Overpassivization Errors made by Japanese EFL Learners: University Students and High School Students

日本人英語学習者による自動詞の過度受動化の誤り ── 大学生と高校生との比較において ──

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Abstract

In the field of research on English as a foreign language (EFL), overpassivization errors of intransitive verbs by learners of EFL have attracted research attention. Prior research has investigated the effects of intransitive verb classes, participants' English proficiency, and subject animacy; results suggested that the higher the learners' English proficiency, the more they tend to passivize intransitive verbs with inanimate subjects. Another study focusing on task differences in addition to the same three effects revealed different results depending on subject animacy and tasks. Given the relevance of the degree of English proficiency in analyzing overpassivization errors, this study investigated these three effects by comparing Japanese English learners from two academic levels: 210 high school and 50 Japanese university students, depending on the tasks. Two additional analyses were conducted to determine the main effects of subject animacy and obtain the point-biserial correlation coefficients. In particular, a distinct finding emerged: the learners appear to misunderstand that alternating unaccusatives can be used in the passive form, while non-alternating unaccusatives are affected by input frequency which overrides the animacy effect. Recommendations to assist learners in avoiding overpassivization during instruction are made based on the implications of the findings.

1. Literature Review

1.1 Overpassivization Errors

Several researchers have established that verb class distinctions are indicative of nouns positioned as sentence subjects/objects that differ in their relation to verbs; such differences dictate whether nouns are regarded as agents/patients, targets/experiencers, or experiencers/targets (Shin, 2011). Generally, since they have no object, intransitive verbs cannot be used in the passive form. Further, they are divided into three types, depending on the verb class distinction: alternating unaccusatives (with a target/experiencer

subject and transitive counterpart), non-alternating unaccusatives (with a target/experiencer subject and no transitive counterpart), and unergatives (with an agent subject; No & Chung, 2006; Shin, 2011).

Previous studies (Deguchi & Oshita, 2004; Kondo, 2005; No & Chung, 2006) have shown that a great percentage of learners of English as a Foreign Language (EFL) make overpassivization errors, especially with alternating unaccusatives. Such learners tend to get confused both by transitive verbs (example 1a) and alternating unaccusatives (example 1b). As the example below shows, the target/experiencer subjects of unaccusatives are originally positioned as a verb's object in the sentence's underlying structure, which are syntactically moved to the position of the subject in the surface structure.

1) a. Transitive: A witch [VP changed] a prince into a frog (VP = verb phrase)

b. Alternating unaccusative: A prince$_i$ [VP changed t_i] into a frog

(t = *target* noun, $_i$ = initial position; Oshita, 2001)

Contrarily, regardless of the learners' developmental stage, unergatives with agent subjects that are not syntactically moved cause fewer overpassivization errors (Hirakawa, 1995; Kondo, 2005). The key insight of the Unaccusative Hypothesis (Burzio, 1986; Perlmutter, 1978) is that the noun phrase and verb (NP-V) structure with unaccusatives can be explained by the NP-movement of the subject from the object position, whereas the subject of unergatives remains underived. The difference in the underlying sentence structures of unaccusatives and unergatives is shown in examples 2a and b.

2) a. Non-alternating unaccusative: The guest$_i$ [VP arrived t_i]

b. Unergative: The boy [VP jumped] (Oshita, 2001)

Regardless of their first language (L1), EFL learners tend to passivize alternating unaccusatives, non-alternating unaccusatives, and unergatives in a descending order (Hirakawa, 1995; Kondo, 2005). However, Choi (2019) reported different error rates with the same type of unaccusative verbs, especially in cases of alternating unaccusatives. Ju (2000) interpreted the discrepancy in error rates within the same category of unaccusatives as the result of "different degrees of directness in the causation of events" (p. 103). These studies suggest the need to clarify the underlying cause for this discrepancy in error rates and determine whether they originate from the categories of the unaccusatives or from the features of individual verbs.

1.2 Unaccusative Trap Hypothesis and Learners' Proficiency Levels

Oshita (2001) proposed the Unaccusative Trap Hypothesis (UTH). According to the UTH, U-shaped developmental patterns are described as follows: 1) learners at low proficiency level will use unaccusatives and unergatives as the same one-argument verb syntactics, 2) syntactic errors with unaccusatives appearing after this verb class are correctly distinguished from the unergatives, and 3) the target syntactic structures with unaccusatives can be acquired after the two classes of intransitive are correctly differentiated in their interlanguage (Oshita, 2001, p. 293). For example, Deguchi and Oshita (2004) conducted grammaticality judgment tasks with Japanese learners of English at four general proficiency levels. The results showed

U-shaped developmental patterns in which lower-level learners (junior high school students) without knowledge of the distinction between unaccusatives and unergatives made fewer errors than intermediate learners (senior high school and undergraduate students), who preferred ungrammatical passives to grammatical actives. Further, advanced learners (graduate students) made fewer errors (p. 48).

However, as Oshita (2014) described, most prior studies (e.g., Deguchi & Oshita, 2004; Yamakawa et al., 2003) have failed to report clear evidence of U-shaped developmental stages in accordance with the UTH, with limitations relating to three points in particular: (a) the lack of a clear and unmistakable definition of U-shaped development; (b) challenges with developing a holistic image that fortuitously emerges when obtained data are presented visually; and (c) the study participants were recruited from a relatively homogeneous sample, which typically included college students (pp. 157–158).

1.3 Subject Animacy

Subject animacy is closely related to choice of voice. An "agent" is the voluntary cause of some action and, therefore, tends to be animate (Ferreira, 1994). The agent typically takes the preceding position (i.e., the subject) in an active sentence. Passive sentences are produced when the discourse topic is the theme of an action, rather than an agent.

Similarly, Jackendoff (2002) proposed the "Argument Linking Hierarchy," establishing the following thematic order of NP arguments: Agent > Recipient > Theme > Location > Predicate NP (p. 143). Jackendoff (2002) called this default word alignment the "Agent First" principle. Aissen (1999) also showed that the association of the agentive role with a person/animate subject is the most robust of generalizations in syntactic markedness.

