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Gender-Based investigation of the Syntactic Development of Iranian EFL Learners: A Focus on Processabilty Theory

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Abstract

Pienemann (1998, 2015) put forward Processability Theory to enlighten why language learners follow definite developmental paths. The aim of the present study was to run a comparative investigation into the difficulty order of different grammatical structures for male and female Iranian EFL learners predicted by Processability Theory. 185 Iranian university students took part in this study. They received a Demographic Questionnaire and a Validated Researcher-Made Grammar Test designed based on the stages of Processability Theory. Item Response Theory (IRT) Rasch Modeling was used to analyze the collected data. Results pertained to the research questions revealed that the stages predicted by Processability Theory do not account for the Iranian male/female EFL learners. Another major finding emerged from the data was that the difficulty level of different grammatical structures presented by Pienneman in PT doesn't match the difficulty order obtained in this study by male/female EFL respondents. All things considered, results of the study provided a reliable counterevidence for the assumptions of the theory.

Keywords: Processability Theory, Syntactic Development, EFL Learners

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1. Introduction

Pienemann's Processability Theory tries to give details of "the universal path of L2 language acquisition based on the architecture of human language processing" (Kawaguchi, 2000, p.238) and is also based on the ideas of Levelt's (1989) work on speech production and the computational model of Kempen and Hoenkam (1987). Processability Theory (PT hereafter) attributes developmental routes caused by the construction of the individual processor to the psychological constrictions of individual language processing such as human memory, word access and linearization. (Pienemann, 1998b, p. 4). Based on the processing principle of grammatical information exchange and salience, PT puts forward a stratified morpho-syntactic development which is incremental, that is, just part of the message is processed at any point in time and that processing has access to a grammatical memory store (Levelt, 1989).

Considering the exchange of grammatical information, Pienemann suggested five processing procedures including "1) word/lemma, 2) category procedure, 3) phrasal procedure, 4) S-procedure, and 5) subordinate clause procedure" (Pienemann, 2005, p.9). They are arranged implicationally and each procedure is essential for the next one. Subsequently, he adjoined the concept of perceptual saliency and created six stages: "1) word/lemma, 2) category procedure, 3) phrasal procedure, 4) S-procedure + saliency, 5) S-procedure – saliency, and 6) subordinate clause procedure. (If applicable)" (Pienemann, 2005, p. 24). At the first stage, word or lemma, no language-specific procedures take place and the ability of word production or learned-chunk generation extends. At the second stage, the category procedure, identification and arrangement of the lexical categories of words following the standard word order develops. The third stage, the phrasal procedure, deals with the identification of a word string and moving or merging the features

across the string. At fourth stage s-procedure with perceptual saliency develops and phrases can be put together as sentences and functional purpose of phrases can be established. At the fifth stage, the sentence procedure without perceptual saliency, learners can produce the subordinate clause (Pienemann, 2005). L2 learners understand all components in a series of words, and place a component in both an initial and internal position of the string at this stage. That implies, they can perform two linguistic operations in a string. At the final stage, L2 learners distinguish a subordinate clause in a series of words at this highest stage (Pienemann & Johnston, 1987; Pienemann, Johnston & Brindley, 1988)(see Appendix1).

This theory, does not envisage the difficulty level of present perfect tense or past perfect tense, which commonly tested by teachers on discrete-point grammar tests. Along these lines, a more extensive combination of grammatical structures, incorporated into grammar tests, should be tested by the teachers so as to attain a reasonable awareness of the experimental sequence of adversity and after that to have the ability to choose and compose items that reproduce those levels of difficulty. Moreover, the fundamental assumption of PT built up based on the ESL data i.e., the development of English grammatical structure of Vietnamese and Polish immigrants in Australia (Senecal, 2011). Thus it is important to change the data sources and analyze if the PT hierarchy applies to EFL data as well. By administering the processing stages to the acquisition of L2 in Iran, This research will contribute to typological plausibility of PT. Additionally, this research will test the main problem raised in recent previous researches as whether the stages of the acquisition of syntax are distinct as proposed by PT (Jansen, 2008).

Much PT researches have focused on establishing applicability for different languages. Such studies are mostly based on cross-sectional and

longitudinal design of the acquisition of German, (Pienemann, 1998b), English (Fetter, 1996; Mackey, 1995, 1999; Pienemann, 1998b; Pienemann et al., 1988), Danish and Norwegian (Glahnet al., 2001; Pienemann & Hakansson, 1999), Swedish (Pienemann & Håkansson, 1999), Italian (Di Biase & Kawaguchi, 2002), Japanese (Di Biase & Kawaguchi, 2002; Kawaguchi, 2005a and 2005b; Iwasaki, 2003; Itani-Adams, 2003), Chinese (Zhang, 2001 & 2008; Gao, 2005; Wang, 2011), Arabic (Mansouri, 1997 & 2002, Alhawary 1999 & 2009), Spanish (Taylor, 2004), and Turkish, German, English (Pienemann, 2005; Özdemir, 2004), although there exist some researches concentrating on aspects of the fundamental assumptions of PT such as investigating the independent nature of each stage (Jansen, 2008), exploring the role of first language (L1) transfer in PT (Bohnacker, 2006; Hakansson, Pienemann & Sayehli, 2002; Pienemann & Hakansson, 2007) and typological plausibility of Processability Theory (PT) (Bonilla, 2012), receptive and productive L2 grammar processing (Buyl & Housen , 2015). High scalability was obtained considering the above mentioned studies. This, thus, results in approving the implicational pattern hypothesized by PT.

