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The Role of Recasts in EFL Learning: Does Working Memory Interfere?

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Abstract. The view of learning from our errors in an EFL learning context as the subject of myriad applied linguistic studies has not yet taken root. Thus, the impact of extensive and intensive recasts on grammatical and lexical development in EFL context along with the students' insights of recasts and the role of working memory was evaluated in this

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study and a quasi-experimental design was employed. The participants included 59 Iranian EFL students. Instruments of the study included an Oxford placement test of English, speaking and writing assignments and a working memory survey. Five short stories were presented during the experiment. The intensive recast group received feedback only on articles and theme words whereas the extensive recast group received feedback on any mistake that occurred throughout communication. The ANOVA results showed that recasts had a helpful effect on EFL learning. A large effect size was indicated for the intensive group, outscoring the extensive group and the control group. Chi-square analysis of the interviews demonstrated a significant and positive difference in the perception of recasts by students of the intensive condition. Working memory was also positively correlated with the scores of learners in the intensive group. Therefore, higher SD learners revealed a higher improvement on oral tasks while higher AD learners were greater on the written tasks. A thorough study of the results implies a rich ground on the effect of recasts and WM in education, helping both teachers and students to a great extent in their teaching and learning journey.

Keywords: EFL grammar, EFL vocabulary, extensive recasts, intensive recasts, working memory

1. Introduction

Applied linguistics research has seen different concepts focused on explaining the way to teach grammar and enhancing the precision of EFL students' output over the past years. An impressive method that has appealed to scholars is recognized as Focus on Form (FOF). This focus on form method denotes several strategies that lead students' focus to language components in receptive or productive forms while accomplishing meaning-oriented tasks.

FOF, as described by Kim and Nassaji (2017), is an instructional plan which precisely guides students' emphasis on structure while the main attention stays on the meaning. Some non-collaborative FOF methods like Textual Enhancement (TE) are utilized for using and improving the accuracy of definite target constituents in text via capitalizing, boldfacing, or underlining those constituents in text. Alternatively, collaborative FOF methods, like recasting students' errors, are employed to improve the accuracy of definite target structures while communicating by pointing to inaccurate structures generated by students.

Despite its extensive acceptance in general parlance, the notion that we learn from our mistakes has long been a major cause of discussion in the realm of Second Language Acquisition (SLA). Although the highly corrective, form-focused and audio-lingual approach has been criticized for not achieving enough success to promote abilities to be linked to the real-world communication (Richards & Rodgers, 2001), the more permissive meaning-based method of communicative language teaching has also been underestimated for its limitations based on fostering target-like productive accuracy (Hammerly, 1987; Harley & Swain, 1984; Swain, 1985). Today, the English as a Foreign Language (EFL) pedagogical burden is leaning on the support of more methodologically wise strategies such as Focus on Form. Yet, different ideas last to the extent to which corrective feedback is of real use, if not essential. Hence, this paper attempts to bridge this flickering gap by scrutinizing the ambiguous role of corrective feedback functionality in EFL development.

A significant factor in the study of recasts is related to how they are delivered. For instance, recasts could be delivered through declarative statement forms to check the students' opinions or through interrogative statement forms to look for the comprehensibility of message. They could be delivered via enhanced or unenhanced forms of recasts, full or partial which is done by correcting only a few mistakes or including more revisions. Recasts could also be offered intensively containing certain preselected errors or extensively containing a great number of mistakes (e.g., Ellis, Basturkmen, & Loewen, 2001; Hawkes & Nassaji, 2016; Nassaji, 2007, 2009). This study indicates valuable results considering the effect of intensive and extensive recasts on EFL development within the teaching community.

Working Memory (WM) is also considered to highlight and affect noticing collaborative recasts (e.g., Mackey, Philp, Fujii, Egi, & Tatsum, 2002; Sagarra, 2007). Processing a recast requires evoking both an individual's statement and the recast; thereafter, students are equipped to make the necessary comparisons between the two. A comprehensive study of the effect of WM and recasts helps both teachers and students to a great extent in their teaching and learning journey.

