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Morphological Awareness and Cross-Language Transfer

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Abstract

This research investigated how knowledge of word structure (morphology) transfers across languages in an EFL context. The study involved 100 randomly selected students from basic education in Tunisia, with half from Grade 8 and the other half from Grade 9. The students' vocabulary sizes were assessed using an adapted version of Nation's Vocabulary Levels. Additionally, tests for inflectional and derivational morphemes in Arabic, French, and English were used to measure the students' awareness of word structure. The students also completed two tasks involving words that are similar in meaning and form across languages (cognates) in French-English and Arabic-English. The results showed that knowledge of word structure in Arabic did not relate to knowledge of word structure in English, but there were significant connections between knowledge of word structure in French and English. Furthermore, the study revealed that the similarity of English words with Arabic affected the transfer of knowledge of word structure, while knowledge of word structure in French had an impact on both similar and dissimilar English words.

1. INTRODUCTION

Cross-language transfer of morphological awareness was rarely investigated. Nevertheless, researchers have indicated that morphological awareness influences the transfer direction of morphological skill (Beyersmann et al. 2020; Kahraman et al. 2023; Norman et al., 2017). As for languages, they are different in terms of the way they put morphemes together. Some languages have incredibly rich, complex morphological processes, while others have less complex ones (De Clercq & Housen, 2019). The L1 and the L2 may have different lexical access processes. The variances between Arabic and English could impede Arab students learning English from analyzing and understanding complex English words. For example, (Saiegh-Haddad & Geva, 2007) clarified that Arabic morphological awareness differs from English morphological awareness. They also confirmed the fact that some beginner Arab learners of English tend to spell English words by writing consonants and leaving vowels, which is a case of transfer from Arabic orthography. These differences may be responsible for representing obstacles for Tunisian Arab learners of English. To conclude, explicit instruction on the

morphological units and how to manipulate English morphological structures may be of extreme importance for Arab learners of English.

2. LITERATURE REVIEW

One of the old practices in foreign language teaching suggests that previous language knowledge ought to be revived in the classroom, and students should seek out comparable expressions in both their native language and the target language, or even L3 (Jessner, 2003). This is in good accordance with Eskander et al. (2013) who recommend teaching learners to rely on their prior cognate knowledge to figure out the meanings of new English vocabulary. The focus of teaching vocabulary through cognates was first implemented in the L2 and then extended to the foreign language context. Rodriguez (2001) argues that teachers should resort to L1/L2 cognates as a way to teach students to unveil the meaning of L2 words.

Whitley (2002) defined cognates as words in different languages with the same or similar meaning, spelling, and pronunciation. Even though French and English do not belong to the same language family, they share a huge number of Greek and Latin origins. Consequently, many French English cognates have emerged. On the other side, Arabic and English belong also to different language families, but a relatively smaller number of cognates exist between the two languages. Cognates can play a key role in language learning; hence, we can speak about the *cognate facilitation effect*. Actually, many researchers have suggested that cognates' storage, processing, and retrieval are easier than non-cognates (Midgley, Holcomb & Grainger, 2011). To conclude, the previously mentioned studies provide tangible evidence of the facilitation role (effect) of cognates in a bilingual context. This study investigates this facilitative role in a multilingual context because to my knowledge a few published studies have investigated it so far.

2.1.Research Questions

1- Are measures of morphological awareness in French and Arabic related to measures of morphological awareness in English?
2- Are measures of morphological awareness in French and Arabic related to measures of English vocabulary sizes?
3- Are measures of morphological awareness in Arabic and French related differently to (Arabic/ English) and (French/ English) cognates and non-cognates?

3. METHODOLOGY

3.1.Sample / Participants

The sample of this study consisted of 100 Tunisian basic education students. Half of the participants were randomly selected from four preparatory schools in Greater Tunis (Grade 8), and the other half were from Grade 9.

3.2. Instrument(s)

A battery of widely recognized tests was both adopted and adapted to the purposes of the study. Some tests were self-designed to get parallel versions across languages:

- 2 English Vocabulary Level Tests (Receptive and Productive)
- 3 Inflectional Morphemes Tests (Arabic/ French/ English).
- 3 Derivational Morphemes Tests (Arabic/ French/ English).