While the Agent First principle (linguistic principle; Jackendoff, 2002) describes the unmarked structure of a language with an agent in the subject position, the First Noun principle (language processing principle; VanPatten, 1996) describes how humans naturally assign the agentive role to the first noun of a sentence when processing linguistic input. Ferreira (1994) suggested that thematic hierarchy influences learners' decisions regarding the agentivity of the sentence subject, after which learners create passive sentences with theme-experiencer verbs (p. 717). Despite these suggestions, the relationship between subject animacy and verb passivization is not particularly discussed in the UTH. Furthermore, beyond studies on the grammaticality judgment task, such as No and Chung's (2006) study, research considering subject animacy is lacking. In their grammaticality judgment tasks studies of Korean undergraduate and graduate students, No and Chung (2006) showed that participants frequently judged ungrammatical passive sentences with inanimate subjects as grammatical, compared to those with animate subjects.

To examine the effect of the verb classes, participants' proficiency levels, and subject animacy on the judgment of voice, one of the author's previous studies adopted No and Chung's (2006) 70 questions from the grammaticality judgment task. However, such a research method produced a substantial amount of unanswered or unclear data. The task procedure included the three stages: (1) Circle "correct" or "incorrect." (2) If "incorrect," underline the ungrammatical part of the sentence. (3) If "incorrect," write the grammatical verb forms or words. This procedure led the learners to simply circle "correct," which is

a less-demanding choice, and skip the second and third procedure when circling "incorrect." Consequently, this troublesome task procedure resulted in a substantial number of unanswered or unclear items. (See Okada, 2019 in details)

1.4 Task-based Differences

Many researchers maintain that the type of tasks and their degree of complexity affect learners' performance. For example, Rahimpour (2007) conducted a data-based study to investigate task complexity and revealed that different task types lead to differences in learners' performance. According to the findings, L2 learners' interlanguage is systematically variable owing to the task type (p. 7).

Despite task-based differences indications and their effects on research results, many previous studies on overpassivization used only one kind of task. However, a study by Matsunaga (2005) reviewed both judgment and production tasks; her acceptability judgment task was conducted with four options, including "not sure," and her production task was translation-based, using participants' L1 (Spanish or Japanese). Hirakawa (1995) researched English unaccusative construction acquisition by native Japanese speakers with both production and judgment tasks using the same verbs; further, a grammaticality judgment task was used to judge sentences on a five-point scale according to acceptability.

Ellis (1991) critically considered grammaticality judgment tasks where learners (1) display considerable inconsistency, (2) rely extensively on "feel," (3) fail to use explicit grammatical knowledge, and (4) show considerable uncertainty with a "not sure" response (pp. 179–180). By contrast, as Okada (2022b) has argued, the target verbs or sentence structures in the data from the learners' corpus are too limited or uncontrolled to yield optimum results. Consequently, the grammaticality judgment tasks and English essay writing or learners' corpus as research tasks should be designed carefully by considering the participants' proficiency levels.

1.5 Okada (2021, 2022a, 2023)

Okada (2021, 2022a) investigated the causes of overpassivization errors made by 210 Japanese high school learners of English with two types of tasks using the same English sentences: a voice production task (VPT; Okada, 2021) and a voice judgment task (VJT; Okada, 2022a). Specifically, these focused on verb classes, participants' English proficiency, and subject animacy. Results revealed that the more learners' proficiency develops and their acquisition of passive forms advances, the more they overpassivize sentences with intransitive verbs for inanimate subjects.

Okada (2023) investigated the three effects of overpassivization among 30 Japanese university students who are expected to have mastered English passive forms, using the same two tasks, the VPT and VJT. The study obtained similar tendencies to Okada's research (2021, 2022a), with a few differences depending on subject animacy and tasks. The higher accuracy rates of both transitives and intransitives in the VPT than in the VJT in this study indicate that learners correctly use active forms with intransitives and passive forms with transitives in the VPT, whereas they cannot be confident in judging the voice forms without explicit knowledge.

Despite the Japanese high-school and university students conducting the same two tasks—VPT and VJT—in these studies, the results of the participants from the two academic levels cannot be compared due to the differences in the types of English proficiency data. Therefore, it is necessary to investigate the results of the two tasks in these previous studies with an alternative analysis to obtain clear evidence of the U-shaped developmental stages in accordance with the UTH.

2. Research Questions

To consider the effect of degrees of passive form mastery on the results, the same two tasks, namely VPT and VJT, performed by participants at two academic levels (i.e., high school and university students), were analyzed using different analyses. The present study aimed to investigate whether the three effects of overpassivization can be affected by the mastery of English passive forms.

The same three research questions (RQs) from prior related research (Okada, 2021, 2022a, 2023), involving passivized sentences created by Japanese EFL learners, were employed to compare the results with those of high school students (participants in Okada's [2021, 2022a] studies) and a sample of 50 undergraduate students (participants in Okada's [2023] study).

RQ1: How much do the verb class distinctions of intransitive verbs affect errors involving passivized sentences made by university students compared to those made by high school students?

RQ2: How much does the level of English proficiency affect errors involving passivized sentences made by university students compared to those made by high school students?

RQ3: How much does the subject animacy affect errors involving passivized sentences made by university students compared to those made by high school students?

3. Research Method

3.1 Participants

As shown in Table 1, this study's sample of participants included 50 undergraduate students, the original participants of Okada's (2023) study. Since most of the students had taken the Test of English as a Foreign Language Institutional Testing Program (TOEFL ITP) approximately 1 month or 1 year prior to this study, I collected their self-reported scores to compare their proficiency levels. However, some had not obtained their TOEFL ITP scores yet or did not remember their scores at the time the task was conducted (see Okada [2023] for more details).

The VPT participants sample included 27 first-year university students majoring in engineering and 19 second-year university students majoring in agriculture at a national university. Nine of the 19 second-year undergraduate participants were excluded because they did not have TOEFL ITP scores. All the remaining 37 participants with TOEFL ITP scores obtained average scores, with M = 487.62, SD = 36.20, Min = 400, and Max = 573. The VJT participants sample included 22 first-year and 20 second-year undergraduate students. Most of the participants were in the same classes as those in the VPT group. Nine of the 20 second-year undergraduates were excluded because they did not have TOEFL ITP scores. The remaining 33 participants with TOEFL ITP scores obtained an average score, with M = 486.12, SD =

35.33, Min = 400, and Max = 573. Both tasks were conducted during their English classes by a cooperating research teacher. Participants were also informed that the task scores would not be included in their grades. Data on age, gender, and nationality were not collected.

