

Gender Differences in Output-input Processing Sequence

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Abstract

The present research reports on a study which examined the role of gender in the input processing preceded by output processing. Forty-six males and fifty-two females studying at Iran Language Institute were assigned to four treatment groups (two output and two non-output groups). First, participants in the output condition were asked to write a story in English based on a series of pictures. Second, participants in both conditions read a model story written by a native English speaker about these pictures. Third, both sets of participants were required to recall in writing what they had already read. The results indicated considerable effect of output-input sequence on learners' acquisition of the targeted vocabulary items and grammatical expressions. However, the gender of the participants was found to have no significant role on the input processing preceded by output processing.

Key words: Output; input; gender differences; processing

1. Introduction

Reviewing second language acquisition literature makes it clear that output has often been considered as a sign of already-learned language and it does not form any important part in language acquisition processes (Izumi, 2003). In fact, in the earlier studies of output in SLA research, output was considered as the outcome, or product, of second language acquisition. Recently, it has been

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claimed that output is as important as input in the process of second language development.

This importance has created a shift in the meaning of output, from product to process. In Gass' (1997) five-stage model of second language acquisition, for example, output plays an active role in the process of acquisition. In his model, 'apperceived input', 'comprehended input', 'intake' and 'integration' are the stages that input should go through to transform into L2 output. The linguistic information that the learner is exposed to through listening or reading (input) is recognized by the learner depending on some factors such as saliency and frequency of the information, as well as learner's attention, prior knowledge and affective factors like motivation and anxiety (apperceived input). Through next stage (comprehended input), the linguistic information is selected and analyzed to derive some form of meaning representation, and afterwards, it may turn into intake; only intake can be used for further processing for acquisition. In the next phase, selected intake, after going through the processes of hypothesis formation, testing, modification, confirmation and rejection, is stored in memory for later use (integration). The fifth stage is verbalizing the linguistic information by learners (output). From Gass' point of view, output has an active role in the acquisition process. He points out that output is related to the analysis that happens in the comprehension stage and also serves a significant function in moving learner from comprehended input to intake. Therefore, there is a cycle from output to comprehension.

All in all, output no longer means that learners should first learn a language and then produce it; in fact, it constitutes an important factor in the process not just the product of acquisition (Swain, 2005) so that, as Swain claims, considering output as part of the process of acquisition makes us believe that research techniques which require producing language (e.g. think aloud and stimulated recall) are not merely a medium of data collection but part of the learning process. Accordingly, foreign language learning arises when learners try to produce their developing second language knowledge (Swain, 2005).

Swain (1985), in a seminal article, argued that although comprehensible input is a vital part of foreign language acquisition, it is not enough for successful L2 learning. The original impetus for her conclusion was the French immersion programs in Canada.

From the beginning of the French immersion programs in Canada in late 1960s, great achievements were made by learners in acquiring French as a second language. In these programs, French was the language of instruction; it was used to teach some or the entire curriculum to English-speaking children. The evaluations of these programs showed that the proficiency level of the immersion students was far higher than that of those who took part in French language classes. Particularly, listening and reading abilities of immersion students were close to those of same-aged native speakers of French. Krashen

(1984) argued that immersion works because learners understand messages and receive comprehensible input. However, French immersion students showed a significant difference from native speakers of French in their speaking and writing abilities. This latter finding made Swain question the validity of the Input Hypothesis that claims “comprehensible input is the only true cause of second language acquisition” (Krashen, 1984, p. 61) because no one could claim that immersion students were not provided with a rich source of comprehensible input.