2. Literature Review

2.1 Recasts in EFL

From a theoretical perspective, many advantages were reported for recasts, starting from attracting the student's focus on structure to presenting opportunities for good and bad proofs, bridging the gap and revised production (Gass, 2003; Goo & Mackey, 2013; Nassaji, 2007, Leeman, 2003; Long, 2007). However, despite several theoretical advantages for recasts, some investigators did not reach an agreement on the amount of support that recasts could provide for language acquisition. The findings of Lyster's study (Panova & Lyster, 2002) in content-based lessons demonstrated that even though recasts offer students "exemplars of what is possible in the L2 [second language]recasts do not convey to learners what is unacceptable in the language," mostly once they are delivered within communicative settings (p. 75).

As a result of different academic profits ascribed to recasts and discussions concerning their success, several research studies examined their efficacy in different contexts. The results of these investigations were summarized in some evaluations and metanalyses of research (e.g., Li, 2010; Lyster & Saito, 2010; Mackey & Goo, 2007; Nassaji, 2013, 2015, 2016; Russell & Spada, 2006), revealing that recasts might be helpful for language learning as a whole. Nevertheless, the issue surrounding the most effective type of recasts was not entirely answered.

2.2 Working memory and EFL

Sawyer and Ranta (2001) related working memory to language skill since it involves attention procedures critical in Second Language Learning (e.g., noticing). They believed that working memory is also active in a temporary cognitive ground that unites some other elements of aptitude like grammatical understanding, memory skill and phonemic coding skill. Robinson (2005) asserted that individual peculiarities in working memory alongside other cognitive skills tend to be significant causes of the amount of learning resulting from recasts. He particularly believed that the capacity of phonological working memory and pace, assist students to preserve the inaccurate structure and the target-like recast in working memory as long as necessary so that the systematic cognitive

comparison can occur.

Most contingent to this paper, the capacity of complex verbal working memory was suggested as an aspect affecting the degree to which students grasp and remember recasts (N. Ellis, 2005). However, thus far, the findings of studies concerning the association between the success of recasts and the capacity of complex working memory were varied. Concerning working memory capacity, Mackey et al.'s research (2002) recommended that based on the measurement of a merged score of Phonological Short-Term Memory (PSTM) and the extent of listening assignments, it might mediate the connection between recasts, perception and progress in forming EFL questions. These research scholars stated that students with higher working memory marks demonstrated a higher extent of noticing recasts compared to students with lower working memory marks, and the higher working memory students attained larger development over a long period. Remarkably, the students with lower working memory revealed more considerable instant achievements. On the other hand, Trofimovich et al. (2007) did not identify any substantial effect for complicated working memory capacity while assessing the impacts of complicated working memory capacity, PSTM, systematic skill and controlling focus on the capability of noticing and grasping from computer-assisted recasts.

A potential advantage of recasts as stated by McDonough (2005) is that it might encourage students to revise their production and hence assist in automating and increasing their language skills. According to Kormos (2006), if an error is identified and a right answer is repeated in short-term memory (like when students instantly correct their production), the subsequent long-term memory (LTM) hint might contribute to the proceduralization of declarative data and providing learnt answers.

In summary, despite the current literature outlining the importance of recasts, it was noticed that there are still some obstacles concerning the effect of recasts and the role of different presentation methods. How various approaches might affect the outcome has been neglected to some extent. On this token, the present study attempted to bridge the gap with the assessment of new methods, providing the opportunity for instructors to improve the manner in which they respond or provide feed-

back on students' errors. For instance, the instructor might choose to provide indirect feedback for the students. Integrating the role of WM capacity with recasts added a more thorough and novel understanding of the literature as well.

3. Research Questions

The present study attempted to answer the following research questions:

1. Does intensive or extensive vocabulary and grammar recast affect the development of EFL learners in these two language components?