Table 1

The Numbers of the University Student Participants in VPT and VJT in details

Class	Registered	TOEFL IPT	VPT	VJT	Both tasks	Okada (2023)
1st Year	30	30	27 *1	22*2	19	19
2nd Year	20	11	19 (10)	20 (11)	19 (11)	11
Total	50	41	46 (37)	42 (33)	38 (30)	30

Note:*1 and *2 Three in VPT and eight in VJT of the 30 1st-year students registered in this class were busy with the other class tasks and did not participate in the studies. Those three in VPT and the eight in VJT included different students. Therefore, only 19 were able to participate in both tasks.
The numbers in the parentheses indicate participants who communicated their TOEFL IPT scores.

This study also included 210 second-year Japanese high school students, who participated in Okada's studies (2021, 2022a), and whose data were used to compare the results obtained from university participants. The high school participants did not have TOEFL ITP scores; therefore, data from nationwide college preparatory exams taken twice before the study were collected to compare their proficiency levels (see Okada [2021, 2022a] for more details).

3.2 Materials

In this study, the two tasks were conducted using the same 40 sentences as in Okada's studies (2021, 2022a, 2023), with five verbs each for four verb classes: alternating unaccusatives (Verb A: *burn, change, drop, freeze,* and *grow*); non-alternating unaccusatives (Verb B: *become, die, disappear, exist,* and *fall*); unergatives (Verb C: *run, smile, swim, walk,* and *work*); and transitives (Verb T: *build, hit, love, need,* and *read*). Each of the five verbs of the three verb classes except Verb C had two subjects with different animacies (animate and inanimate). Both the sentences with each Verb C had animate subjects because the task sentences were adopted from textbooks or a dictionary for high school students. Owing to the subjects' thematic roles as *agents*, sentences with Verb C had very few inanimate subjects in the teaching materials.

Therefore, in this study, animacy is defined as follows: animate subjects constituted primarily of human beings and animals, including characters in novels and comic books, etc. Inanimate subjects mainly included objects, natural phenomena, and plants, and were also found in the titles of novels and comic books, etc.

The directions for the task (originally in Japanese) and the example are shown below:

VPT: "Fill in the blank with the appropriate form of the verb in the parentheses."

Example: Imagine what will happen to us if all grass_____. (disappear)

VJT: "Check the sentence with the appropriate voice."

Example: (　) a) Imagine what will happen to us if all grass <u>disappears</u>.

(　) b) Imagine what will happen to us if all grass is disappeared.

The judgment of correct voice forms was also checked by one American and two Canadian native speakers of English, one Filipino teaching English in Japan, and two Japanese-speaking English teachers with a one-year experience studying in the US or Canada.

The VPT was assigned to the two “Academic English Basic” classes for first-year undergraduates and “Academic English Advanced” for the second-year undergraduates on April 26, 2019. With an oral explanation of the aim in Japanese and the task procedures written in Japanese on the top of the task paper, the task was administered during the 90-minute class by the same English class teacher, who covered the role of research cooperator. The time allotted for the task ranged from 15–30 minutes owing to the variability in the average time taken by the students to complete the task.

The VJT was conducted approximately 3 weeks after the VPT; this was carried out without notifying the participants for two reasons: (a) to minimize the effect of participants’ memory and (b) to conceal the voice forms (active or passive) of the target verbs. According to Ebbinghaus’s Forgetting Curve (Ebbinghaus, 1987), after one month memory drops down to 21 percent. However, because of the class schedule, which included term examinations and the one-week national holidays at the beginning of May, most of the studies were conducted after an interval of three to four weeks.

3.3 Data Analysis

The data in this study were analyzed to investigate overpassivization errors with two tasks for all 50 university students, by conducting the same data analysis as the author’s previous studies. The analysis procedures used in the three studies (Okada, 2021, 2022a, 2023) were as follows: first, the hand-written answers were digitalized into text files, including the participants’ ID numbers. Then, the answers were classified through two steps for VPT: (a) voice classification and (b) correctness determination, depending on the transitivity of the verb class. Answers determined to be “correct” were assigned the value of “1” for statistical analysis and “incorrect” answers were assigned the value of “0.” In both tasks, answers determined to be “unclear” or “unanswered” were considered “missing values” and were left blank. The accuracy rates for the four verb classes and subject animacy were calculated. Missing values were treated as incorrect. As for the first step, the judgment criteria of the voice forms in this case study are the same as that employed in Okada’s research (2021 p.7).

Second, a statistical analysis was conducted using generalized linear mixed models (GLMMs) to examine the three RQs and compare participants at the two levels, employing the unbalanced data volume and missing values. Maximum likelihood estimation and *p* value were calculated using the lme4 package and lmerTest package of R. The participants’ task scores were analyzed as a dependent variable, with verb class, proficiency, subject animacy, and their interactions as fixed effects. Participants and sentence items were entered as crossed random effects. To compare each level with the reference level, two of the categorical variables (verb class and subject animacy) were dummy-coded. To identify the best model with the lowest Akaike information criterion (AIC), the first step was to test the most complex model

containing all factors (verb class, proficiency, and subject animacy), their pairwise interactions, and their three-way interactions. To analyze the data, including missing values, and to compare the model, an analysis of variance (Type III Wald chi-square tests) was conducted. Finally, to identify the best model with the lowest AIC, participant random slope and an item random slope for proficiency, verb class, and subject animacy were considered.

Besides the two procedures mentioned above, this study calculated point-biserial correlation coefficient (PBCC) for both the 210 high school students in Okada's study (2021, 2022a) and all the 50 university students including the 30 in Okada (2023). Positive correlation was expected for test reliability to show that participants with higher total scores had a higher chance of answering each item correctly. R (ver. 3.6.3) was used for analysis of the PBCC for each task item, and calculations were made using the "polycor" package. The correlation coefficients were calculated using a dichotomous variable (0 or 1 point for each item of three types of intransitives) and a continuous variable (0–10 as the total scores on 10 items with transitives). Further, the total scores of transitive verbs were square-rooted to improve the distribution. In agreement with Ebel and Frisbie (1972), items with values ≥ 0.30 were considered "reasonably good" and those with values between 0.20 and 0.30 were considered "marginal items." However, if a U-shaped development of this verb class was observed, I expected to find a negative PBCC rather than a positive one for the items with unaccusative verbs.