An alternative explanation, based on observation of immersion programs in Canada, was Swain’s (1985) Output Hypothesis that she originally referred to as “Comprehensible Output Hypothesis” comparable to Krashen’s Comprehensible Input Hypothesis. She pointed out:

...the meaning of ‘negotiating meaning’ needs to be extended beyond the usual sense of simply ‘getting one’s message across’. Simply getting one’s message across can and does occur with grammatically deviant forms and sociolinguistically inappropriate language. Negotiating needs to incorporate the notion of being pushed toward the delivery of a message that is not only conveyed, but that is conveyed precisely, coherently, and appropriately. Being ‘pushed’ in output...is a concept parallel to that of the $i+1$ of comprehensible input. (Swain, 1985, pp. 248-249)

According to Swain (2005), the analysis of observations obtained from immersion programs revealed that the immersion students were not pushed enough in their output. They were not required to give extended answers to their teachers and peers and also not adequately engaged in producing language. In other words, what made immersion students be clearly identifiable as nonnative speakers or writer was the lack of sufficient opportunities for language use. In addition, the teachers did not push the students to consider accurate grammatical and appropriate social factors in producing the second language. She defined comprehensible output as “output that extends the linguistic repertoire of the learner as he or she attempts to create precisely and appropriately the meaning desired” (Swain, 1985, p.252). Thus, Swain concluded that to fully develop second language proficiency, just understanding the new forms is not enough, and learners must also be pushed into producing these new forms as accurately and appropriately as possible. She indicates that for successful SLA, learners need not only ‘comprehensible input’ but also ‘comprehensible output’.

This has led to research in which attempts are made to find the roles of output in foreign language acquisition. Swain (1985) claims that when learners attempt to produce the language they are more likely to notice the gaps between their own production and the target language. This awareness will help learners to acquire the knowledge that is not in their interlanguage (noticing function). Moreover, to overcome their problems in production, learners may formulate some hypotheses about language and test them through feedback

they receive during production (hypothesis-testing function). Producing output also encourages learners to consciously reflect on their production (metalinguistic/reflective function) and, subsequently, through repeated production their fluency and automaticity in language use will increase (fluency/ automaticity function).

To confirm the validity of Swain's Hypothesis, several studies examined the role of output in foreign language acquisition. To name a few, Baleghizadeh and Arab (2010), Hanaoka (2007), Izumi (2002, 2003), Izumi and Bigelow (2000), Izumi, Bigelow, Fujiwara and Fearnow (1999), Jiyuan (2009), Qi and Lapkin (2001), and Song and Suh (2008) examined the noticing function of output. The hypothesis testing function was explored by McDonough (2005) and Shehadeh (2003). Some other studies investigated the metalinguistic function (Storch, 2008; Swain & Lapkin, 2002) and fluency/automaticity function (Zhang, 2009).

By and large, although most of the studies discussed above seem to suggest that engaging in the production of target language is influential for second language acquisition, there is still no unanimous consensus about its final implications in promoting the development of L2 competence. The questions arising here are: how does output play a role in L2 acquisition? And what are the psycholinguistic mechanics of the output production? Some SLA researchers have explored the psycholinguistic mechanics of the output production (e.g., Bygate, 2001; de Bot, 1996; Izumi, 2003; Muranoi, 2007, and others). Since Levelt's (1989, 1993) speech production model has been mostly used by SLA researchers to describe processes involved in L2 production, a detailed description of this model is presented here.

2. Levelt's Speech Production Model

Levelt (1989, 1993) proposed a model for the processes involved in speech production of first language. However, his model has also been applied for the processes involved in the second language production. In this model, several processing components and knowledge resources are involved in producing the language. The processing components are Conceptualizer, Formulator, Articulator, Audition and Speech-comprehension system, and the knowledge resources consist of Lexicon and Discourse knowledge (Figure 1.).