- 2 Cognate Tasks (French English / Arabic English

To address the current research questions, two commonly employed tests were adapted for the study's objectives: a Vocabulary Level Test comprising two subsets—receptive and productive—and a Morphological Awareness Test. The learners' morphological knowledge was tested by inflectional and derivational morphemes tests in the three languages. First, the inflectional morphemes tests were self-created in both English and Arabic (Appendices C and D). However, the French test (Appendix E) was developed using Carlisle's (2000) format. As for the derivational morphemes test, it was adopted from Singson *et al.* (2000). Also, it was a multiple-choice task (Appendix F). In fact, even the French derivational test (Appendix H) and the Arabic derivational test (Appendix G) were designed following the same format to get parallel tests in the three languages.

Two cognates tasks were used in this study, namely an adapted version of the English French cognates task (Lok: 2014) and a parallel researcher-created Arabic-English cognate test. Both tests were translation multiple-choice tests. Each test included 20 items with 3 alternatives each. Half of these items (10 words) were cognates and the other 10 were non-cognates. This is meant to examine the relationship between morphological awareness and both cognates and non-cognates (Appendices I and J).

2.3.Data collection and analysis

To answer the first research question, concerning the cross-language transfer of morphological awareness in Arabic, French, and English among students of different levels (grades), the results of all the participants and the separate results of each group (Grade 8 and Grade 9) were compared through Multiple Analysis Of Variance MANOVA. The latter was used to compare population means across categories of the explanatory variables; and morphology test types across the three languages. Concerning the second research question, Pearson's product-moment correlation was employed to examine the relationships between the total scores of the Vocabulary Level Test and the Morphological Awareness Test. Initially, the scores of all participants were assessed for correlation between these variables. Then, the scores of each group were correlated separately.

Finally, concerning the last research question, two main statistical analyses were conducted, namely Pearson's correlation and multiple regression. First, Pearson's product-moment correlation was used to investigate the correlations between the Morphological Awareness Tests and the participants' total scores on cognates and non-cognates. Multiple Regressions were used to determine which of the independent variables (i.e., cognates and non-cognates) best predicted performance on the two independent variables, namely the participants' morphological awareness in Arabic and their morphological awareness in French.

2. FINDINGS

2.1. Cross-language transfer of morphological awareness

The table below presents descriptive statistics. It depicts a general overview of total students' performance on the different measures in the three languages, and then, performance details of the two grades (Grade 8 and Grade 9) are provided and correlated.

Table 1. Descriptive statistics for all variables

	N	Mean		Std. Deviation	Skewness	
	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error
Inflectional Morphemes English Test	100	6.07	.22	2.28	-.14	.241
Inflectional Morphemes Arabic Test	100	9.07	.08	.81	-.15	.241
Inflectional Morphemes French Test	100	7.94	.16	1.66	-.41	.241
Derivational Morphemes English Test	100	6.22	.22	2.29	-.11	.241
Derivational Morphemes Arabic Test	100	9.61	.05	.56	-.81	.241
Derivational Morphemes French Test	100	7.15	.15	1.55	-.01	.241
English Morphological Awareness	100	12.29	.33	3.34	-.16	.241
Arabic Morphological Awareness	100	18.67	.10	1.02	-.33	.241
French Morphological Awareness	100	15.09	.24	2.39	-.32	.241
English VocabularyKnowledge	100	53.18	.89	8.95	-.04	.241
French English cognates	100	8.39	.19	1.90	-1.29	.241
French English non-cognates	100	7.02	.24	2.43	-.63	.241
Arabic English cognates	100	7.44	.14	1.40	-.78	.241
Arabic English non-cognates	100	6.72	.21	2.16	-.30	.241
Valid N (listwise)	100					

Intra-language differences between students' performance on inflectional morphemes and derivational morphemes were insignificant as demonstrated by the detailed descriptive statistics in Table 1. First, students' scores on the two English morphological awareness tasks were around 6 out of 10. Second, students' scores on the French morphological awareness tasks were around 7 out of 10. However, students' best scores were in the Arabic morphological awareness tasks, which were around 9 out of 10. In other words, students' performance in the Arabic inflectional morphemes test as well as the derivational morphemes test was better than their performance in these tests in both French and English. This can be clearly seen in Figure 1.