However regarding exploring the role of first language (L1) transfer in PT (Dao, 2007; Charter, Dao & Jansen, 2011), questioning whether the syntax and morphology develop jointly or separately (Dyson, 2009; Fetter, 1996, Yamaguchi, 2013), difficulty order of PT grammar structures (Nishitani, 2012), applicability of PT to Japanese adolescent EFL learners (Eguchi & Sugiura, 2015), variation in ESL longitudinal development of syntax and morphology (Dyson, 2016) provided reliable counter evidences in response to PT.

Equally, Syntax Developmental studies often determine the distances and differences of EFL learner's linguistic constructions and native speakers' grammatical patterns. All the above mentioned studies, share a common

assumption that native speaker grammar is a kind of formal system with various hierarchies which has not a context dependent relationship with their meanings (Silva, 2002). This viewpoint seems to provide an indispensable knowledge about how EFL students learn foreign language and the syntactic development processes thereof, however, it might be inadequate for explaining particular tendencies of syntactical development.

All in all, given the significance of Proceessibilty Theory in shedding light on the process of second language acquisition, in order to validate Processability Theory order in EFL contexts, the current investigation aims at a comparative examination of the Syntactical Development of male and female learners based on Processabilty Theory.

1.2. Research Questions

The following research questions are posed in the present study:

1. How are the stages predicted by Processability Theory applicable for Iranian male/female EFL learners in learning syntax?
2. Are there any significant differences between male/female EFL learners in learning English syntax based on the stages predicted by Processability Theory?

2. Methodology

2.1. Participants

The sample participants consisted of 185 freshman university students majoring in medicine, pharmacy and dentistry who enrolled in general English course at Medical Sciences of Shiraz University. The selection was based on convenient sampling procedure. Of all respondents 93 students were female and 92 were

male in the age bracket 18–22 years old. They learned English as foreign language, and all had prior EFL learning experience in language institutes more than two years, with no informal exposure to English. Also, all of them were Persian native speakers. The rationale behind the selection of this student group was that they had already passed the Pre University English Course Test successfully, or based on their grades in entrance exam, they didn't need to take the Pre University English Course. Therefore, they had a better interpretation of grammar skills and the features which might influence their performance.

2.2. Instruments

Demographic Questionnaire: Participants took a demographic questionnaire which included gender, age, prior EFL learning experience, informal exposure to English. In this study, English language background was really important and asking a respondent where she/he learned English was a vital question since it was supposed that respondents who completed English language courses or programs at an institute or abroad may answer questions differently than those whose English education ended in high school.

PT Test: The researchers designed a 39- item multiple-choice grammar test based on stages of Processability Theory (PT Test, hereafter) to explore the difficulty order of different grammatical structures for Iranian learners envisioned by Processability Theory. The items that match the specified stages in the theory were selected based on the structures listed in appendix1 (Pienemann, 1998). The test used a multiple-choice format with one correct answer and three distracters. The Processibilty Test (PT) had 39 items of which three were attempted correctly by all participants. Thus, items 7, 10 and 14 were dropped from the analyses.

2.3. Issues of Reliability and Validity

The PT pilot Test achieved an alpha coefficient of 0.68. This suggests that the items of the PT Test are internally consistent based on the data set. Besides, in order to evaluate the degree to which the content of the PT test matches a content domain of PT, six experts evaluated the test items against the test requirements and accordingly the researcher modified this measurement instrument on the basis of expert's judgments. Equally, the questionnaires were rewritten in Farsi and checked for accuracy. In order to make sure that the translated items of the questionnaires conveyed the same meaning and elicited the same information as its original version in English, the researcher asked five experts in translation to back-translate the items of questionnaire into English. The back-translated questionnaires were finally compared with original versions and with translated versions in Farsi. Based on this comparison the researcher modified the Farsi translations of some of the items.

3. Data Collection Procedure

Initially, the Grammar Test was administered to the participants of the study. Demographic Questionnaire was attached to the Grammar Test. The participants instructed to do the Grammar Test within the time limit and following this they were requested to fill out the questionnaire. The time set for grammar test was 40 minutes which is the standard amount of time available to grammar test for these test takers in an authentic test according to number of items. Also the administration of questionnaire took approximately 10 minutes.

It is worth mentioning that because of two prerequisite conditions, i.e., covering a large part of the general English course material as well as attaining the required standard of the mentioned course on the part of a majority of

students, all the experiments were virtually carried out at the end of semester, as it might naturally take place in a typical final exam.

4. Data Analysis

To analyze the data, Item Response Theory (IRT) Rasch Modeling was used. The SPSS software version 24 and NCSS 2008 software version 07.1.8 were utilized which are commonly used for analyzing the results of the studies in social science.

5. Results

5.1. Results of Demographic Questionnaire

Results of questionnaire indicated that of all respondents 86 were medicine students, 30 pharmacy and 30 were dentistry students. It also showed that 93students were female and 92 students were male in the age bracket 18–22 years old.