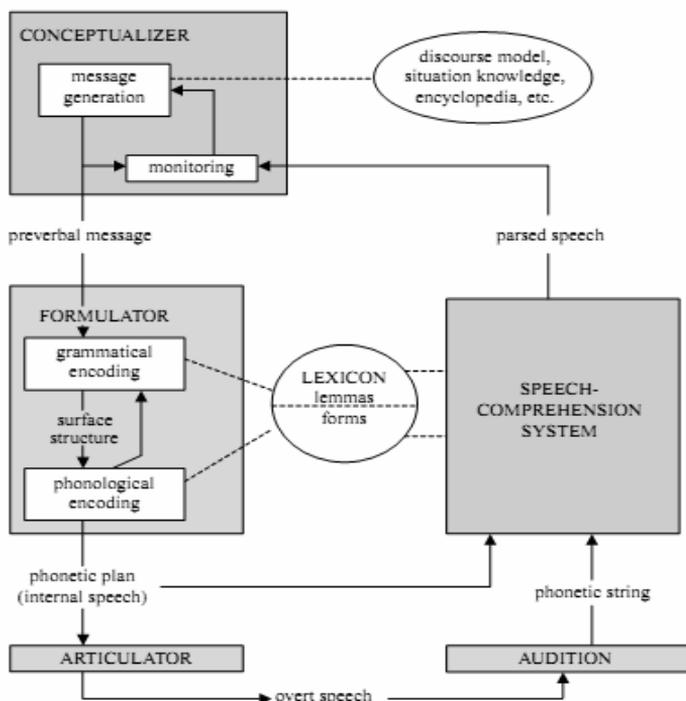


Figure 1. Levelt's speech production model

The Conceptualizer: in the Conceptualizer, which is the first component of Levelt's model, the speaker's knowledge about the situation, his/her experience of world, as well as his/her information about the discourse models are utilized to create the intended message. Also, at this level, there is a monitoring system which supervises the created message, as well as the outcomes of the Formulator and Articulator. This means that the monitoring system oversees the entire speech production system to check the accuracy of the output prior to verbalization or even immediately after overt production. The product of Conceptualizer is called *preverbal message* which contains all the necessary information but it does not have the linguistic form. This is, indeed, an input for the Formulator to work on.

The Formulator: the preverbal message (the product of Conceptualizer) enters the Formulator. The Formulator involves two important processes, i.e. grammatical encoding and phonological encoding, which convert the preverbal message into a linguistic message. Furthermore, the Formulator has access to a knowledge source called Lexicon. The Lexicon consists of two important parts: lemmas and lexemes/forms (Figure2.). The lemma involves the meaning and syntax of a lexical item and lexeme involves morphological and phonological information. Lemmas (meaning and syntax) enter grammatical encoding and lexemes (phonology and morphology) enter phonological encoding. In the

Formulator, first, the meaning of the preverbal message matches with a specific meaning in lemma. The selected meaning activates its syntactic information too. This syntactic information awakened by the selected meaning enters grammatical encoding through which the surface structure of the intended message is created. Then the morpho-phonological information stored in the lexeme enters phonological encoding through which the final product of the Formulator (*phonetic plan*) is produced. The phonetic plan is, in fact, the internal speech which is not yet verbalized and is the input of the Articulator.

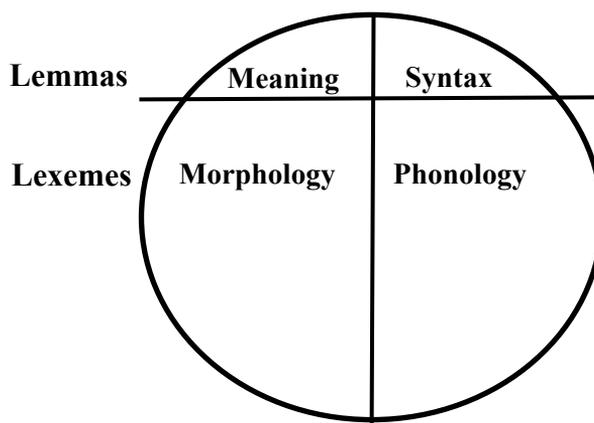


Figure 2. Levelt's (1989) representation of lexical entry

The Articulator: the phonetic plan which is the product of Formulator enters the Articulator that changes the phonetic plan to real speech, called *overt speech* in Levelt's model.

The Audition and Speech-comprehension system: through the Audition the overt speech enters the Speech-comprehension system which plays a feedback role and examines the accuracy of the overt speech, namely output.

To sum up, the communicative intention is first created in the Conceptualizer. Its output that is called preverbal message enters the Formulator. Through grammatical and phonological encoding, the Formulator converts the preverbal message into a phonetic plan. The Articulator changes the phonetic plan that is an internal speech to the audible sounds. Finally, the Speech-comprehension system monitors the accuracy of this output.

3. Relevance of Levelt's Model to the Output Hypothesis

Let's return to the question mentioned above: How does output play a role in L2 acquisition? In light of the foregoing discussion, one might note that, according to Levelt's model of speech production, the contribution of output to L2 development is via the processes of grammatical encoding and monitoring.