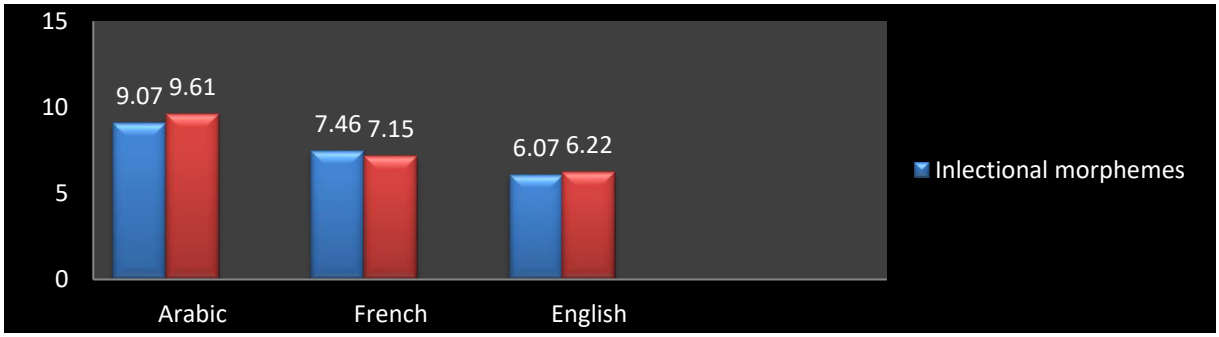


Figure1. Mean scores of the Morphological Awareness Test in Arabic, French and English

The standard error statistics represent estimates of the interval in which the population parameters may be found. This assumes the small values of the standard error could reveal that the sample statistics are close to the population parameters.

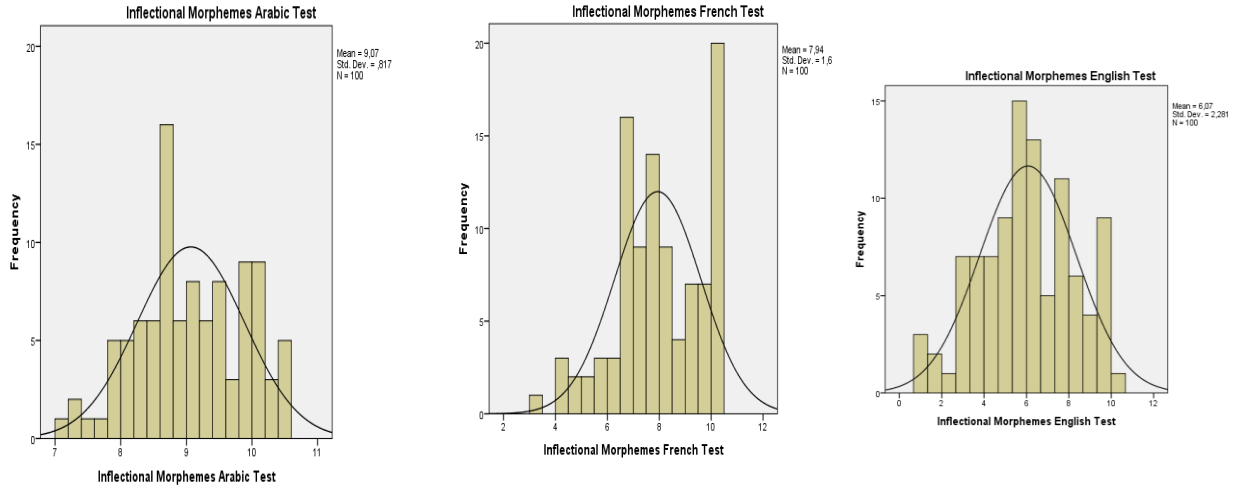


Figure2. Score distribution of the inflectional morphemes test in Arabic, French and English