2. If yes, which treatment group impacts these two language divisions better?

3. How do learners perceive the effect of intensive or extensive recasts on different forms of outcome estimations?

4. Does working memory capacity account for the impacts of recasts on different forms of outcome estimations?

4. Method

4.1 Design

This research followed a quasi-experimental design engaging three intact classes as two treatment conditions and a control condition. Firstly, learners participated in the pretest and then joined five experimental lessons. They took the posttest after the final experimental lesson, followed by stimulated recall interviews. Later, they filled out the Working Memory Questionnaire (WMQ). A pilot study was accomplished preceding the main research to check the validity of the instruments. The independent variables cause a change in the dependent variables; hence, independent variables of the study include the treatments applied in three conditions and students' performance is the dependent variable. The following groups were considered in the present study:

- Intensive vocabulary and grammar recast condition
- Extensive vocabulary and grammar recast condition
- Control condition

4.2 Participants

The participants of this research included 59 Iranian EFL students registered in three intermediate level courses in an online English language institute in Iran. The participants included 32 women and 27 men with an age range of 17 to 35. Convenient sampling was followed to select learners who fit the research purpose. The sampling criteria included learners' proficiency in English. Therefore, those learners who had studied standard general English for at least 5 years with the language institute were chosen for further examination. However, a placement test was also applied to proceed the research with more certainty about the learners' experience in learning English language. All participants' first language was Persian which removes the effect of systematic bias. An EFL instructor with native-like proficiency helped conduct the experiment. The reason behind choosing one instructor was to present an equal performance quality and a thorough impression of the whole experiment.

4.3 Instruments

To collect the data, four instruments were employed: an Oxford placement test of English, a speaking and a writing assignment and a working memory survey. Employing multiple measures rather than a single measure (e.g. Ellis, Loewen, & Erlam, 2006) was highly recommended by researchers in the literature; therefore, both speaking and writing assignments were performed to grasp more comprehensive results of the learners' English language understanding. Moreover, a writing test is a different approach toward testing the participants as learners need more time to plan and edit the product while these features are not present in a speaking activity. Two different formats of both tests were applied for the pretest and the posttest. Moreover, a working memory survey was applied to evaluate the relative effect of the experiments. A thorough description of each is presented below.

4.3.1 Oxford placement test of English

Two separate tests of English (i.e., a grammar level test and a vocabulary level test) were presented to the learners to assess their homogeneity level before the experiment. Both tests contained 40 multiple-choice questions (Oxford test of English, 2021). Their overall score and proficiency level

was shown by the website after completion.

4.3.2 The picture description activity (PDA)

The oral activity was employed to assess students' knowledge of using the target structures in a meaning-oriented unrestricted production activity. Learners were requested to explain sequenced pictures portraying a story within seven minutes based on the results of the pilot study. The instructor started by asking some comprehension check questions combined with learners' L1 to ensure that the participants realized the concept and objective of the task before starting the main test. Then, each learner could narrate the story with the help of the pictures. Three experts attempted to help the researcher to select materials with the same level of difficulty for the entire experiment, involving target terminologies and grammar constructions. The testing sessions were recorded and transcribed for further analysis. Obligatory contexts for using target terminologies and structures were ascertained (Pica, 1984). This obligatory setting was proven in the pilot study with a similar population. The tasks were supposed to involve implicit knowledge more than explicit knowledge as descriptions engaged the natural use of language concentrating on meaning, without asking students to examine language constructions (Ellis et al., 2009).

Participants' scores were calculated by dividing the amount of accurate aimed structures by the total amount of essential and unessential settings where the erroneous aimed structures were employed in the learners' performance (Rassaei, 2020). Another rater also assessed 20 percent of the tests to guarantee inter-rater reliability.

4.3.3 The story writing activity (SWA)

This story writing task was employed in this research to evaluate the students' active knowledge of the target structures in a writing exam. Hence, learners were requested to study a short story for each session for about fifteen minutes. The length of each short story was around 700 words. A similar procedure as the picture description task was followed to guide and ensure the thorough comprehension of the learners. Then, they began rewriting the story. The same scoring method was also conducted to evaluate the tests. This task contained explicit knowledge as it pro-

vided learners with enough time to monitor their draft as well as implicit knowledge where it first involves a natural meaning-focused performance.

4.3.4 Stimulated recall interviews

To assess and compare the relative effect of different experiments identified by learners, their insights of extensive and intensive vocabulary and grammar recasts in the experiment were collected through stimulated recall interviews after the other two tests. In this vein, the instructor asked the learners to listen to the already recorded sections and explain what happened during the interaction lessons. Hence, each student's interaction during the recorded sessions was obtained and analyzed carefully for distinguishing the details.

