language.

3.2. Japanese in L2 Processing

The last three chapters of the Handbook are concerned with the relatively new field of L2 Japanese processing. The influence of working memory in L2 Japanese relative clause processing is discussed in Chapter 16. Chapter 17 concerns L2 Japanese production regarding work on motion description and speech errors. Chapter 18 introduces findings from the processing of Japanese as a second language by native speakers of Chinese, investigating the perception of lexical pitch accent, lexical access in the perception of *kanji* characters, and the processing of syntactic structures distinct from their L1.

4. Conclusion

The 18 chapters in the Handbook present a state-of-the-art overview of the field of Japanese psycholinguistics. Due to limited space, the present review has managed to provide only a brief summary of this Handbook, with a little more detailed look at some of the studies in scope acquisition, L2 acquisition of

tense and aspect, the role of prosody in processing and experimental syntax. This by no means suggests that the chapters not discussed extensively here are any less important than the others, and readers are strongly encouraged to closely read all of the chapters. As the studies reviewed in this volume show, psycholinguistic research on the Japanese language will surely continue to provide helpful insights towards the universal theories of language acquisition and processing in general. While there is no question that the Handbook will serve as a comprehensive reference book for those who are already involved in the field, it will also inspire those who are new to the field of Japanese psycholinguistic research. The insights and inspirations that the Handbook offers will, I believe, facilitate further research within and between theoretical and empirical research communities in the future.

NOTE

1. Gabriele and Sugita-Hughes do acknowledge the possibility suggested in Ishida (2014) that the order of instructions may be responsible for the order of the L2 acquisition of aspect, although their standpoint, or working assumption, is still that their experimental findings on L2 aspect acquisition are instantiations of L1 transfer. I thank an anonymous reviewer of English Linguistics for recommending clarification on this point. In order to resolve this conflation, a study on the proficient L2 speakers who have never received explicit instructions on Japanese would be informative though, in reality, conducting such research would not be an easy task due to the particular characteristics of the learner population of Japanese. Unlike English or other languages, Japanese as an L2, especially at the beginning levels, is normally learned through some type of explicit instructions, rather than through exposure to the language in the naturalistic environment.

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This article presents a concise review of the *Handbook of Japanese Psycholinguistics* edited by Mineharu Nakayama, a recent addition to the *Handbooks of Japanese Language and Linguistics series*. The 18 papers included in the Handbook represent the state-of-the-art of the fast-growing field of Japanese psycholinguistics, ranging from the acquisition and processing (comprehension and production) of Japanese as the first language and a second language. The L1 acquisition of scope, the L2 acquisition of aspect, the role of prosody in the resolution of structural ambiguity, and experimental syntax giving insights on word order processing and the cartographic approach in theoretical syntax, are some of the topics introduced with a closer look in the review. I am certain that not only these select papers but all of the chapters in the Handbook will educate readers on the latest research advances in Japanese psycholinguistics, and the Handbook will certainly help open up for further cross-disciplinary research possibilities within and between theoretical and empirical research communities.