Table 1.*Descriptive Statistics of the Participants' Gender*

	Medicine	Pharmacy	Dentistry	Total
Male	61	13	18	92
%	32.91	7.02	9.72	49.72
Female	64	17	12	93
%	34.59	9.18	6.48	50.27
Total	125	30	30	185

5.2. Results of PT Test

Table 2 displays the difficulty and discrimination parameter of the 36 items of the PT test administered to female students. It also shows the difficulty of the 36 items of the PT sorted on a descending order.

Table 2.*Item Difficulty and Item Discrimination of PT Test (female students)*

Item	Type	Stage	Difficulty	Discrimination
11	(ADV)	3	14.624	-0.165
5	REG_PL	3	12.946	-0.159
1	SVO ?	2	4.884	-0.424
2	no+x	2	2.667	-0.403
37	DAT_MOV	6	1.187	0.458
35	Q_TAG	6	0.266	1.415
29	SUPPLET	5	0.221	1.523
13	TOPIC	3	0.141	1.708
39	2SUB_COMP	6	0.037	0.307
23	PREP- STRANDING	4	-0.476	1.698
21	COMP_TO	4	-0.497	15.583
38	CAUSATIVE	6	-0.501	0.593
33	GERUND	6	-0.511	1.124
18	PSEUDO_INV	4	-0.514	15.336
22	PART-MOV	4	-0.860	1.560
17	POSSESS	4	-0.865	3.484
20	Better, best	4	-1.053	3.612
19	Y/N_INV	4	-1.163	2.393
30	Ly	5	-1.223	2.673
31	-er/ -est	5	-1.310	1.285
34	RFLX(PN)	6	-1.323	1.270
28	DO_2ND	5	-1.408	1.780
15	AUX_EN	4	-1.664	2.560
26	REFLX(ADV)	5	-1.752	0.976
4	IREG_ED	2	-1.789	0.610
16	AUX_ING	4	-1.863	1.160
32	DAT_TO	5	-1.935	0.784
6	IREG-PL	3	-2.375	0.248
24	3SG_S	5	-2.537	0.933
3	SVO	2	-2.671	1.014
8	DO_FRONT	3	-2.741	0.985
25	PL_CONCD	5	-2.866	0.938
9	WHX_FRONT	3	-2.883	0.644
27	AUX_2ND	5	-5.357	0.459
36	ADV VP	6	-5.473	0.398
12	(more)	3	-9.093	0.216

From this table it can be inferred that item 11 (Difficulty=14.624) is the most difficult item and item number 12 (Difficulty=-9.093) is the easiest one for the female students. The Stage 3 items, as the table shows, are typically more complicated than the items measuring other stages. The items of Stages 4-5, though, are scattered out and show no meticulous propensity. In other words, the items that match Stage 4 of Processability Theory, for instance, are not of similar complexity and are not essentially more difficult than the items that match Stage 2. Consequently, it can be stated that Processability Theory does not give a satisfactory explanation for the difficulty order of the items used in this study.

Regarding the discriminatory statistics, it can be claimed that the following items enjoyed the highest levels of discrimination; items 15, 30, 17, 20, 18 and 21. On the other hand; the least discriminatory items were 1, 2, 11, 5, 12 and 6. The Cronbach's alpha reliability index for the PT test for the Female students was 0.690.

Table 3.*Item-Total Statistics; PT Test (Female Students)*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	27.83	15.470	-.115	.702
2	27.98	15.434	-.102	.708
3	27.76	14.922	.155	.687
4	27.94	14.518	.177	.686
5	27.82	15.347	-.068	.699
6	28.04	14.824	.061	.696
8	27.76	15.161	.029	.692
9	27.83	14.709	.176	.686
11	27.78	15.236	-.017	.695
12	27.82	15.129	.017	.695
13	28.18	13.716	.352	.671
15	27.73	15.047	.145	.688
16	27.81	14.549	.266	.681
17	27.82	14.303	.354	.675
18	27.85	13.977	.436	.669
19	27.80	14.556	.279	.680
20	27.77	14.503	.349	.678
21	27.87	13.983	.405	.670
22	27.91	14.123	.317	.675
23	28.00	13.804	.368	.670
24	27.78	14.801	.183	.685
25	27.76	14.943	.143	.687
26	27.85	14.760	.141	.688
27	27.77	14.981	.110	.689
28	27.80	14.534	.289	.680
29	28.20	13.751	.342	.672
30	27.77	14.612	.294	.680
31	27.86	14.252	.318	.676
32	27.87	14.396	.256	.680
33	28.03	13.923	.320	.674
34	27.86	14.143	.359	.673
35	28.22	13.366	.452	.662
36	27.80	15.164	.011	.694
37	28.30	14.800	.062	.697
38	28.10	14.197	.226	.682
39	28.18	14.542	.126	.691

Table 3 displays the item-total correlations for the 36 items of the PT test. Based on these results it can be concluded that the following items had negative contributions to the test; 1, 2, 5 and 11. There were only 12 items which had moderate to high (>=.30) contributions to the PT test; 13, 17, 18, 20, 21, 22, 23, 29, 31, 33, 34 and 35.