Moreover, each learner had received some instructions before they attended the interview which involved the following plan: (1) please carefully observe the video that contains a collaboration part of your story description lessons, (2) try to remember that moment when you were engaged in the collaboration activity and (3) describe what was going on throughout the whole interaction comprehensively (Rassaei, 2020). The interviews were performed in the learners' L1 to assist the report. They had the freedom to pause and listen to the audio several times. Each interview took about 20 minutes.

4.3.5 The working memory questionnaire

A revised format with the Persian translation of the Working Memory Questionnaire (WMQ) designed by Vallat-Azouvi, Pradat-Diehl and Azouvi (2012) was employed after the treatment. This survey contained three concepts: short-term storage, attention and executive control. An equal number of items in a stable pseudo-random order was provided to prevent any bias (Vallat-Azouvi et al., 2012). The first part (short-term storage) assessed the capability to bear data in short-term memory for a short period (e.g., "Do you find it difficult to remember the name of a person who has just been introduced to you?"). The second part (attention) pointed out distraction and mental processing challenges (e.g., "Do nearby conversations disturb you during a conversation with another person?"). The third part (executive control) examined decision-making

and planning parts (e.g., "Do you find it difficult to carry out an activity with chronological steps?").

Each item was marked based on a five-point Likert-type scale, ranging from 0 ("Not at all") to 4 ("Extremely"). Three sub-scores were calculated for each of the three fields (maximal score 40 for each) in addition to a total score (out of 120). Higher scores were linked to more difficulties. The study indicated the reliability of the WMQ as 0.89 measured by Cronbach's alpha (Vallat-Azouvi et al., 2012).

4.3.6 Target linguistic structures

The target forms were grammatical functions of English articles (namely, "the" and "a") and theme vocabularies based on the story subject. Several EFL learners encounter difficulties in learning English grammar regardless of their background (Butler, 2002). The present study aimed at the indefinite article "a" to denote something or someone in the initial reference and the definite article "the" to denote something or someone in subsequent references. Other conventional, non-referential and generic functions of articles were not counted in this research because of the challenging essence of English article rules. Moreover, the different phonetic and grammatical rules of Persian language in comparison with the English language rules highlight the difficulties that learners face during the learning procedure. Therefore, English articles and topic-related terminologies were employed as target constructions as they could securely be induced from students throughout interactive and meaning-oriented assignments.

4.4 Data collection procedures

A pilot study was performed before the main research to remove the potential barriers with a smaller but similar population. Two TEFL experts meticulously reviewed the instruments to ensure their validity. Based on the received feedback, some revisions were done to the translated version of WMQ.

At first, two separate Oxford online tests were applied. The reliability of the Oxford tests (i.e., vocabulary and grammar) was assessed by measuring Cronbach's alpha on the 40 items of each test separately. Estimations of Cronbach's alpha reliability were shown to be 0.82 and 0.86

for vocabulary and grammar tests, respectively. Participants who were found to be homogeneous participated in the PDA and the SWA. The intensive recast team had feedback only on articles and theme words whereas the extensive recast group received feedback on both article and lexical errors as well as any other mistakes that occurred parenthetically throughout communication. The control group received no feedback. The number of target structures for each treatment session was around 30 definite articles, about 20 indefinite articles and about 18 target vocabularies. Accordingly, five short stories were selected for the present study.

The recasts groups: For the intensive and extensive recasts' conditions, participants were presented with a short story of about 700 words in each session and were requested to read the story within 10 minutes. The text was deleted from the screen after the time limit ended and they were sent into equal groups and engaged in retelling the story. The instructor was conscious about giving equal chance of exposure to all the learners. Other learners were also asked to listen to the other groups' presentations. Each group presentation took around five minutes. While narrating the story, the instructor presented an intensive or extensive recast based on the treatment condition for each target error uttered by learners. The objective was to present an equal input and recast to the entire class. In the extensive group, some other mistakes such as the absence of subject-verb agreement, inappropriate use of the tenses and some vocabulary mistakes in addition to the target-related mistakes were also modified through recasts by the teacher. The recasts type was mostly declarative with no further emphasis, recurrence or verbal reminders (Nassaji, 2009). Furthermore, the entire recasts lessons were recorded to assist the interviews later on. Some examples of the study are presented in the following table to clarify the concept in detail.