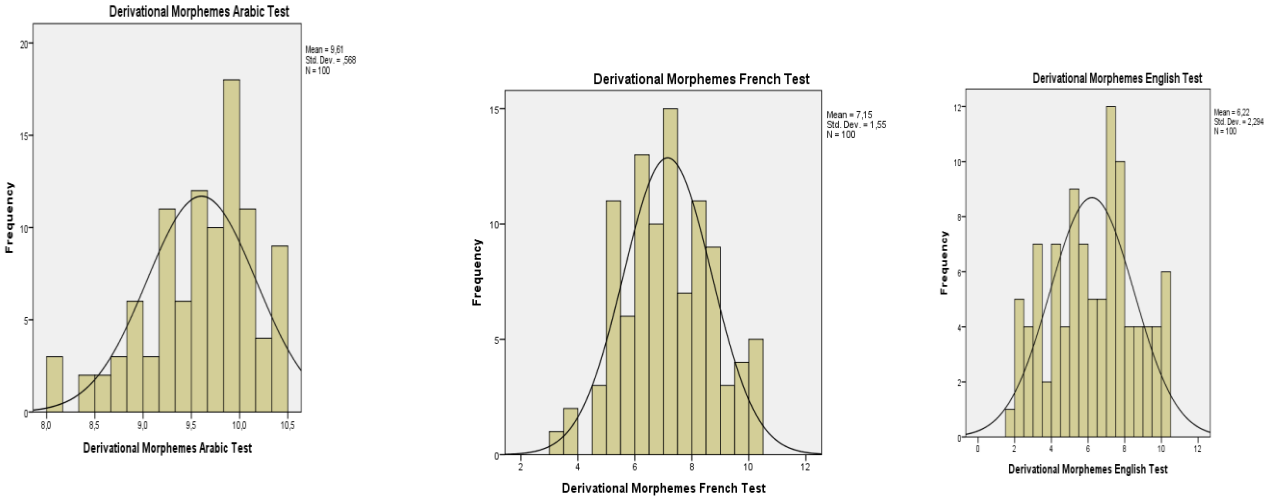


Figure3. Score distribution of the derivational morphemes test in Arabic, French and English

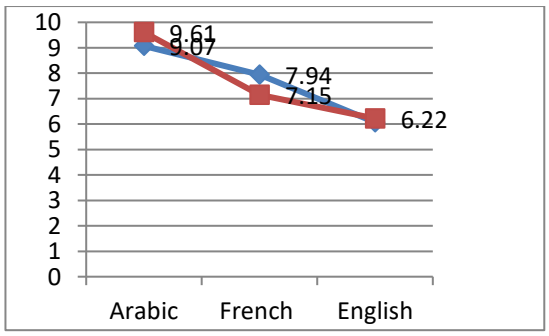
Figure 2 and Figure 3 depict cross-language score distributions of the inflectional and derivational morphemes tests. As far as the inflectional morphemes tests are concerned, students' scores were almost normally distributed in the three languages with slight differences in mean performances. Concerning the derivational morphemes tests, students' scores were also normally distributed in the English and French tests. However, in the Arabic morphological awareness test, the scores were not normally distributed. In fact, students' scores were *negatively skewed* or skewed to the left. This marks the mean of the scores to the left of the peak, and the tail is obviously longer on the left. After reporting the results of the whole participants (100 students), it was necessary to investigate the performance of both grades (Grade 8/Grade 9). Table 2 presents a description of both groups' performances on both inflectional and derivational awareness tests.

Table 2. Means and standard deviations for morphological awareness for both grades