Furthermore, this study examined target verb frequencies in high school textbooks determine the amount of implicit input of each target verb. Additionally, to investigate how differently subject animacy affects the two academic-level participants' overpassivization in detail, animacy's main effect on the accuracy of two types of unaccusatives (Verb A and Verb B) was calculated using another GLMM to explore the relationship between overpassivization errors and the input from high school textbooks regarding subject animacy and verb class pairs. This analysis was also applied to data collected from the 210 high school students' sample for comparisons with university students.

4. Results

4.1 Overpassivization Errors Related to the Lexical Meanings of Verbs

Table 2 shows the accuracy rates of each verb class and animacy in both tasks in the sample including university students. The number of valid answers obtained from the 46 participants in VPT was 1,798, excluding those considered "unclear" based on the criteria presented in Okada's study (2021). The results revealed a 92% average accuracy rate for the actives (three types of intransitives) and a 68% accuracy rate for the passives (transitives); both results were higher than those collected from the high school students sample in Okada's studies (2021, 2022a). Although the university students' results showed a rate of 3.3% in the *-ed* morphology of irregular verbs (see Appendix 1), their accuracy rate for the passives was higher than that of the former (19%) (see Appendix 2). Table 2 also shows the 42 participants' answers based on an analysis revealing the accuracy rates in VJT. As all the answers were valid, the total number of valid answers was 1,680.

The results collected from university students revealed the same tendencies as those of high school

students in Okada's studies (2021, 2022a) (see Table 3). The accuracy rates with intransitives for animate subjects were higher than those for inanimate subjects, except for Verb B (the same for both animacies); further, the accuracy rates with transitives for inanimate subjects were higher than those for animate subjects. All university students' accuracy rates were higher than high school students' ones.

Table 2

Accuracy Rates of Verb Classes, Voice, and Subject Animacy for the University Students in VPT and VJT

	VPT (N = 46)				
Voice		Active		Passive	Total
Verb class	A	B	C	T	
Animate	85%	95%	99%	53%	88%
Inanimate	78%	94%		79%	83%
Total	81%	95%	99%	68%	86%
	VJT (N = 42)				
Voice		Active		Passive	Total
Verb class	A	B	C	T	
Animate	76%	90%	97%	76%	90%
Inanimate	61%	80%		61%	80%
Total	69%	85%	97%	69%	85%

Table 3

Accuracy Rates of Verb Classes, Voice, and Subject Animacy for the High School Students in Okada (2021, 2022a)

	VPT (N = 210)				
Voice		Active		Passive	Total
Verb class	A	B	C	T	
Animate	91%	94%	98%	10%	81%
Inanimate	87%	90%		24%	65%
Total	89%	92%	98%	19%	75%
	VJT (N = 210)				
Voice		Active		Passive	Total
Verb class	A	B	C	T	
Animate	53%	60%	66%	54%	60%
Inanimate	43%	47%		65%	52%
Total	48%	53%	66%	61%	57%

Table 4 shows the GLMM results of the verb classes' main effects for both tasks (VPT and VJT). The model with the lowest AIC for the VPT only had verbs as a dependent variable and the model for the VJT contained the interaction between verbs and subject animacy. These models' random-effect structure comprised random intercepts for subject and item: glmer (rating ~ verb * animacy + (1 + verb | subject) +

(1 | item), dat=dat.A, family="binomial") However, to compare high school students data, the same model was adopted with three-way interactions of all factors (verb class, proficiency, and subject animacy): glmer (rating~ (proficiency * verb * animacy + (1+verb|subject) + (1|item), dat = dataA, family = "binomial"). Statistical significance was represented by the following symbols in all statistical analyses: "***" ($p < .001$), "**" ($p < .01$), "*" ($p < .05$) and "." ($p < .10$).

Table 4

GLMM Results of the Main Effects of Verb Classes for the University Students (Extracted from Appendix 3 for VPT and Appendix 4 for VJT)

VPT ($N = 46$)						
Parameter	Animacy	Estimate	*SE*	*z*	*p*	
(Intercept)		5.138	1.623	3.166	.002	**
Verb A (Verb B referenced)	Ani-ref	-2.527	1.260	-2.006	.045	*
	Ina-ref	-2.783	1.209	-2.302	.021	*
Verb A (Verb C referenced)	Ani-ref	-8.040	4.663	-1.724	.085	
Verb B (Verb C referenced)	Ani-ref	-5.511	4.706	-1.171	.242	
Verb T (Verb A referenced)	Ani-ref	-2.153	1.021	-2.110	.035	*
	Ina-ref	0.240	0.947	0.254	.800	
Verb T (Verb B referenced)	Ani-ref	-4.680	1.365	-3.429	<.001	***
	Ina-ref	-2.543	1.280	-1.986	.047	*
Verb T (Verb C referenced)	Ani-ref	-10.193	4.671	-2.182	.029	*
VJT ($N = 42$)						
Parameter	Animacy	Estimate	*SE*	*z*	*p*	
(Intercept)		2.418	0.326	7.427	<.001	***
Verb A (Verb B referenced)	Ani-ref	-1.873	0.833	-2.248	.025	*
	Ina-ref	-1.960	0.784	-2.499	.012	*
Verb A (Verb C referenced)	Ani-ref	-3.043	0.867	-3.509	<.001	***
Verb B (Verb C referenced)	Ani-ref	-1.170	0.936	-1.250	.211	
Verb T (Verb A referenced)	Ani-ref	-0.387	0.767	-0.505	.614	
	Ina-ref	2.044	0.720	2.840	.005	**
Verb T (Verb B referenced)	Ani-ref	-2.260	0.875	-2.583	.010	**
	Ina-ref	0.084	0.802	0.105	.916	
Verb T (Verb C referenced)	Ani-ref	-3.430	0.904	-3.795	<.001	***

Note. Ani-ref = animate subject referenced, Ina-ref = inanimate subject referenced.