Table 1 demonstrates samples of recasts employed in the extensive and intensive recast conditions. The first part indicates instances from students in the extensive recast condition which covered feedback on the other occurred errors as well as the target linguistic structures (i.e., article and target vocabulary usage) while the second part shows samples from the intensive group where no feedback on non-target forms was

offered by the instructor.

Table 1: Samples from the extensive and intensive recasts groups

Samples from the extensive recast group	
Sample 1: Target Grammar Feedback	Sample 2: Target Vocabulary Feedback
Student: He is cutting tree.	Student: The man is eating *ref -- , snacks!*
Teacher: He is cutting the tree. (recast)	Teacher: The man is eating refreshments. (recast)
Example 3: General Feedback	
Student: The cat was *terrifying*.	
Teacher: The cat was terrified. (recast)	
Samples from the intensive recast group	
Sample 1: Target Grammar Feedback	Sample 2: Target Vocabulary Feedback
Teacher: Why do you think she is surprised?	Student: The dogs entered through the *wood door*.
Student: Because he ate all desert.	Teacher: fence. (recast)
Teacher: the desert. (recast)	
Example 3: No Feedback	
Student: He *lost* the bus.	
Teacher: Did he arrive late? (no feedback)	

The control group: The materials for the control group were similar to the experimental group except for the fact that they were presented without recasts.

The inter-rater reliability for the PDA and SWA was checked by a second rater who examined 20 percent of the entire students' products in pretests and posttests. 0.92 agreement in PDA and 0.96 agreement in SWA was estimated between the two raters by using simple percentage agreement. The correlation between the control group's scores in the pretest and posttest also showed an estimation of test-retest reliability of 0.86 for the PDA and 0.79 for the SWA, in order.

The estimation of Cronbach's alpha reliability for the WMQ was 0.87 revealing good reliability. The evaluation of internal validity of the

scale showed that the three sub-scores were meaningfully correlated with each other (Spearman's Rho ranging from 0.45 to 0.59, Sig. = .0001) and significantly correlated with the total score as well (Spearman's Rho ranging from 0.79 to 0.89, Sig. = .0001).

5. Results

To examine the normal distribution of data based on the Oxford test results, the Kolmogorov-Smirnov statistics were applied. The findings do not display a meaningful difference between the groups; hence, it can be stated that all three groups were homogeneous before the experiment (Sig. value of more than .05). To understand whether intensive or extensive vocabulary and grammar recasts have any effect on the improvement of EFL students in these two language constituents, descriptive and inferential statistics for the students' marks were employed for both the PDA and the SWA in each group.

Table 2: Descriptive data for students' performance in PDA and SWA

		Pretest		Posttest	
	N	Mean	SD	Mean	SD
Intensive Recast Condition in PDA	20	36	7.7	58	7.2
Extensive Recast Condition in PDA	20	35	6.8	53	5.9
Control Condition in PDA	19	34	7.1	35	6.8
Intensive Recast Condition in SWA	20	35	8.1	60	4.2
Extensive Recast Condition in SWA	20	34	6.9	56	4.9
Control Condition in SWA	19	36	7.5	38	8.1

Table 2 shows that the sum of experimental mean scores enhanced from pretests to posttests. Besides, the mean scores dedicated to the intensive

recast condition seem to be higher than the other groups in both oral and written tests. The next highest mean score belongs to the extensive recast condition and the control group comes last. To further understand the significance of the findings, ANOVA calculations were considered.

Table 3: One-way ANOVA results in pretests versus posttests

		Pretests		Posttests	
	df	P-value	Sig.	P-value	Sig.
Between	2	PDA = .31	PDA = .37	PDA = 46.2	PDA = .001
Within	56	SWA = .42	SWA= .61	SWA = 39.3	SWA = .001
Total	58				

Concerning the PDA, the findings of one-way ANOVA in Table 3 revealed no meaningful differences among the conditions in the pretests, F (2,56) =.31, Sig.=.37. In the same way, the findings demonstrated no meaningful differences among the conditions in the pretest with regard to the SWA, F (2.56) =.42, Sig.=.61. The posttest scores on the PDA indicated a meaningful effect for the experimental groups, $F(2.56) = 46.2.Sig. < .001$. The SWA data also showed meaningful alterations among the conditions, $F(2.56) = 39.3, Sig. < .001$. To further evaluate students' development throughout time in the effect of the treatment circumstances, mixed between-within-group ANOVA was performed on participants' scores in the pretests and the posttests.