Based on these results it can be concluded that the order of difficulty of the items matched the processibilty theory when predicting difficulty of the items but failed when predicting their leniency. Except for the first two items; item one and two were rated as difficult despite the fact that they belonged to the first two stages of difficulty, fourteen out of first sixteen items belonged to the third to sixth stages. In other words, the present data predicted the order of difficulty of the first 15 items with an accuracy of 87.5 percent. Unfortunately; the bottom 16 items rated as easy and had 14 items from the third to sixth stages; in other words only 12.5 % of easy items were predicted correctly. That is why it was claimed that the difficulty of the items was predicted more accurately than their leniency.

Table 4 displays the item difficulty of the 36 items of the PT test administered to Male students.

Table 4. *Item Difficulty and Item Discrimination of PT Test (Male Students)*

Item	Type	Stage	Difficulty	Discrimination
6	IREG-PL	3	11.866	-0.10
37	DAT_MOV	6	1.097	0.80
13	TOPIC	3	0.688	2.85
19	Y/N_INV	4	0.338	17.04
18	PSEUDO_INV	4	0.331	18.08
23	PREP- STRANDING	4	0.309	2.02
21	COMP_TO	4	0.139	1.58
35	Q_TAG	6	0.013	0.80
12	(more)	3	-0.038	4.27
32	DAT_TO	5	-0.078	1.82
20	Better, best	4	-0.143	3.90
22	PART-MOV	4	-0.176	1.63
29	SUPPLET	5	-0.191	1.17
17	POSSESS	4	-0.249	4.44
33	GERUND	6	-0.318	1.22
15	AUX_EN	4	-0.339	4.87
16	AUX_ING	4	-0.574	3.75
2	no+x	2	-0.647	0.67
9	WHX_FRONT	3	-0.800	1.60
34	RFLX(PN)	6	-0.876	1.03
8	DO_FRONT	3	-0.943	2.34
5	REG_PL	3	-1.501	1.49
30	ly	5	-1.536	1.16
1	SVO ?	2	-1.559	1.32
31	-er/ -est	5	-1.571	0.89
4	IREG_ED	2	-1.588	0.75
38	CAUSATIVE	6	-2.095	0.22
27	AUX_2ND	5	-2.344	1.09
28	DO_2ND	5	-2.581	0.66
39	2SUB_COMP	6	-3.059	0.17
24	3SG_S	5	-4.064	0.53
3	SVO	2	-4.115	0.44
36	ADV VP	6	-4.304	0.51
11	(ADV)	3	-4.318	0.47
25	PL_CONCD	5	-4.454	0.52
26	REFLX(ADV)	5	-11.185	0.22

Table 4 revealed that, the item measuring Stage 3 was more complex than the other items. The items evaluating Stage 3 (i.e., Items 5, 6, 8, 9, 11 and 12) were extensively apart from each other. Item 6 (Difficulty=11.866) was the most difficult and Item 26 (Difficulty=-11.185) was the easiest of the sentences. The other items (i.e., items measuring Stages 4 and 5) were in moderate. Results revealed that the items measuring Stage 6 (i.e., Items 37) and Stage 3 (i.e., Item 13) were difficult, and the items evaluating Stage 3 (i.e., Item 11) and Stage5 (i.e., Item 25) were relatively easy.

Regarding the discriminatory statistics, it can be claimed that the following items enjoyed the highest levels of discrimination; items 18, 19, 15, 12, 20 and 16. On the other hand; the least discriminatory items were 6, 39, 26, 38, 3 and 11.

The Cronbach's alpha reliability index estimated for the PT test, right brain dominance group was 0.796. Table 5 displays the item-total correlations for the 36 items of the PT test for the Male Students.

Table 5. *Item-Total Statistics; PT Test (Male Students)*

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	28.21	21.836	.106	.797
2	28.43	21.237	.165	.797
3	28.25	21.772	.094	.798
4	28.30	21.687	.093	.799
5	28.20	21.566	.249	.793
6	28.39	21.801	.038	.802
8	28.20	21.500	.280	.792
9	28.26	20.898	.382	.788
11	28.23	22.156	-.034	.801
12	28.32	20.350	.480	.784
13	28.64	19.529	.532	.779
15	28.24	20.602	.536	.784
16	28.21	21.133	.416	.789
17	28.26	20.481	.527	.783
18	28.32	20.020	.580	.780
19	28.35	19.900	.573	.779
20	28.29	20.254	.542	.782
21	28.47	20.164	.415	.785
22	28.38	20.700	.323	.790
23	28.50	19.945	.457	.783
24	28.22	21.732	.137	.796
25	28.21	21.880	.087	.797
26	28.21	22.078	.002	.799
27	28.18	21.867	.123	.796
28	28.25	21.706	.117	.797
29	28.42	20.840	.266	.792
30	28.23	21.387	.259	.793
31	28.27	21.453	.184	.795
32	28.39	20.065	.485	.783
33	28.39	20.351	.408	.786
34	28.33	20.947	.293	.791
35	28.51	20.626	.291	.792
36	28.22	21.798	.111	.797
37	28.71	20.627	.280	.792
38	28.49	21.374	.122	.800
39	28.49	21.659	.057	.803

Based on the results of item-total statistics (table 5) the following item had negative contributions to the test; 11. There were only 14 items which had moderate to high (>= .30) contributions to the PT test; 9, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 32, and 33.Based on these results it can be concluded that the order of difficulty of the items matched the Processability Theory when predicting difficulty of the items but failed when predicting their leniency. Sixteen out of first sixteen items (100 %) belonged to the third to sixth stages. In other words, the present data predicted the order of difficult of the first 16 items correctly. However; among the bottom 16 items rated as easy only three them – items 1, 3 and 4 – were from the first two stages; 18.75 percent accuracy. That is why it was claimed that the difficulty of the items was predicted more accurately than their leniency.