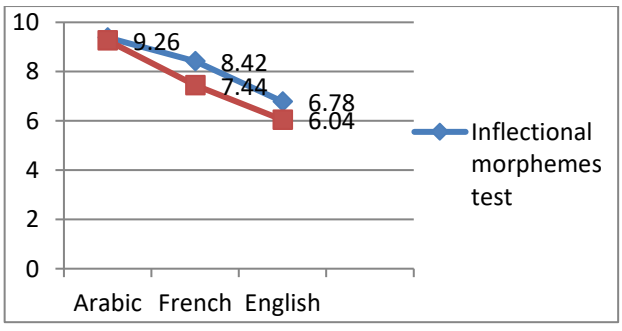
Grade / Test	Mean		Standard deviation
	Statistic	Std. Error	Statistic
Grade8 (n=50)			
Arabic inflectional awareness	9.07	.08	.81
Arabic derivational awareness	9.61	.05	.56
French inflectional awareness	7.94	.16	1.66
French derivational awareness	7.15	.15	1.55
English inflectional awareness	6.07	.22	2.28
English derivational awareness	6.22	.22	2.29
Grade 9(n=50)			
Arabic inflectional awareness	9.38	.11	.83
Arabic derivational awareness	9.26	.22	1.56
French inflectional awareness	8.42	.23	1.69
French derivational awareness	7.44	.26	1.86
English inflectional awareness	6.78	.35	2.58
English derivational awareness	6.04	.39	2.78

Note: A maximum score at each test is10

Inter-language differences between groups' performance on inflectional morphemes and derivational morphemes were insignificant as demonstrated by detailed descriptive statistics in Table 2. First, similar to the previously mentioned overall students' performance, groups' scores on the two English morphological awareness tasks were better at Arabic (First Language) than French (Second Language) and English (Foreign Language). To illustrate, students' scores on the Arabic morphological awareness tasks were around 9 out of 10. However, students' scores on the French morphological awareness tasks were around 7 out of 10, and they were around 6 out of 10 on the English morphological awareness tasks. It is worth noting that Grade 9 students' performance was better than Grade 8 students even though the differences did not reach statistical significance (see Figure 4). A close look at both groups' performances reveals that Grade 9 participants performed better than Grade 8 participants on inflectional morphemes tests in the three languages. However, this was not the case with the performance on derivational morphemes tests. In other words, groups' scores were fluctuating: Grade 9 participants performed slightly better at the French derivational test, but Grade 8 participants performed better at both the Arabic and English tests.



Grade 8



Grade 9

Figure4. Line charts showing groups' performance on inflectional and derivational morphemes tests. After reporting and comparing the results of both groups, it was necessary to investigate correlations between measures of morphological awareness in the three languages.

Table3. Cross-language correlations and confidence intervals of measures of morphological awareness for both grades (N=100)

95% CI (Lower Bound + Upper Bound)	**Grade 8**			**Grade 9**		
	Eng. infl test	Eng. deri test	MA	Eng. infl test	Eng. deri test	MA
Ar. infl Aw	.03	.04	.04	.09	.09	.11
CI: LB	-.24	-.30	-.24	-.19	-.19	-.17
UB	.31	-.25	.31	.35	.35	.37
Ar.deri Aw	-.03	-.14	-.19	.16	.10	.18
CI: LB	-.30	-.40	-.44	-.12	-18	-10
UB	.25	.14	.09	.41	.36	.43
AMA	.04	.19	.21	.20	.17	.21
CI: LB	-.24	-.09	-.07	-.08	-11	-.07
UB	.31	.44	.46	.45	.42	.46
Fr. infl Aw	.34	.32	.36	.47	.51	.52
CI: LB	.06	.04	.09	.22	.27	.28
UB	.56	.54	.58	.66	.69	.69
Fr. deri Aw	.27	.43	.46	.29	.44	.38
CI LB	-.009	.17	.20	.01	.18	.11
UB	.51	.63	.65	.52	.63	.59
FMA	.35	.47	.49	.34	.39	.51
CI: LB	.08	.22	.24	.06	.12	.27
UB	.57	.66	.67	.56	.03	.69

For Grade 8, cross-language correlations between measures of morphological awareness in English and Arabic were insignificant (p's > .01). Correlations ranged from -.035 to .210 for Grade 8 and from .091 to .219 for Grade 9. On the other hand, measures of morphological awareness in English and French were significant (p's < .01), and they ranged from .275 to .493 for Grade 8 and from .295 to .523 for Grade 9. So, figures from Table 46 reveal that cross-language correlations between measures of morphological awareness in English and Arabic were insignificant (p's > .01), while correlations between measures of morphological awareness in English and French were significant (p's < .01).