In relation to the PDA, the findings demonstrated main impacts for time $F = 151, Sig. < .001, \eta p^2 = .58$, the treatment groups $F = 22.1, Sig. < .001, \eta p^2 = .57$, and the connection between time and the experiment $F = 25.3.Sig. < .001, \eta p^2 = .51$. These results present proof that the students' English language ability has increased over time as a result of the experiment. They also note the fact that the two experimental groups had various impacts on students' enhancement throughout time. Concerning the SWA, the findings of mixed between-within group ANOVA in Table 4 described main effects for time, $F = 48.1, Sig. < .001, \eta p^2 = .34$, treatment conditions, $F = 20.7, Sig. <$

$.001, \eta p^2 = .34$, and also the connection between time and experimental groups, $F = 20.6. Sig. < .003, \eta p^2 = .44$.

Table 4: Mixed between-within-group ANOVA results concerning the effect of time

	F	Sig.	Partial Eta Squared
Time	PDA = 151	PDA = .001	PDA = .58
	SWA= 48.1	SWA= .001	SWA= .34
Experiment	PDA= 22.1	PDA = .001	PDA = .57
	SWA= 20.7	SWA= .001	SWA=.34
Time * Experiment	PDA = 25.3	PDA = .001	PDA = .51
	SWA= 20.6	SWA= .003	SWA= .44

The results of descriptive and inferential data (i.e., mean and ANOVA) for the first research question (1. Does intensive or extensive vocabulary and grammar recast affect the development of EFL learners in these two language components?) indicated a positive effect of the experiment on students' scores improvement.

The significance of the results indicated for the first research question, further consolidates the mean scores provided in Table 2 in response to the second research question (2. If yes, which treatment group impacts these two language divisions better?). In this vein, the intensive recast condition presented the best treatment results followed by the extensive recast condition and the control group, respectively. However, to specify the strength of the difference between groups or the effect of the independent variable, the effect sizes were pursued to differentiate between groups. Cohen's D describes the difference between groups based on the standard deviation unit as: small 0.2, medium 0.5 and large 0.8 (Pallant, 2013). Table 5 demonstrates Cohen's D effect size for comparisons between conditions in the posttests.

Table 5: Summary of effect sizes (Cohen's D)

	PDA	SWA
Intensive Recasts versus Extensive Recasts	1.1	1.2
Intensive Recasts versus Control	2.1	2.3

As Table 5 indicates, the effect size values for the joint language components (i.e., vocabulary and grammar) in the intensive recasts condition compared to the other two groups disjointedly are large to very large.

To realize learners' perceptions of the different treatment recasts groups in the third research question (How do learners perceive the effect of intensive or extensive recasts on different forms of outcome estimations?), learners' comments were coded and analyzed. Their ideas were divided into three categories and coded: a) full comprehension of the recast, b) partial comprehension of the recast and c) absent comprehension of the recast. If a learner could recognize the nature of the mistake for which he or she received feedback, that feedback was marked as "full comprehension". If a learner could recognize the corrective essence of the feedback but was unsuccessful to notice the mistake for which he/she received the feedback, that feedback was called "partial comprehension". If a learner did not succeed to identify the feedback as corrective in connection to the mistake, that case was coded as "absent comprehension". The following instances describe how each category was coded in this study:

a) Full comprehension:

Interviewee: I had an error. You corrected my error.

Interviewer: What was the error?

Interviewee: I used "a" instead of "the" for tree.

b) Partial comprehension:

Interviewee: Maybe I made a mistake, I think!

Interviewer: What was that mistake?

Interviewee: .Ur.I don't know.

c) Absent comprehension:

Interviewee: You repeated my sentence.

Interviewer: Why?

Interviewee: [silence]

Totally, 666 stimulated recall feedbacks were identified and coded for

examination. Table 6 reveals the frequencies for each category based on the overall data.