The results for the VPT indicated that all comparisons between the three types of intransitives were statistically significant. This study's university students made more passivization errors; further, they made more mistakes with Verb A than with Verb B ($p = .045$ for animate subjects and $p = .021$ for inanimate subjects). The interactions between Verb T and all types of intransitives revealed significance for both subject animacies; they displayed no significance with inanimate subjects, except for Verb A. The results of the GLMM for VJT demonstrated statistical significance regarding the differences between

Verbs A and C ($p < .001$) but no difference between Verbs B and C ($p = .211$; Table 4). The results obtained from university students (Table 4) differed from those in Okada's study (2022a), as the score for Verb B was high even with inanimate subjects. Verb B with animate subjects had a higher score, while the score for animate Verb T was low, resulting in a significant difference between the two. As with VPT, university students demonstrated the acquisition of Verb B in VJT as well.

University students outscored high school students for Verb T (68% VS 19%), but they scored lower for Verb A (81% VS 89%), as shown in Tables 2 and 3. The former, who seem to have more acquired the passive forms of transitives, applied that form to Verb A (81%), while they did not generally do so for Verb B (95%) and Verb C (99%). The GLMM analysis revealed no statistical difference between the accuracy of Verb T and that of Verb A with inanimate subjects ($p = .800$). Even though the "be + base form" was classified as a passive form in Okada's study (2021), this form written by university students was 1.6% among all the passive answers, fewer than that of the high school students (19.5%). It is assumed that this form decreased along with the acquisition of the passive form. As shown in Table 3, the VJT results in Okada's study (2022a) demonstrate a lower level accuracy rate from 48% to 66% for all the verb classes. As displayed in Table 2, the VJT results of university students show that the accuracy rate of Verb T is 81%, compared to 61% for high school participants in Okada (2022a), implying the university student learners' better understanding of the passive form.

In summary, as the university participants understood passive forms more than the high school students, 97% of Verb C instances were not overpassivized, while Verb A (alternating unaccusatives) was overpassivized with an accuracy rate of 68%. This is in line with the UTH that predicts the overpassivization of unaccusatives may begin at the intermediate learning stage, after awareness of the unaccusative and unergative verb distinctions is developed (Oshita, 2001), although all the case studies demonstrated a non-significant difference between Verb B (non-alternating unaccusatives) and Verb C.

4.2 Overpassivization Errors and Learners' Proficiency Levels

Table 5 shows the frequencies of the target verbs with each subject animacy in the five textbooks used in the participants' high school. The 210 high school participants in Okada (2021, 2022a) only employed two of the five books, and few university participants were expected to have used all five textbooks as high school students. However, since they were all authorized by the Ministry of Education, there is a tendency for input to cater to the university student participants in this study, most of whom just graduated from high schools.

Textbook frequency analysis revealed whether the frequent combination of animate/inanimate subject and verb patterns was less susceptible to overpassivization errors than infrequent patterns. Table 5 reveals that 222 sentences with the target verbs appeared in the five high school textbooks: 33 Verb A (14.9%), 103 Verb B (46.4%), and 86 Verb C (38.7%). Verb A had more inanimate subjects (26/33, 78.8%), while Verb C had more animate subjects (69/86, 80.2%). Verb C terms *run* and *work* with inanimate subjects did not have common meanings pertaining to the movement or function of human beings or animals, except for those of function by mechanics or organizations. Therefore, excluding these meanings, this verb class

had all animate subjects. Verb B had almost the same rates of both subject animacies, even though the term *die* had all animate subjects and the term *fall* had many more animate subjects (71.4%) than inanimate ones.

Table 5

Subjects with Target Verbs in the Five Textbooks

Verb A	Ani	Ina	Total	Verb B	Ani	Ina	Total	Verb C	Ani	Ina	Total
burn	0	3	3	*become*	31	34	65	*run*	19	6	25
change	1	7	8	*die*	9	0	9	*smile*	7	0	7
drop	1	5	6	*disappear*	0	3	3	*swim*	6	0	6
freeze	0	2	2	*exist*	1	4	5	*walk*	13	0	13
grow	5	9	14	*fall*	15	6	21	*work*	24	11	35
Total	7	26	33	Total	56	47	103	Total	69	17	86
Total of all the intransitives									132	90	222

Note. Ani = animate subjects, Ina = inanimate subjects.

University students' proficiency was not statistically significant and the PBCCs were calculated for RQ2 to compare them with those of high school students. The PBCC was between the point for each item of three types of intransitives and the total scores of transitives. Table 6 reveals that all the PBCCs for Verb A from the 210 high school students were negative, indicating that the participants with higher scores on passive transitives were more likely to use passives with Verb A in the VPT. In total, two out of 10 items had a negative coefficient > -0.40, three items > -0.30, and three items > -0.20.

For the 46 university students, five out of 10 Verb A items had negative coefficients > -0.20, and one had a negative coefficient > -0.10, without a different tendency between animacies. Similarly, as for the PBCCs of Verb B, four items (out of five) with inanimate subjects had meaningful negative coefficients > -0.20. The coefficients of items with animate subjects were close to zero, except for one item of Verb B. As for Verb B among university students, two items had negative coefficients > -0.20 and four items had negative coefficients > -0.10. Most items had high accuracy rates, and three items reached 100% accuracy ($SD = 0$).

The PBCC results of high school students from the VJT revealed features considerably different from those of the VPT results. Verb A obtained no items with a meaningful negative PBCC. There was one item with a positive coefficient > 0.10—*grow*—with an animate subject. Next, the results of high school students from the VJT revealed that Verb B attained only one item with a coefficient over 0.10—*die*—with an inanimate subject (0.15).

Table 6

List of the Point-biserial Correlation Coefficients of Unaccusative Verbs

Verb A		VPT		VJT		Verb B		VPT		VJT	
Animacy		US	HS	US	HS	Animacy		US	HS	US	HS
burn	Ina	-0.209	-0.225	0.000	-0.012	*become*	Ina	-0.131	-0.138	-0.095	0.058
	Ani	-0.224	-0.306	-0.119	0.048		Ani	*SD* = 0	0.066	*SD* = 0	0.028
change	Ina	-0.271	-0.320	-0.016	0.041	*die*	Ina	-0.236	-0.370	0.515	-0.147
	Ani	-0.230	-0.088	-0.164	-0.019		Ani	-0.116	-0.123	0.076	-0.038
drop	Ina	-0.087	-0.377	0.303	-0.076	*disappear*	Ina	-0.227	-0.314	0.207	-0.019
	Ani	-0.097	-0.276	0.101	0.037		Ani	0.072	-0.223	0.121	-0.006
freeze	Ina	-0.171	-0.407	0.016	-0.096	*exist*	Ina	*SD* = 0	-0.364	0.009	0.041
	Ani	-0.254	-0.262	-0.062	-0.059		Ani	*SD* = 0	-0.085	0.306	-0.001
grow	Ina	-0.082	-0.548	0.314	0.097	*fall*	Ina	-0.151	-0.418	0.511	-0.049
	Ani	0.074	-0.262	-0.116	0.102		Ani	-0.135	0.069	0.401	0.033

Note. US = university students. HS = high school students. Ani = animate subjects, Ina = inanimate subjects. *SD* = 0 indicates that the accuracy rates of the task sentences are 100% in this study.