2.2. Cross-language effects of Arabic and French morphological awareness on English vocabulary

Table 4. Cross-language correlations and confidence intervals of measures of morphological awareness and vocabulary knowledge (N=100)

		Arabic Morphological Awareness	French Morphological Awareness	English Vocabulary Knowledge
Arabic Morphological Awareness	Pearson Correlation	1	.06	-.10
95% CI:	Sig. (2-tailed)		.49	.31
	Lower Bound		-.13	-.29
	Upper Bound		.25	.09
French Morphological Awareness	Pearson Correlation	.06	1	.33
95% CI:	Sig. (2-tailed)	.49		.00
	Lower Bound	-.13		.14
	Upper Bound	.25		.49
English Vocabulary Knowledge	Pearson Correlation	-.10	.33	1
95% CI:	Sig. (2-tailed)	.31	.00	
	Lower Bound	-.29	.14	
	Upper Bound	.09	.49	

Cross-language correlations between measures of morphological awareness in Arabic were insignificantly correlated with English vocabulary knowledge (r = -.101, *p* =.316). Whereas, measures of morphological awareness in French yielded significant a positive

correlation with English vocabulary knowledge (r = .331, *p* =.002). In fact, whilst the correlation between Arabic morphological awareness and English vocabulary knowledge was negative, French morphological awareness positively correlated with English vocabulary knowledge. Finally, for group performances, correlations between measures are displayed in Table 5 for Grade 8 and Grade 9 respectively.

Table5. Cross-language correlations of morphological awareness and vocabulary knowledge among groups

	Morphological Awareness Test (Arabic)			Morphological Awareness Test (French)		
	Whole group	***Grade 8***	***Grade 9***	***Whole group***	***Grade 8***	***Grade 9***
Vocabulary Test (English)	-.10	-.13	-.09	.33	.35	.41

Using Steiger's z-tests, a comparison of the correlations between morphological awareness in Arabic and English vocabulary among Grade 8 and Grade 9 yielded the following results (z score =-0.261, p =0.397). On the other hand, a comparison of the correlations between morphological awareness in French and English vocabulary provided the following values (z score = -0.45, p = 0.326). By convention, when using a 95% confidence level, the critical Z score values are -1.96 and +1.96 standard deviations. As the given Z scores are both between -1.96 and +1.96, consequently, the p-value is larger than 0.05, and the null hypothesis cannot be rejected.

2.3. The effect of cognate status on the cross-language transfer of morphological awareness

Table 6. Paired Samples Statistics for cognates

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Arabic English cognates	7.44	100	1.40	.14
	Arabic English non-cognates	6.72	100	2.16	.21
Pair 2	French English cognates	8.39	100	1.90	.19
	French English non-cognates	7.02	100	2.43	.24

Model Summary

Model		MOE	95,0% Confidence Interval Lower Bound	Upper Bound
	Arabic English cognates	0.27	7.16	7.71
	Arabic English non-cognates	0.42	6.29	7.14
	French English cognates	0.37	8.01	8.76
	French English non-cognates	0.48	6.53	7.50

Table 6 presents a comparison of participants' mean scores on cognate and non-cognate items. Obviously, performances were better on cognates. First, a paired sample t-test reveals that students performed significantly better on Arabic English cognates ($\bar{x}$=7.44, sd =1.402) than non- cognates ($\bar{x}$=6.72, sd =2.165), t (99) = 3.325 p ≤ .001. Second, the correlation between Arabic English cognates and Arabic English non-cognates was .32. This moderate correlation is not conclusive to confirm that students who scored high on the Arabic English cognate test tend to score high on the Arabic English non-cognates. The figure below presents a comparison of students' mean scores on Arabic English and French English cognates and non-cognates tests.