Table 6: The frequency of students' understanding of recasts

	Full Comprehension		Partial Comprehension		Absent Comprehension	
	F	%	F	%	F	%
Extensive Recast	106	32.01	179	54.02	37	30.80
Intensive Recast	189	56.10	136	38.99	19	7.30

As Table 6 shows, the intensive vocabulary and grammar recast condition had a better understanding of recasts. While the individuals in the extensive vocabulary and grammar recast group noticed 32.01 percent of the feedback that they encountered, the students in the intensive vocabulary and grammar recast group noticed 56.10 percent of the recasts they encountered.

Furthermore, even though the students of the extensive recast group were not successful at identifying the corrective nature of recasts by 30.80 percent, the individuals in the intensive recast condition could not recognize the corrective nature of only 7.30 percent of the recasts they encountered. The findings of chi-square test also revealed a meaningful difference between the intensive recast and extensive recast groups concerning the accuracy of the students' insights about recasts, $x^2(2.665) = 35.3, p < .003$, Cramer's $V = .23$.

To deal with the last research question (Does working memory capacity account for impacts of recasts on different forms of outcome estimations?), correlations of working memory test scores in all features (i.e., Storage Domain (SD), Attention Domain (AD) and Executive Domain (ED)) and posttest scores were calculated as shown in Table 7.

Table 7 presents the associations between the working memory measures and the posttest scores. As indicated in the intensive recast group, learners' development on the PDA and SWA tests revealed medium to large positive correlations with their performance on the SD (PDA: $r = .71; Sig. < .003; SWA : r = .47; Sig. < .001$) and AD sections ($PDA : r = .49; Sig. < .001; SWA : r = .75; Sig. < .000$) of the test but no

significant correlations were identified between the ED section and the PDA and SWA tests. However, none of the other components were shown to be significantly correlated with each other.

Table 7: Correlations of working memory test scores and posttest scores

Condition	WM Questionnaire	PDA	SWA
Intensive Recast	SD	.71 Sig. = .003	.47 Sig. = .001
	AD	.49 Sig. = .001	.75 Sig. = .000
	ED	.08	-.11
Extensive Recast	SD	.10	.11
	AD	.21	-.16
	ED	.09	.12
Control	SD	.19	.17
	AD	-.08	.12
	ED	.14	.17

Generally, working memory questionnaire scores were positively associated with students' scores in the intensive recasts group. Precisely, students with higher SD revealed more substantial development on oral tasks with fewer challenges ($PDA : r = .71; Sig. < .003$) whereas students with higher AD were seen to indicate better achievements on the written tasks with fewer complaints ($SWA : r = .75; Sig. < .000$).

In summary, the findings of the first research question demonstrated that intensive or extensive vocabulary and grammar recasts positively affect the development of EFL learners in both language components. Concerning the second research question, it was revealed that the intensive recast condition provided the most effective outcome followed by the extensive recast condition and the control group, in order. The results of the third question on learners' perception of the effect of intensive or extensive recasts on different forms of outcome estimations showed that the intensive group had a better understanding of recasts in both

PDA and SWA. And the findings related to the last research question on working memory's role in relation to recasts on different forms of outcome estimations presented a positive association between students' performance on the questionnaire and the intensive group's scores of SD and AD sections of the memory test.

6. Discussion and conclusion

Lack of mutual consent in the SLA literature on the effects of recasts despite a wide body of research has led to confusing results. This fascinated the accomplishment of the present study to understand why recasts are sometimes more and sometimes less effective. The findings revealed that intensive recasts possessed a more noticeable positive impact than extensive recasts.

A possible explanation for the differential effects could be the precision of recasts in the intensive group, thus improving the accuracy of feedback. The additional recasts in the extensive group on mistakes such as singular or plural, subject and verb agreement, pronunciation, prepositions, question formation and order of words might have confused and distracted learners in deciding what they should concentrate on. Moreover, it seems that intensive recasts allowed students to distinguish better that the concise recasts they took on word choice and articles were educative in essence. This could have also improved the efficiency of the intensive recasts compared with the extensive recasts. Previous studies have also demonstrated that students' alignment with language structures could be an issue in discussing the efficiency of recasts (Lyster & Mori, 2006; Oliver & Mackey, 2003; Sheen, 2004). Accordingly, participants in the extensive recast condition may have drifted apart by thinking about the reason for recasts given on their nontarget-like errors. Kamiya (2015) conducted a study on the effectiveness of the two forms of recasts on the correctness of English unreal conditionals. While she did not find any difference in the effect of the studied recasts, she discovered a trend toward the more beneficial effects of intensive recasts in line with the results of the present research. Nassaji (2017) questioned the saliency of Kamiya's results (2015) due to the unbalanced design of the study which could be partially linked to the more satisfactory

situation for the intensive recast team. However, the equal condition provided in the present research can remove the doubt and reinforce Kamiya's findings (2015) on the positive effect of intensive recasts on EFL development in general.