As de Bot (1996) points out, the information stored in lemma is the main requirement of grammatical encoding system and is of a declarative nature for language learners. This means that grammatical encoding for L2 learners needs a large amount of controlled processing and attention. Undoubtedly, this information is procedural for adult native speakers and requires no conscious attention. Thus the process of grammatical encoding makes the learners well aware of the strengths and weaknesses of their linguistic knowledge and what they can or cannot say in the target language. Additionally, the monitoring system boosts up this awareness by providing feedback. Therefore these processes “serve as an internal priming device for consciousness raising for language learning” (Izumi, 2003, p.191). This consciousness raising prompts the language learners to follow different ways based on the production situation they are in. As a result, different functions of output identified by Swain appear (Izumi, 2003).

Izumi (2003) asserts that when L2 learners encounter deficiencies in their language production process, they may decide to try out their output to see if it works. In such a situation, the learners may be provided with feedback that results in confirmation, rejection or modification of their hypothesis. Alternatively, they may talk and discuss together in order to find solutions for their problems (metalinguistic function). Or, when facing difficulties in language production process, learners may be immediately provided with the relevant input. The feeling of having difficulty to verbalize their intentions encourages them to notice the relevant features in the subsequent input with more focus attention. And finally, producing output contributes to the transition of declarative to procedural knowledge. As mentioned previously, the processes that take place in the Formulator, i.e. grammatical and phonological encoding, are highly controlled and slow, and require more attentional resources on the part of the learners. Practice in production makes these processes automatic, demanding learners’ fewer attentional resources.

4. Output and Subsequent Input

As noted earlier, through production learners can be provided with opportunities to notice the gaps and/or holes in their linguistic knowledge, that is, producing output directs learners’ attention to the problem areas in their interlanguage knowledge. In such conditions, they seek the relevant input with selective attention which per se facilitates L2 acquisition. In Gass and Alvarez Torres’ (2005) words, output processing “serves as a priming device” that triggers learners to attend to the relevant features in the subsequent input processing. “In this case, the additional input may serve as a *reinforcing device* in that it provides the learner with evidence to confirm or disconfirm information about particular parts of the language” (p. 3). Drawing on this idea, some researchers (Hanaoka, 2007; Izumi, 2002; Izumi & Bigelow, 2000; Qi &

Lapkin, 2001; Song & Suh, 2008; Suzuki et al., 2009, and some others) indicate that output-first-then-input activities facilitate the development of the second language acquisition.

As Suzuki et al. (2009) point out; there are some factors that influence the effect of output on L2 acquisition. These factors include task type, L2 proficiency level, linguistic domain and modality. A few studies have investigated the possible effect of these factors on second language acquisition: *task type* (text reconstruction vs. picture cued writing): Song and Suh (2008); *proficiency level* (advanced vs. intermediate): Hanaoka (2007), Swain and Lapkin (1995), and Williams (1999); *Linguistic domain* (grammar vs. vocabulary): Gass and Alvarez Torres (2005), and Qi and Lapkin (2001); and *modality* (oral vs. written output): Izumi and Izumi (2004).

However, despite its significance, gender has elicited few studies of output in the field of second language acquisition. Some studies examined the role of gender in L2 acquisition. Maitland, Herlitz, Nyberg, Backman and Nilsson (2004) state that females surpass males in ‘episodic memory tasks’ whose requirements are verbal processing and verbal fluency. On the other hand, males outperform females in mathematical and spatial abilities.

Schmidt (2010) compared the performance of a male and a female ‘Julie’ and ‘Wes’, who were L2 learners, and saw that Julie unlike Wes displayed a near native-like grammatical competence. He concluded that the individual differences that exist in noticing ability bring about various rates of learning.