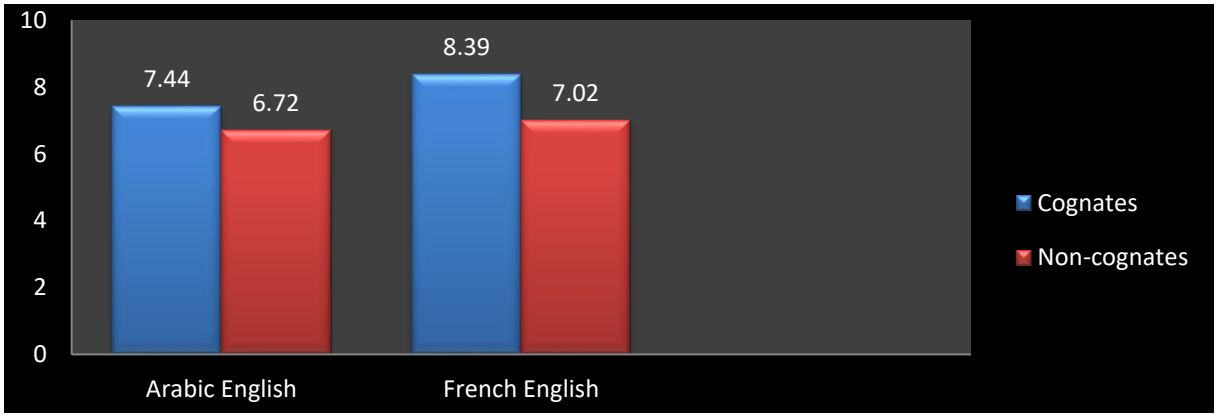


Figure 5. Mean scores of the cognate status tests

A paired sample t-test reveals that students performed significantly better on French English cognates ($\bar{x}$=8.39, sd =1.90) than non-cognates ($\bar{x}$=7.02, sd =2.433), t (99) = 6.891 p = .001. Furthermore, the correlation between French English cognates and French English non-cognates was .60. Thereby, students who scored high at the French English cognate test tend to score high at the French English non-cognates. So, the larger the correlation with the sample paired t-test is, the less the standard error would be in testing the hypothesis that the mean values are different. The following figures present a comparison of students' score distribution of these two tests.