Recasts treatment outcomes are also in line with some older investigations which have discovered comparable impacts (Ellis et al., 2006; Rvsz, 2012). Mackey and Goo's (2007) meta-analysis presented even a greater impact on the delayed posttests (1.09) than the immediate posttest (0.71) for a collaborative response as recast, and Li (2013) discovered that the impact of recast was highly obvious on the delayed posttest. These results strengthen the fact that recasts can be effective even if learners do not identify the corrective role of the feedback immediately.

It is beneficial to consider the fact that the findings of this research concerning the attained effect sizes dealt with the beneficial effect of each treatment condition. Plonsky and Oswald (2014) recommended major-related guiding principles for understanding Cohen's D effect size in EFL studies. According to their proposal, Cohen's D value should be observed as a large effect size if it is around 1.00. Therefore, the post hoc comparisons in the present research concerning the posttests suggested an alteration in the effect size among the intensive vocabulary and grammar recast condition compared to the other conditions (from 1.1 to 2.3) i.e., large to very large. It implies that adding precise recasts can provide an important change concerning teaching efficiency. In accordance with Gass (2013), in addition to Corrective Feedback (CF) that presents students with negative evidence, positive proof is also required for forming and learning EFL structures. In particular, the intensive vocabulary and grammar recast condition was a more conducive state for EFL growth by stressing the target form first. Next, the extensive type of recast was revealed to be more successful than other treatments, demonstrating improved positive evidence that eased students' understanding of the target structures.

In relation to the effect of intensive or extensive recasts on different types of outcome measures, the results of this research approved the findings of prior studies that described recasts as influential in EFL

advancement (e.g., Lee & Rvsz, 2018; Lyster & Izquierdo, 2009; Nassaji, 2017; Sheen, 2007). Research scholars frequently relate the success of CF to the negative and positive proof that CF offers. As stated by Mackey (2012), recasts can present both negative and positive evidence. Accordingly, the application of recasts in providing negative proof is contingent on the amount of perception attained by students (Sato & Loewen, 2018). The interviews' findings demonstrated that students of the intensive recast group had a meaningfully more accurate insight into recasts. Hence, it can imply that concise recasts are more successful than general recasts. Possibly, emphasizing the target structures in intensive recasts improves students' insights and recognition of recasts ending in recasts' success. The findings of the stimulated recall interviews present extra proof that when recasts are intensive, students' understanding of the saliency of recasts as corrective feedback rises meaningfully.

The fact that working memory appeared not to influence the achieved scores of students who did not take intensive recasts, alongside their substantial development on oral tasks with SD and on written tasks with AD, can be discussed with reference. An explanation for these findings might be dependent on multifaceted verbal working memory capacity since learners engaged in different types of learning procedures in varying extents. High capacity might have allowed students to store the data of the intensive recast condition in short-term memory longer, hence simplifying the procedure of emerging EFL ability (N. Ellis, 2005). It could also justify the reason why students who scored high on the SD section of the WMQ acted better on the speaking tasks in posttests, as the oral assessments tended to pay more attention to employing the procedural knowledge. On the other hand, students with high complex working memory capacity on account of their high ability to concentrate, split and switch attention among several activities based on demands, might have been more related to directing active focus to recasts in written assignments. Accordingly, they could possibly enhance metalinguistic and declarative knowledge linked to the grammatical and terminological data involved in the feedback (N. Ellis, 2005).

In conclusion, the findings indicate a benefit for the intensive versus extensive recasts and therefore guide us to notice the effect that recasts

can present on one form of error, and is substantially more effective than recasts on different forms of errors. Particularly, the results recommend that recasts are more successful when presented in reaction to the aimed mistake only, rather than covering the other errors as well. Delivering recasts on several errors on different occasions including the target mistakes can make them more regular and thus might distract learners' attention from staying focused on one concept.

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