Ellis (2008) argues that females are usually reported to be greater second language learners than males because they use more standard and prestige forms in their speech and they are often more open to linguistic change. As a result, there is a tendency for women to notice the new linguistic forms in the follow-up input. In fact, they are willing to internalize new linguistic forms and discard the mismatches they see between their interlanguage and the target language. Ellis (2008) refers to several studies as evidence for his claim. Burstall’s (1975) longitudinal study, for instance, showed that in general females were better language learners than males. Boyle (1987) observed that females outperformed males in ten general L2 English proficiency tests. Nyikos (1990) noticed that females were more successful than males in memorizing German lexical items. Eisenstien (1982) reported that females were usually more able to recognize the differences among various American English accents than males were. The reason for the superior performance of females, as put by Gardener and Lambert (1972), is their positive attitude and motivation towards a second language.

However, it has not always been the case that females outperform males. Boyle’s (1987) study showed that females were less successful than males in tests of listening vocabulary. Bacon (1992) also reported no statistically significant difference between the performance of males and females in authentic listening tasks.

To recapitulate, the few published studies on the role of gender in L2 acquisition are contradictory. Some report that males are superior language learners while some show superiority of females. Others reveal no difference between males and females' language acquisition. As a result, further research is required to investigate the role of gender in second language acquisition in general and its effects on output-input sequence in particular.

Owing to the controversy of the effect of output on L2 acquisition as well as the insufficient studies investigating the role of gender on the effect of output processing on subsequent input processing in second language acquisition, the writer decided to embark on the task of implementing this study to examine the effect of output processing on subsequent input processing in terms of learners' gender (male vs. female).

5. Methodology

Participants

The participants of this study were 98 Iranian EFL learners (46 males and 52 females). They were selected from among the low-intermediate proficiency level classes of Iran Language Institute (ILI) in Isfahan, Iran. The participants were randomly assigned to two subgroups so that four treatment groups were formed. Two groups (25 males and 28 females) were allotted to the output condition and the other two groups (21 males and 24 females) were allotted to non-output condition. The four treatment groups are outlined in Table 1.

Table 1. The number of participants in the four treatment groups

Proficiency Level		Treatment Type		
		Output	Non-output	Total
Low-intermediate	Males	25	21	46
	Females	28	24	52
Total		53	45	98

6. Materials and Procedure

The materials of the current study were a series of cartoon pictures (see Appendix A) and a model story written by a native English speaker describing these cartoon pictures (see Appendix B), taken from Suzuki et al.'s (2009) study. The study was conducted in four phases for experimental group, and in three phases for control group. First, participants in the experimental group (output condition) wrote a story in English based upon a series of pictures, output task, in 10 minutes. Here, to avoid different interpretation the story was told to the students in Persian. Second, participants in both conditions (output

and non-output) read a model story written by a native speaker of English describing the pictures, input task, in 3 minutes. In the input task, participants in both conditions were provided with the pictures together with the model story. Third, to divert students' attention and minimize the effects of short-term memory, the students were provided with a few Persian expressions and were asked about their English counterparts for 2 minutes. In this way the effects of short-term memory and output processing on recall task would not be confounded. Finally, participants in both conditions were asked to recall, in writing, what they had already read, recall task, in 7 minutes. In other words, a recall task was used to measure the effect of output processing on subsequent input processing in terms of linguistic domain, i.e. grammar vs. vocabulary (see Figure3. for overall research procedure).

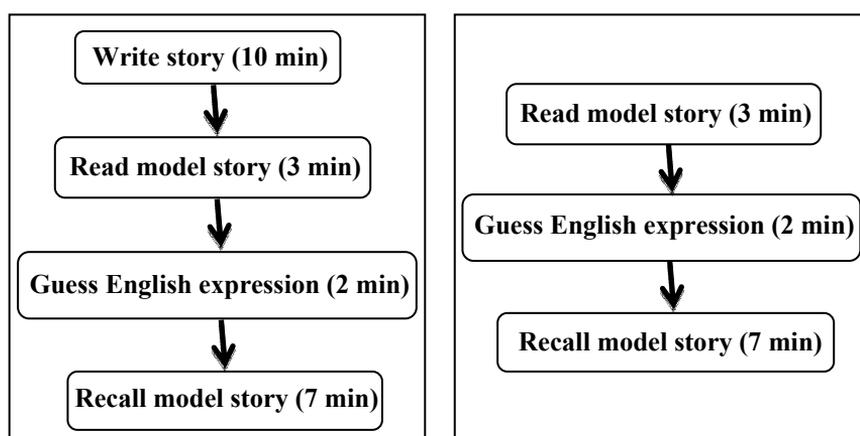


Figure3. Overall research procedure

It is worth mentioning that to prevent participants from consciously memorizing the L2 input, they were not informed in advance about the procedure of the study. Also, to ensure students concentrate on their linguistic gaps and problems, the researchers did not allow them to use dictionaries.