The results of university students demonstrated no tendency of the verb classes but of task-based differences. Verb A obtained three negative coefficients > -0.10 and three positive coefficients > 0.10, compared to the negative coefficients of Verb A's nine items in the VPT. In this task, Verb B obtained only one negative coefficient compared to six negative coefficients among 10 task sentences for this verb class in the VPT. Additionally, the results of Verb B revealed five positive coefficients > 0.20 and one coefficient > 0.10.

In summary, both Verbs A and B (with two minor exceptions) had negative coefficients in VPT in both the student groups, suggesting four points. First, overpassivization by the participants who had acquired passive forms of transitives was not unique to a certain verb, rather, it was unique to the verb class. This proves that the accuracy rate was owing to the characteristics of the verb class and not to the individual verbs in the task. Second, with high school students, the PBCCs for *freeze* and *grow* with an inanimate subject revealed meaningful negative coefficients of -0.41 and -0.55, respectively. The input from the five textbooks is a sign of frequency effect, given that there were no active forms with animate subjects/objects, except for the verb *change*. Third, the results of the VPT demonstrated the tendency of all students to make more errors with Verb A than Verb B. Finally, the errors with Verb A increase as proficiency increases with high school students, while the increase of errors is not so large with university students. It can be seen from the results that all the PBCCs for Verb A from the high school students were negative, indicating that the participants with higher scores on passive transitives were more likely to have lower accuracy rates with Verb A in the VPT. On the other hand, the university students' accuracy rates with Verb A did not decrease even as the total scores of Verb T increased with rather small negative and rather positive PBCCs. This suggests that high school students are at the developmental stage of the former half of the U-shape, from the beginning to the intermediate stages, while university students are at that in the latter half, namely from the intermediate to the final stages.

Meanwhile, the VJT revealed results showing that the learners become capable of judging the correct voice even for unaccusative verbs as their mastery of passive forms develops when, and only when, the sentence possesses an animate subject. These findings do not correspond with the UTH, which suggests that learners should become aware of the underlying structure of unaccusative sentences as having patient/target subjects and adopt passive forms. By contrast, subject animacy plays an important role in choosing the voice and interacting with the proficiency level. Unlike the VPT results, the VJT results of university students did not reveal a meaningful negative or a positive PBCC. Thus, while the learners with higher mastery of passive forms began to overly produce passive forms as they learned in an implicit condition, such as the VPT without any direction of the voice choice, they became confused when they were aware of the voice choice as in the VJT.

4.3 Animacy Effect on Voice Choice

Table 7 shows the results of animacy's main effects in VPTs and VJTs for all students whose data were analyzed, excluding the non-significant verbs of *change*, *die*, and *disappear* in both tasks. The main effects of animacy on each verb item of unaccusatives for high school students revealed that in Verb A, three out of five items (*drop, freeze,* and *grow*) in VPT and two items (*burn* and *grow*) in VJT were overpassivized with inanimate subjects significantly more often than with animate subjects (Table 7). As for Verb B, the same three verbs out of five used by the high school students had significantly lower scores with inanimate subjects compared with animate subjects: *become, exist,* and *fall*.

The results of the main effects of subject animacy by university students showed that two out of five Verb A items with inanimate subjects were significantly more overpassivized than they were with animate subjects in both tasks. As Verb A appeared more with inanimate subjects in textbooks (see Table 5), the input of inanimate subject + active form did not work positively for Verb A, which had transitive counterparts with passive forms. As mentioned in Section 4.2, even though few university participants were expected to have used all five textbooks authorized by the Ministry of Education, the input of subject animacy usage would affect the participants in this study. However, the results of Verb B in VJT were more straightforward. In fact, for instance, Verb B item *fall*, having more animate subjects in the input, was overpassivized with inanimate subjects, whereas the term *exist*, having more inanimate subjects in the input, was overpassivized with animate subjects.

In summary, Table 5 shows that, in the five textbooks, there are more inanimate subject sentences than animate ones for Verb A and large numbers of inanimate subject sentences for Verb B. Nonetheless, the results of the main effect of animacy on the scores of each unaccusative verb among high school participants in both tasks showed that two or three verbs from Verb A and three verbs from Verb B were overpassivized with inanimate subjects more than with animate subjects. These tendencies were evident for both tasks with university students with a slightly less statistically significant number of Verbs A and B. Thus, the participants were likely to overpassivize intransitive verbs with inanimate subjects. This result supports the findings of No and Chung (2006), who showed that animate subjects are not accepted in passive sentences by EFL learners. Furthermore, the results of the main effects of subject animacy in university

students' tasks align with the discussion of the results of high school students in that the animacy effect from Agent First/First Noun Principles (Jackendoff, 2002; VanPatten, 1996) continued for Verb A, while the frequency effect of positive input worked for Verb B later in the developmental phase.