Table 6. *Comparing Male and Female Groups' Results*

Males				Females				
Item	Stage	Difficulty	Discrimination	Item	Stage	Difficulty	Discrimination	
6	3	11.866	-0.1	11	3	14.624	-0.165	Different
37	6	1.097	0.8	5	3	12.946	-0.159	Different
13	3	0.688	2.85	1	2	4.884	-0.424	Different
19	4	0.338	17.04	2	2	2.667	-0.403	Different
18	4	0.331	18.08	37	6	1.187	0.458	Different
23	4	0.309	2.02	35	6	0.266	1.415	Different
21	4	0.139	1.58	29	5	0.221	1.523	Different
35	6	0.013	0.8	13	3	0.141	1.708	Different
12	3	-0.038	4.27	39	6	0.037	0.307	Different
32	5	-0.078	1.82	23	4	-0.476	1.698	Different
20	4	-0.143	3.9	21	4	-0.497	15.583	Different
22	4	-0.176	1.63	38	6	-0.501	0.593	Different
29	5	-0.191	1.17	33	6	-0.511	1.124	Different
17	4	-0.249	4.44	18	4	-0.514	15.336	Different
33	6	-0.318	1.22	22	4	-0.86	1.56	Different
15	4	-0.339	4.87	17	4	-0.865	3.484	Different
16	4	-0.574	3.75	20	4	-1.053	3.612	Different
2	2	-0.647	0.67	19	4	-1.163	2.393	Different
9	3	-0.8	1.6	30	5	-1.223	2.673	Different
34	6	-0.876	1.03	31	5	-1.31	1.285	Different
8	3	-0.943	2.34	34	6	-1.323	1.27	Different
5	3	-1.501	1.49	28	5	-1.408	1.78	Different
30	5	-1.536	1.16	15	4	-1.664	2.56	Different
1	2	-1.559	1.32	26	5	-1.752	0.976	Different
31	5	-1.571	0.89	4	2	-1.789	0.61	Different
4	2	-1.588	0.75	16	4	-1.863	1.16	Different
38	6	-2.095	0.22	32	5	-1.935	0.784	Different
27	5	-2.344	1.09	6	3	-2.375	0.248	Different
28	5	-2.581	0.66	24	5	-2.537	0.933	Different
39	6	-3.059	0.17	3	2	-2.671	1.014	Different
24	5	-4.064	0.53	8	3	-2.741	0.985	Different
3	2	-4.115	0.44	25	5	-2.866	0.938	Different
36	6	-4.304	0.51	9	3	-2.883	0.644	Different
11	3	-4.318	0.47	27	5	-5.357	0.459	Different
25	5	-4.454	0.52	36	6	-5.473	0.398	Different
26	5	-11.185	0.22	12	3	-9.093	0.216	Different
Mean		-1.13514	2.395			-0.54806	1.904889	

The second research question of the study aimed at investigating whether there was any significant difference between male/female EFL learners in learning English syntax based on the stages predicted by Processability Theory. The results of the analyses done on the performance of the male and female groups on the PT test indicated that;

- The male group's data enjoyed a higher Cronbach's alpha reliability; i.e. .796 vs. .690.
- The male group's data had few items with negative item-total correlations; 4 items vs. 5 items.
- The male and female groups' data had equal number of items with high item-total correlations; i.e., 12 items.
- Among the first 16 items, male group's data predicted the difficulty of the 16 items correctly; i.e. 100 % accuracy. The same percentage for the female group was 87.5 %; that is to say; 14 items out of 16 were predicted correctly.
- The male group had fewer misleading item; i.e., one vs. four. Both groups had only one flat item.
- None of the items' difficulty was predicted correctly in two groups (Table 6).
- The PT test was more difficult for the female group (M_{Female} =-.54 vs. M_{Male}=-1.13). It had also more discriminatory power ($Discrim_{Male}$= 2.39. vs. $Discrim_{Female}$ =1.90).

Then, it could be concluded that there is a significant difference between male/female EFL learners in learning English syntax based on the stages predicted by processability theory.

6. Findings

The researchers of this study categorize the structures into nine grammatical categories based on appendix1 (Pienemann, 1998) and compares the difficulty within each category. The nine categories are Verbs, Nouns, Pronouns, Question, Negative, Adverbs, Adjectives, Prepositions and Word Order.

Verbs: There were five verb items in this study, i.e., 4, 15, 16, 24 and 33. Table 7shows their difficulty levels for Male students and this table indicates that item 33> items 15> item 16> item 4> item 24 and this order for Female students can be stated as item 33> items 15> item 16> item 4> item 24.