7. Scoring Procedure

Two categories i.e. lexis and grammar were used to analyze how much of the model story participants accurately recall. For scoring procedure in the word level, one point was assigned to each word and since the total number of words in the model story was 83, the maximum word score was 83.

In the grammar level, one point was assigned to each correctly recalled grammatical expression selected before based on a pilot study. Since there were 20 predetermined grammatical expressions, the maximum grammar score was 20.

In addition, to avoid subjective interpretations, the points were assigned to the exact words and grammatical expressions in the model story that the participants used in their recall task. In other words, no points were assigned to the words or grammatical expressions with similar meanings to those of the original story. That is, we scored points for the employment of the exact words and grammatical expressions.

8. Results

The descriptive statistics of the males and females engaged in this study are presented in Table 2. It contains the means and standard deviations of the vocabulary and grammar test scores obtained by the participants of this study in output and non-output conditions.

Table 2. Descriptive statistics of the females and males in output and non-output conditions

	gender	group	Mean	Std. Deviation	N
vocab	girls	input	25.67	6.735	24
		output	31.86	8.204	28
		Total	29.00	8.112	52
	boys	input	24.90	6.402	21
		output	30.20	6.807	25
		Total	27.78	7.074	46
gram	girls	input	2.29	1.367	24
		output	4.04	2.151	28
		Total	3.23	2.016	52
	boys	input	2.62	1.596	21
		output	3.68	1.952	25
		Total	3.20	1.857	46

The findings of two-way ANOVA displayed in Table 3. show no statistically significant difference between the vocabulary scores achieved by the two genders in the output condition ($p = .758$).

Table 3. Two-way ANOVA for the role of gender in the treatment condition in vocabulary scores

Source	Type III Sum of Squares	Df.	Mean Square	F	Sig.
Corrected Model	851.429 ^a	3	283.810	5.567	.001
Intercept	76879.970	1	76879.970	1.508E3	.000
gender	35.465	1	35.465	.696	.406
group	799.525	1	799.525	15.682	.000
gender * group	4.857	1	4.857	.095	.758
Error	4792.571	94	50.985		
Total	84846.000	98			
Corrected Total	5644.000	97			

The results are depicted in the following graph (Figure 4.). What is worth mentioning is that although the difference between the vocabulary scores obtained by the two genders in the output condition is not statistically significant, females in the output condition performed better than males in learning vocabulary items.