Table 7

Main Effects of Animacy on the Accuracy of Unaccusative Verbs

Verb A	US					HS				
VPT	Estimate	*SE*	*z*	*p*		Estimate	*SE*	*z*	*p*	
burn	-0.784	0.558	-1.405	.160		0.536	0.323	1.659	.097	
change	-3.272	2.516	-1.300	.194		0.641	0.517	1.239	.215	
drop	-15.565	5.309	-2.932	.003	**	-2.940	0.982	-2.994	.003	**
freeze	2.370	1.991	1.191	.234		-2.298	0.780	-2.947	.003	**
grow	-1.954	0.799	-2.447	.014	*	-0.962	0.280	-3.340	< .001	***
VJT	Estimate	*SE*	*z*	*p*		Estimate	*SE*	*z*	*p*	
burn	-1.912	0.700	-2.734	.006	**	-0.771	0.206	-3.747	< .001	***
change	-0.175	0.593	-0.295	.768		0.148	0.206	0.718	.472	
drop	-7.192	0.002	-4.142	<.001	***	-0.116	0.206	-0.562	.574	
freeze	-0.230	0.680	-0.338	.735		-0.209	0.219	-0.952	.341	
grow	-1.198	0.614	-1.953	.051	.	-1.419	0.241	-5.875	< .001	***
Verb B	US					HS				
VPT	Estimate	*SE*	*z*	*p*		Estimate	*SE*	*z*	*p*	
become	-689.82	26.14	-26.39	<.001	***	-8.712	1.808	-4.818	< .001	***
die	0.907	1.421	0.638	.523		0.302	0.306	0.987	.323	
disappear	0.136	1.473	0.092	.926		-0.919	0.720	-1.276	.202	
exist	*SD* = 0					-4.085	1.461	-2.796	.005	**
fall	-1.609	1.119	-1.439	.150		-3.480	1.023	-3.401	< .001	***
VJT	Estimate	*SE*	*z*	*p*		Estimate	*SE*	*z*	*p*	
become	-34.630	44.670	-0.775	.438		-1.283	0.280	-4.579	< .001	***
die	-0.817	0.677	-1.206	.228		0.042	0.205	0.205	.838	
disappear	-0.817	0.677	-1.206	.228		0.069	0.199	0.349	.727	
exist	15.954	6.994	2.281	.023	*	-0.778	0.231	-3.365	< .001	***
fall	-1.785	0.690	-2.587	.010	**	-1.458	0.242	-6.021	< .001	***

Note. US = university students. HS = high school students. Ani = animate subjects, Ina = inanimate subjects.

5. General Conclusions and Future Implications

5.1 General Conclusions

Through the results of this study, we identify the following key points. As learners grow in terms of proficiency, they develop the ability to use passive forms correctly. Since the university student participants in this study revealed to understand the passive forms more correctly than the high school students in the author's previous studies, the results show that after mastering passive forms, they can use an animate subject as an agent in an active sentence and as an inanimate subject in a passive sentence, as expected by

Agent First/First Noun Principles and the universal unmarkedness of "subject agent (animate) + active form" argument structures (Aissen, 1999). Therefore, learners overpassivize intransitive verbs with inanimate subjects more often than with animate subjects. These results align with Otaki and Shirahata's findings (2017), confirming that Japanese EFL learners make more voice errors with intransitive verbs together with inanimate subjects. Therefore, learners' overpassivization errors are not owing to the distinction of unaccusatives and unergatives but the distinction with respect to subject animacy. Additionally, the results show that learners appear to be misled into thinking that alternating unaccusatives can be used in passive form, while non-alternating unaccusatives are affected by input frequency which overrides the animacy effect.

5.2 Research Limitations and Implications for EFL Teaching

It is crucial to note that this study presents two limitations. First, with the unbalanced numbers of participants (210 high school and 50 university students), clear comparisons could not be made. Second, the participants were selected from one university only and were majoring in to fields only: technology and agriculture. Future research would benefit from a larger number of participants, at least 200, with an equal number of high school and university students, as well as the inclusion of more universities and learning fields.

The findings have two major implications for language teachers. First, teachers should promote and prioritize learners' English proficiency, including the acquisition of passive forms. Second, teachers should provide learners with explicit instructions to enhance their implicit learning (e.g., alerting students to sentences with the same target verb used as different verb classes, different voice forms, or sentences with the same target verb). Thus, teachers should encourage learners to thoroughly comprehend the sentence pattern "inanimate subject + active forms" and to avoid the overpassivization errors of intransitive verbs.

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Appendices

Appendix 1

Numbers and Rates of the Verb Forms Answered by the University Students in VPT

	Classification of voice forms of the target verbs				Total
Voice	No	Classification criteria	Total	Rate	rate
Active	1	base, basic and perfect tense forms	1,224	66.5%	
	2	progressive (basic and perfect tenses)	61	3.3%	
	3	+*ed* (irregular verbs) without *be*	61	3.3%	
	4	+*ing* without *be*	20	1.1%	
	5	*have/has/had* + base or *ing* form	7	0.4%	74.6%
Passive	6	*be* + past participle or +*ed* (irregular verbs)	418	22.7%	
	7	be + base form	7	0.4%	
	8	*be* + third person singular present-tense forms or past-tense forms	0	0.0%	23.1%
Unclear	9	+*ed* (irregular verbs) without *be*	13	0.7%	
	10	(*be*+) to + base, basic and perfect tense forms or participles	0	0.0%	
	11	other parts of speech, *make*+O+C	29	1.6%	2.3%
Unanswered	12	no answer	0	0.0%	
	13	answer with the words in [ ]	0	0.0%	0.0%
Total			1,840	100%	

Note. Classification No. 7 *be* + base form, was classified as a passive form in this study. It is partly because the high school students in this research have not completely mastered conjugation forms. In addition, it is partly because it is difficult to judge whether the participants produced *be* + base form as a passive form or not, having many verbs with the same forms of past participles as base or past forms. Thus, the answers including *be* copula could not be judged as active forms and then they were classified as passives.

Appendix 2

Numbers and Rates of the Verb Forms Answered by the High School Students in VPT

(Calculated form the original data of Okada [2022a])

	Classification of voice forms of the target verbs				Total
Voice	No	Classification criteria	Total	Rate	rate
Active	1	base, basic and perfect tense forms	5,049	60.1%	
	2	progressive (basic and perfect tenses)	320	3.8%	
	3	+*ed* (irregular verbs) without be	246	2.9%	
	4	+*ing* without *be*	1,380	16.4%	
	5	*have/has/had* + base or *ing* form	73	0.9%	84.14%
Passive	6	*be*+ past participle or +*ed* (irregular verbs)	574	6.8%	
	7	*be* + base form	149	1.8%	
	8	*be* + third person singular present-tense forms or past-tense forms	42	0.5%	9.11%
Unclear	9	+*ed* (irregular verbs) without *be*	84	1.0%	
	10	(*be*+) to + base, basic and perfect tense forms or participles	328	3.9%	
	11	other parts of speech, *make*+O+C	67	0.8%	5.70%
Unanswered	12	no answer	54	0.6%	
	13	answer with the words in [ ]	34	0.4%	1.05%
Total			8,400	100%	