Table 7. ***Item Difficulty of Verb Items***

		Item difficulty	
Item	Sentence Position	Male	Female
4	S(V-ed) +Adv / past	-1.588	-1.789
15	Be/have +(V-ed)/ past participle	-0.339	-1.664
16	Be+ (V-ing)/ present progressive	-0.574	-1.863
24	S + (V) +O/ present	-4.064	-2.537
33	(V-ing)+ Adv+ V/ gerund	-0.318	-0.511

This table shows that surprisingly gerund in item 24 is the simplest item for the both groups. The past perfect (item 15) and the present progressive tense (item 16) items were difficult and determining the irregular verb in item 4 was much more difficult than determining third person singular '-s' in item 24 when tested in a multiple-choice format.

It is predictable that the present perfect tense (item 15) was fairly the most complicated, since it is perceptually difficult for Iranian students, who regularly have trouble identifying it from the simple past tense. Despite large amounts of exposure to the students in the classroom, this in itself is clearly not sufficient.

It seems that the present perfect tense is not easy for Iranian students, and they frequently evade using it.

Nevertheless, in this test, both present perfect and past tense items had adverbials such as *last year* and *already* in the sentences, which might have made the items much easier. On the other hand, although, the present tense is the first tense taught in high school, in this study, distinguishing the third person singular '-s' was difficult for the Iranian students. In researchers' experience, many students might use the simple present tense when the present progressive tense is suitable. On account of the absence of adverbials such as *today* and *every day* in the sentences in item 24, the students might not have had trouble choosing the present tense.

Additionally, Item 16 evaluated the knowledge of the present progressive tense but did not contain keywords such as *right now* or *at the moment*, and had the present tense in the other clause in the sentence. This might have raised the complexity of this item. In contrast, the item assessing knowledge of past tense (item 4) was fairly easy and it may be because of the presence of the adverb *last year*. In sum, the presence or absence of adverbials such as *last year, already, now*, and *at the moment* seems to affect the complexity of tense items.

In relation to item 33, many students in this study expressed difficulties regarding whether to use gerund form or infinitive form of a verb. Sometimes, in a sentence, either the gerund or the infinitive form can be used, either with the same or different meanings, and sometimes there is only one form which is correct. Based on the researchers' experience, deciding which one to use is not easy for Iranian students since making a distinction between these two forms is conceptually difficult for students, but the more students read and listen in English, the easier it will become.

Nouns: There were four noun items in PT test, i.e., 5, 6, 17 and 25. Table 8shows their difficulty levels for the Female students and it can be expressed as item 5> item 17> item 6>item 25 and this order for the Male students can be stated as item 6> items 17> item 5> item 25.

Table 8.*Item Difficulty of Noun Items*

		Item difficulty	
Item	Sentence Position	Male	Female
5	Possessive pr+ (pl noun)	-1.501	12.946
6	V+ (pl noun)	11.866	-2.375
17	Article+ (noun)	-0.249	-0.865
25	Number or quantifier+ (pl noun)	-4.454	-2.866

Items 5 and 6 ask test-takers to place a noun in an object position, but the appearance of a possessive pronoun in item 5 makes the item much easier for the right brain students and presence of quantifier before noun in item 6 makes the item much easier for Female students. In answering the item 17, students might not recognize the combination of two nouns to show possession as occupying an adverb position but rather as something occurring after an adjective in choice c. It can be inferred that the apostrophe may be somehow an absurd punctuation mark for the Iranian EFL students. It is also interesting to note that both items 6 and 25 have quantifiers but *regular plural* makes item 25 much easier than item 6. Besides, making a regular plural noun is one of the earliest structures taught in high school, this fairly enlightens why item 25 was much easier than all noun items. Nishitani (2012) asserted that Nouns are the easiest notion to understand and the earliest notion to learn; English textbooks for beginners typically initiate with the details of nouns.

Pronouns: There were two pronoun items in this study, i.e., 26 and 34. Table 9 shows their difficulty levels for both male and female students, so, it can be expressed as item 34> item 26.

Table 9. *Item Difficulty of Pronoun Items*

		Item difficulty	
Item	Sentence Position	Male	Female
26	V + (REFLX Pr)	-4.064	-1.752
34	V + (REFLX Pr)	-0.876	-1.323

In item 26 a reflexive pronoun is required immediately after a verb as an adverb however, in item 34 a reflexive pronoun is used as a true reflexivization. It is surprising that the adverbial role of reflexive pronoun was not difficult than the true reflexivization since Iranian students were not familiar with the reflexive pronoun as an adverb or it was possible that the students misunderstood it as an objective pronoun. The appearance of a past tense verb after the blank could not have confused the students, since the blank was in the middle of the sentence and followed by an infinitive phrase. If only reflexive pronouns were used, in item 26, as distracters, the difficulty might have been different.

Question: There were seven question items in this study, i.e., 1, 8, 9, 18, 19, 27 and 35. Table10 shows their difficulty levels for the Male students and can be expressed as item 19> item 18> item 35> item9> item 8 > item1> item27and this order for the Female students can be stated as item 1> item35> item 18> item 19 > item 9 > item 8> item 27.