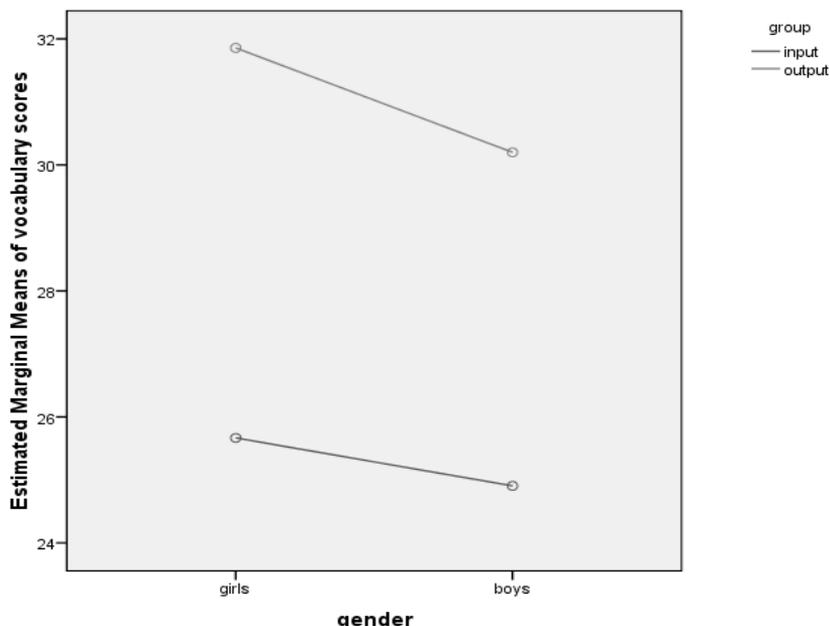


Figure 4. The role of gender in learning vocabulary in the output condition

According to the findings of the two-way ANOVA (Table 4.), no significant difference in grammar learning was found between males and females in the output conditions ($p = .375$).

Table 4. Two-way ANOVA for the role of gender in the treatment condition in grammar scores

Source	Type III Sum of Squares	Df.	Mean Square	F	Sig.
Corrected Model	52.185 ^a	3	17.395	5.269	.002
Intercept	966.222	1	966.222	292.686	.000
gender	.005	1	.005	.001	.969
group	47.685	1	47.685	14.445	.000
gender * group	2.828	1	2.828	.857	.357
Error	310.315	94	3.301		
Total	1375.000	98			
Corrected Total	362.500	97			

The test results are illustrated in Figure 5. It is clear that although the difference between grammar scores of males and females in the output condition is not statistically significant, females in output condition performed better than males in grammar learning.

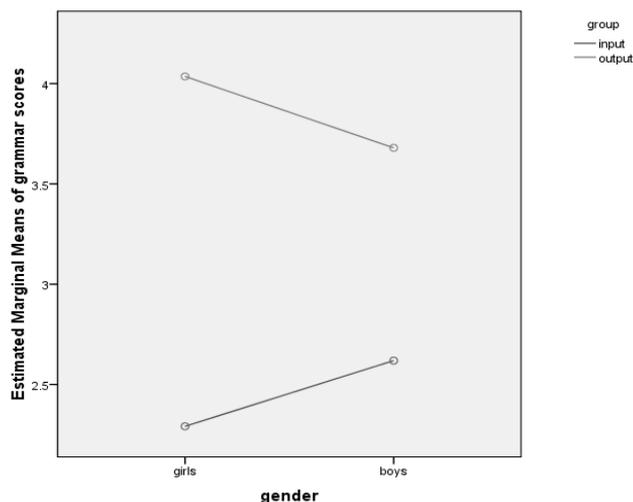


Figure 5. The role of gender in learning grammar in the output condition

On the account of the above mentioned statistics, there is no statistically significant difference between the performance of the males and females in the output condition.

9. Discussion

In Iran, as far as my observation of EFL classes is concerned, the current traditional sequence in language classes is in such a way that the output comes at the end of the sequence. The present study, considering the rationale underlined Swain’s Comprehensible Output Hypothesis (1985), examined the effect of output processing on subsequent input processing by Iranian EFL learners. A further purpose of this study was to investigate the role of gender on subsequent input processing preceded by output processbehindng.

The results obtained from two-way ANOVA revealed that although a significant difference was found between the participants’ performance in output and non-output condition, no significant difference was found between males and females’ vocabulary and grammar scores in the output condition. This means that gender plays a peripheral role in the input processing preceded by output processing. That is, although both males and females in output condition performed significantly better than did the ones in non-output condition, the performance of both genders in output condition was fairly the same.

The results jibe with Izumi (2002), Izumi and Biglow (2000), Izumi et al. (1999), Song and Suh (2008) and Suzuki et al. (2009). In all of these studies, the output group outperformed the non-output group in their learning of targeted structures. They came to the conclusion that output triggers cognitive processes (such as noticing) which facilitate future input processing.

The findings of this study provide partial empirical evidence for Swain's (1985) Output Hypothesis. The output-input sequence used in the present study must have triggered cognitive processes such as noticing, cognitive comparison and hypothesis formulating and testing that subsequently facilitate acquisition of the targeted lexical items and grammatical expressions. On the other hand, the research results can be used to insinuate the inadequacy of Krashen's (1980) Input Hypothesis. Suffice it to say that, according to the results of this study, output is as important as input in the process of foreign language learning. Since output prompts learners to detect the gaps and/or holes in their interlanguage and struggle to overcome these problems by searching the relevant input.