Appendix 3

GLMM Results of the Main Effects and Interactions of Verb Classes, Proficiency, and Subject Animacy as Fixed Effects and Participants and Items as Random Effects (VPT)

Parameter	Animacy	Estimate	*SE*	*z* value	Pr(>|z|)	
(Intercept)		5.138	1.623	3.166	.002	**
Verb A (Verb B referenced)	Ani-ref	-2.527	1.260	-2.006	.045	*
	Ina-ref	-2.783	1.209	-2.302	.021	*
Verb A (Verb C referenced)	Ani-ref	-8.040	4.663	-1.724	.085	.
Verb B (Verb C referenced)	Ani-ref	-5.511	4.706	-1.171	.242	
Verb T (Verb A referenced)	Ani-ref	-2.153	1.021	-2.110	.035	*
	Ina-ref	0.240	0.947	0.254	.800	
Verb T (Verb B referenced)	Ani-ref	-4.680	1.365	-3.429	<.001	***
	Ina-ref	-2.543	1.280	-1.986	.047	*
Verb T (Verb C referenced)	Ani-ref	-10.193	4.671	-2.182	.029	*
Proficiency		0.198	0.730	0.272	.786	
Proficiency : Verb A (Verb B referenced)	Ani-ref	0.572	0.605	0.945	.345	
	Ina-ref	0.177	0.542	0.328	.743	
Proficiency : Verb A (Verb C referenced)	Ani-ref	-0.104	2.978	-0.035	.972	
Proficiency : Verb B (Verb C referenced)	Ani-ref	-0.676	2.997	-0.225	.822	
Proficiency : Verb T (Verb A referenced)	Ani-ref	0.378	0.560	0.675	.499	
	Ina-ref	-0.072	0.556	-0.130	.897	
Proficiency : Verb T (Verb B referenced)	Ani-ref	0.950	0.772	1.230	.219	
	Ina-ref	0.105	0.737	0.143	.887	
Proficiency : Verb T (Verb C referenced)	Ani-ref	0.275	2.980	0.092	.927	
Animacy		0.090	0.550	0.165	.869	
Animacy : Verb A (Verb B referenced)	Ani-ref	-0.255	1.358	-0.188	.851	
Animacy : Verb T (Verb A referenced)	Ani-ref	2.393	1.226	1.952	.051	.
Animacy : Verb T (Verb B referenced)	Ani-ref	2.138	1.366	1.565	.117	
Proficiency : animacy		0.275	0.250	1.101	.271	
Proficiency : Verb A : animacy (Verb B referenced)	Ani-ref	-0.394	0.744	-0.530	.596	
Proficiency : Verb T : animacy (Verb A referenced)	Ani-ref	-0.450	0.476	-0.946	.344	
Proficiency : Verb T : animacy (Verb B referenced)	Ani-ref	-0.845	0.751	-1.124	.261	

Note. The results for main effects and interactions “Proficiency”, “Animacy” and “Proficiency : animacy” were obtained through analysis with contrast cording treatment to recenter the categorical variables: four types of verbs and both animacies.

Appendix 4

GLMM Results of the Main Effects and Interactions of Verb Classes, Proficiency, and Subject Animacy as Fixed Effects and Participants and Items as Random Effects (VJT)

Parameter	Animacy	Estimate	*SE*	*z* value	Pr(>|z|)	
(Intercept)		0.261	0.104	2.502	.012	*
Verb A (Verb B referenced)	Ani-ref	-0.316	0.364	-0.868	.385	
	Ina-ref	-0.181	0.364	-0.498	.619	
Verb A (Verb C referenced)	Ani-ref	-0.641	0.316	-2.028	.043	*
Verb B (Verb C referenced)	Ani-ref	-0.325	0.318	-1.022	.307	
Verb T (Verb A referenced)	Ani-ref	0.048	0.386	0.125	.900	
	Ina-ref	1.032	0.349	2.955	.003	**
Verb T (Verb B referenced)	Ani-ref	-0.268	0.389	-0.690	.490	
	Ina-ref	0.851	0.351	2.427	.015	*
Verb T (Verb C referenced)	Ani-ref	-0.593	0.342	-1.732	.083	.
Proficiency		0.184	0.034	5.347	<.001	***
Proficiency : Verb A (Verb B referenced)	Ani-ref	-0.179	0.100	-1.789	.074	.
	Ina-ref	-0.020	0.097	-0.206	.837	
Proficiency : Verb A (Verb C referenced)	Ani-ref	-0.298	0.089	-3.347	<.001	***
Proficiency : Verb B (Verb C referenced)	Ani-ref	-0.119	0.096	-1.237	.216	
Proficiency : Verb T (Verb A referenced)	Ani-ref	-0.093	0.105	-0.885	.376	
	Ina-ref	0.264	0.099	2.677	.007	**
Proficiency : Verb T (Verb B referenced)	Ani-ref	-0.271	0.112	-2.428	.015	*
	Ina-ref	0.244	0.102	2.392	.017	*
Proficiency : Verb T (Verb C referenced)	Ani-ref	-0.390	0.098	-4.002	<.001	***
Animacy		-0.251	0.223	-1.125	.260	
Animacy : Verb A (Verb B referenced)	Ani-ref	0.135	0.514	0.263	.792	
Animacy : Verb T (Verb A referenced)	Ani-ref	0.984	0.519	1.897	.058	.
Animacy : Verb T (Verb B referenced)	Ani-ref	1.119	0.520	2.154	.031	*
Proficiency : animacy		-0.117	0.058	-2.028	.043	*
Proficiency : Verb A : animacy (Verb B referenced)	Ani-ref	0.159	0.133	1.196	.232	
Proficiency : Verb T : animacy (Verb A referenced)	Ani-ref	0.357	0.136	2.627	.009	**
Proficiency : Verb T : animacy (Verb B referenced)	Ani-ref	0.516	0.137	3.755	<.001	***

Note. The results for main effects and interactions “Proficiency”, “Animacy” and “Proficiency : animacy” were obtained through analysis with contrast cording treatment to recenter the categorical variables: four types of verbs and both animacies.