Table 10.*Item Difficulty of Question Items*

		Item difficulty	
Item	Sentence Position	Male	Female
1	S+V+O+?	-1.559	4.884
8	(Aux)DO+ S+V+O+?	-0.943	-2.741
9	Wh + (Aux)do+ S+ V+?	-0.800	-2.883
18	Wh+ (Aux) is+ S+V+?	0.331	-0.514
19	(Aux)is/have+ S+ V+ O+?	-0.338	-1.163
27	Wh+ O+ (Aux)Do+ S+?	-2.334	-5.357
35	S+V+O,(Aux)+ S+?	0.013	0.266

This table indicated that the question tag, item 35, was difficult and Placement of 'do' in *wh*-word question position i.e., item 27, was easy when tested in a multiple-choice format. It is surprising that the question tag item was not easy. However, this could be because the students only knew it as a set phrase *positive/negative sentences, with negative/positive tags*.

It is noteworthy that, as this table shows, the item 1 in these two groups of students took different places. This item is relatively easy for the Male students while it is the most difficult one for the Female students. It seems recognition of *SVO?* pattern from among the available choices was difficult for Female students. In addition, the sentence structures of items 8 and 19and items 9 and 18 are moderately the same. Item 19 is more difficult than item 8 in both groups and item 18 is more difficult than item 9, as well. This pattern, in some way, was not predictable for the researchers because learning yes/no questions precedes *wh*-word fronting and also making question by modals(placing the Linking Verb or Auxiliary Verb at the beginning of the sentence) precedes main verbs(beginning the sentence with a form of DO) in high school.

Negative: There were three negative items in this study, i.e., 2, 28 and 29. Table11 shows their difficulty levels for the Female Students and it can be expressed as item 2>items 29> item 28 and this order for the Male Students can be stated as item 29> items 2> item 28.

Table 11. *Item Difficulty of Negative Items*

		Item difficulty	
Item	Sentence Position	Male	Female
2	No +(noun)	-0.647	2.667
28	Wh + (don't +S) +V	-2.581	-1.408
29	S +Negative V+ any (N) S+ positive V+ some (N)	-0.191	0.221

It can be inferred from this table that item 28, placement of 'do' in second position, in negation, was easy for both group of students, however, item 2 and item 29 are in two different patterns. Items 2 and 29 require test-takers to read all choices carefully, recognize the grammar patterns and choose one choice. This recognition form of assessing, particularly in item 2 for the Female students and in item 29 for the Male students, might be complicated and could have confused students.

Adverbs: Table12 shows their difficulty levels for the Female students and it can be expressed as item 11>items 30>item 14 and this order for Male students can be stated as item 30>items 11>item 14.

Table 12. *Item Difficulty of Adverb Items*

		Item difficulty	
Item	Sentence Position	Male	Female
11	Be + (adv) + present participle	-4.318	11.624
14	(adv) + S + V + O	removed	removed
30	S + (adv) + V + O	-1.536	-1.223

There were three adverb items i.e., 11, 14 and 30 , two of which were grouped as sentence-internal adverbs and since all of students answered item 14 correctly, it can be inferred that sentence-internal adverbs were found to be more difficult than a sentence-initial or sentence-final adverb i.e., item 14. This means that sentence-internal> sentence-final or sentence- initial adverbs, and meets the order predicted by Processability Theory. It should be mentioned that item 14 was removed in the analysis since all students answered this item correctly.

Adjectives: There were three adjective items in PT test, i.e., 12, 20 and 31. Table 13shows their difficulty levels for the male students and it can be expressed as item 12>items 20>item 31 and this order for the Female students can be stated as item 20>items 31>item 12.

Table 13. *Item Difficulty of Adjective Items*

		Item difficulty	
Item	Sentence Position	Male	Female
12	Be +(more) +Adj	-0.038	-9.073
20	Noun+ (Adj) +than	-0.143	-1.053
31	Be+ (Adj)+ than	-1.571	-1.310

Item 12 is the most difficult item for male students while for females it is the easiest one. Items 12 and 20 indicated that an irregular superlative and comparative makes the item far more difficult than placing regular superlative and comparative adjective in sentences. This could be because student are not familiar with the irregular form of words, and thus less familiarity with adjectives might confuse some students and make answering item 20 difficult. On the other hand, placing "than" immediately after a blank make the identification very easy. This structure is one of the earliest structures taught in high school.

Prepositions: Just one item in this study represents preposition, which required the students to distinguish between 4 prepositions and place it between two verbs.

Table 14.*Item Difficulty of preposition Item*

		Item difficulty	
Item	Sentence Position	Male	Female
21	V + (preposition) +V	0.139	-0.497

The item difficulty of this item is 0.139 for the male students and -0.497 for the female students. This table indicates that "insertion of *to* as a complementizer" for males was much more difficult than females in this research.

Word Order: There were nine Word Order items in this study, i.e., 3, 13, 22, 23, 32, 36, 37, 38 and 39. Table 15 shows their difficulty levels for the Female students and can be expressed as item 37> item 13> item 39> item 23> item 38> item 22> item 32> item 3> item 36 and this order for the Male students can be stated as item 37> item23> item13> item32> item22> item 38> item 39> item 3> item 36.