It needs to be noted that although no significant difference was found between the performance of the males and females in the output condition, when comparing two genders with each other in the output condition, one might find that females performed slightly better than did males in both vocabulary and grammar acquisition.

This is in accordance with the study done by Schmidt (2010). As he suggests, noticing ability is different between different individuals and these individual differences in noticing ability result in various L2 learning achievements.

There is ample evidence that shows superiority of females in some verbal tasks (Harley, 2008). Compared to males, they start talking sooner, their verbal memory is better, and they are superior in reading and spelling. This is partly because of the fact that females have a tendency to make use of both of the brain hemispheres (left and right), whereas males just utilize their left-hemisphere. As Harley (2008) puts it "it seems that the less lateralized brain leads to an advantage for language processing_ perhaps because both hemispheres can be used" (p. 72). This leads females to be more fluent speakers, produce more words and longer sentences and have fewer errors in their productions (Harley, 2008).

The researcher did not come across find any study that has investigated the role of gender in output-input sequence. For this reason, it is not possible to look at these findings from the perspective of previous research or compare them with the findings of other studies in this regard. Thus it seems that further investigation into the role of gender in L2 acquisition and more specifically the role of gender in output-input sequence may be worthwhile.

10. Conclusion

The results of the present study demonstrated considerable effect of output-input sequence on learners' acquisition of the targeted vocabulary items and grammatical expressions. However, the findings revealed no significant role of gender in the subsequent input processing preceded by the output processing. That is, although both males and females showed a significant improvement in the output condition, their performance was not significantly different from each other.

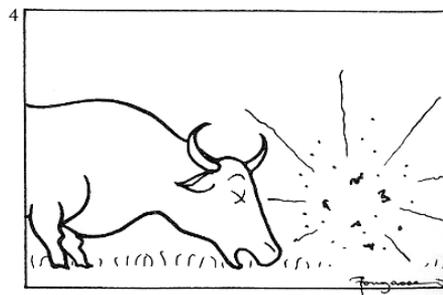
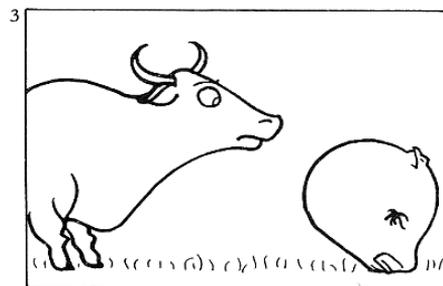
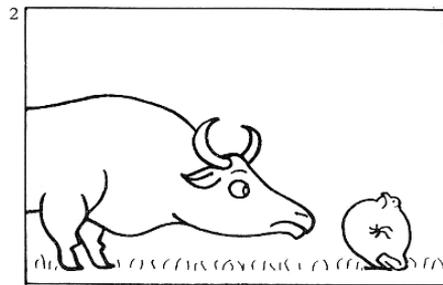
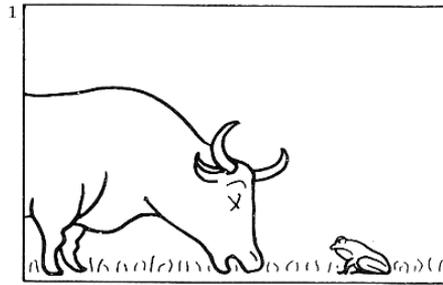
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Appendix A : Four Cartoon Pictures



Appendix B : *Model Story*

One day, a frog was sitting¹ on the grass, looking at² a cow. The cow was eating³ the grass quietly. The frog thought that the cow was a very big animal⁴, and it wanted to be⁵ a very big animal, too⁶. So, it began to fill⁷ itself⁸ up⁹ with air. The cow looked at¹⁰ it in surprise¹¹. The frog went on¹² filling¹³ itself¹⁴ with more air¹⁵ until suddenly---bang¹⁶! It broke into¹⁷ little pieces¹⁸. The cow went back to¹⁹ eating²⁰ the grass quietly.

Note: The underlining with the numbers indicates the predetermined 20 target grammatical forms.