Table 15.*Item Difficulty of Word Order Items*

Item	Sentence Position	Item difficulty	
		Right	Left
3	S+V+(O)	-4.115	-2.671
13	(O) +S+V/ topicalization	0.688	0.141
22	S+(V)+O/ verb particle separation	-0.176	-0.860
23	S+V+(O)/ Stranding of prepositions in relative clauses	0.309	-0.476
32	S+V+(O) / indirect object with to	0.078	-1.935
36	S+(Adv)+V+O	-4.304	-5.473
37	S+(V)+O+O	1.097	1.187
38	S+V+O+(V)	-2.095	-0.501
39	S+V+O+(to V)	-3.059	0.037

As this table shows item 37is the most difficult one and items 3 and 36are the easiest for both groups. Although objects are not explained explicitly in the high school textbooks, it seems that, in item 3, placing a subject and a verb before a blank made this item much easier. Distinguishing a sentence-internal adverb and thus familiarity with adverbs might make answering item 36 much simpler. It is predictable that items 37 and 13 rated as highly complicated in difficulty order of word order because they are not explicitly explained in grammar books and in some way, have absurd syntactical process. Although topicalization is generally widespread in Persian, students are not familiar with this in English.

There are many phrasal or compound verb forms in English that are fairly similar to separable verbs. With item 22, separable verbs are really challenging for students because semantic unit cannot be understood based upon the meanings of the individual parts, but must be taken as a whole and also these kinds of verbs don't follow any specific rule to be memorized. Item 23 is preposition stranding, sometimes called P-stranding, is relatively difficult for both groups of students. This might be because it is a syntactic structure in which the placement of an object preposition is at the end of the sentence rather than being positioned in the proximity of object. In item 32 an indirect object is required immediately after *to*. The blank was at the end of the sentence, preceded by *to*. Although presence of *to* immediately before the blank could have confused the students, the difficulty level of this item is relatively low. Using both base form of the verb and infinitive in distracters, in item 38, confused students and made this item fairly tough for both groups. With regard to item 39, it is interesting to note that distinguishing an infinitive right after object seems difficult for the females; however, this item is moderately easy for the other group of students.

7. Discussion

Based on the analyses related to research questions, it was found that for Iranian female EFL learners in learning syntax, four items were found to have had negative contributions to the test, while 12 items had moderate to high contributions to the PT test. On the other hand, for Iranian male EFL learners the item-total correlations represented only one item (shared by both groups) which had negative contributions to the test, while 14 items had moderate to high contributions to the PT test. Between the two groups there were 8 items shared to have had moderate to high contributions to the PT test. It was also revealed that there were significant differences among the stages predicted by PT between Iranian male and female EFL learners in learning syntax; the PT based grammar test was more difficult for the female group and had a more discriminatory power.

Findings also revealed that there were significant differences among the stages predicted by PT between Iranian male and female EFL learners in learning syntax; the PT oriented test was more difficult for the female group and had a more discriminatory power. This finding is in contrast with a lot of studies previously conducted in the area of L2 development and gender effect (Cuza & Perez-Tattam, 2016; Reid, 1995; Tomasello, 2003). Simonsen, Kristoffersen, Bleses, Wehberg, & Jørgensen (2014) in their study concerning the Norwegian communicative development inventories, also asserted that " boys lagged behind girls in vocabulary production and comprehension, grammatical complexity, and in certain types of imitation" (p. 3). This gender difference seems to be different in the data used in the present study than in the data from Norwegian language. The present study findings give priority to the male learners while other studies give priority of language development in general and L2 grammar in particular to the female L2 learners. Bleses, Vach,

Slott, Wehberg, Thomsen, Madsen, & Basbøll (2008) in their study concerning the Danish communicative developmental inventories, acme to know that female learners develop higher grammatical ability.

This result was confirmed by Fenson, Marchman, Thal, Dale, Reznick, & Bates, (2007) in the American context. The different result obtained in the Iranian context may be pursued in the cultural factors such as unwillingness of girls to make mistakes in front of others and their recessive stand (Mahdavi, 2007). Another reason for such a difference (male priority in predicting PT in L2 grammar) may be pursued in the nature of the participants taking part in the study; the male learners might have paid more attention to the grammatical notions compared to the female ones.

8. Conclusion

The purpose of this study was to investigate the difficulty order of different grammatical structures for Iranian learners predicted by Processability Theory. "According to the Processability Theory, there are clear stages in processing foreign language development which are progressed hierarchically" (Khansir & Zaab, 2015, p.348). PT is a universal theory of language acquisition so it is not language specific and focuses on the relation between language processing and acquisition. However, researchers identified empirical evidence conflicting with Pienemann's prediction. The results of this research demonstrated analytically that there was somehow counterevidence for the assumptions of the theory. Analyses of the data firstly revealed that both male and female EFL learners taking part in the study moderately, not completely, develop their grammar based on the stages predicted by PT and found fundamental differences between male/female EFL learners in learning English syntax based on the stages predicted by Processability Theory. On the whole, the results suggest

that Processability Theory may not be thoroughly convincing for language learners who study the target language as a foreign language. In a nutshell, researchers point out a few limitations and suggest directions for further research. Due to the suffering of the study from the conceivable limitations, which make it difficult to take a broad view of the results of the study, further research with more number of participants in different proficiency levels must be included in the analysis to test the validity of Processability Theory. Moreover, although Pienemann (1998a, 2007) does not restrict the theory to second language production, this study was derived from the productive features of language use. So, on condition that linguistic procedural skills are involved, this theory is of great significance.

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