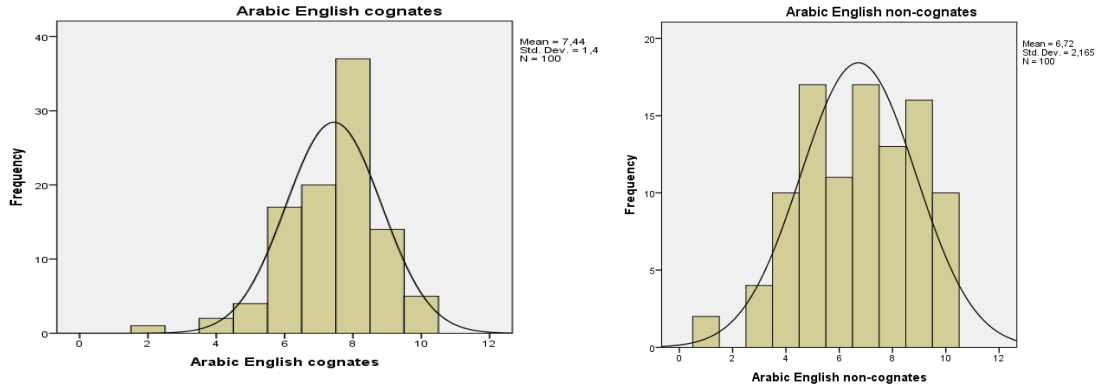


Figure 6. Score distribution of the Arabic English cognates and non-cognates

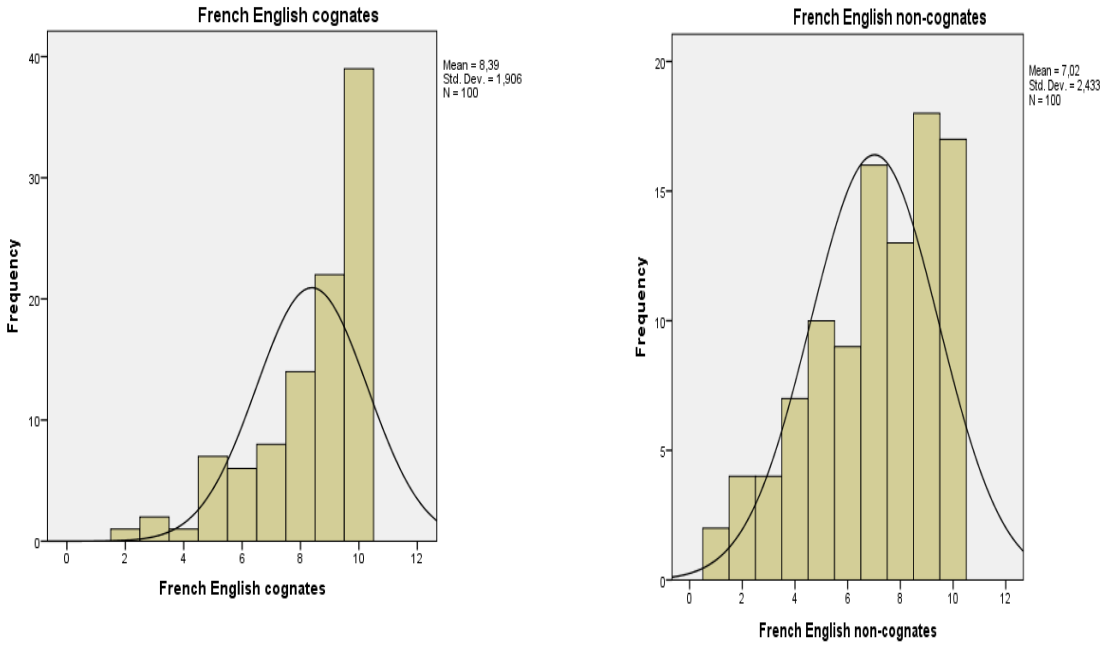


Figure 7. Score distribution of the French English cognates and non-cognates

Figure 6 and Figure 7 depict cross-language score distribution of the French English and Arabic English cognates and non-cognates tests. Concerning the Arabic English cognate test (see Figure 6**)**; students' scores were almost normally distributed for both cognates and non-cognates with slight differences in mean performances. As far as the French English cognate test is concerned, students' scores were *negatively skewed* or skewed to the left. This makes the mean of the scores to the left of the peak, and the tail is obviously longer on the left. Besides, the mode was larger than the mean.

Based on our sample data, the difference between means of Arabic English cognate and non-cognate vocabulary is 0.72, 95% CI [0.38, 1.05]. There appears to be a significant mean difference between students' performances since zero is not captured in this interval, and since the entire interval is above zero. On the other hand, the difference between means of French English cognate and non-cognate vocabulary is 1.37, 95% CI [0.95, 1.79]. Here again, We are quite certain that with 95% confidence, this interval captures the true mean difference, and that this mean difference is statistically significant as the CI does not cross the point of no difference.

Cross-linguistically, there were no significant correlations between Arabic inflectional awareness, derivational awareness, and the composite Arabic morphological awareness with both cognate and non-cognate vocabulary. Upon closer inspection of the confidence intervals, it is evident that the lower bounds were negative while the upper bounds were positive. This means that the confidence intervals for these correlations intersect the point of no difference. However, in the case of French, inflectional awareness, derivational awareness, and the

composite French morphological awareness showed a notably stronger correlation with cognate vocabulary compared to non-cognate vocabulary. The confidence intervals were all above zero and therefore the measured correlations are statistically significant. As indicated in Table 7, separate measures along with the total measure of Arabic morphological awareness were negatively associated with Arabic English non-cognates. However, the same measures of French morphological awareness were positively correlated with French English cognates.

Table 7. Cross-language correlations and confidence intervals of measures of morphological awareness and cognates status(N=100)

		Inflectional awareness (Arabic)	Derivational awareness (Arabic)	Morphological awareness (Arabic)	Inflectional awareness (French)	Derivational awareness (French)	Morphological awareness (French)
Arabic English cognates	Pearson Correlation	-.07	-.06	-.01	.15	.02	.12
	Sig. (2-tailed)	.43	.51	.32	.13	.77	.22
	Lower Bound	-.26	-.25	-.29	-.33	-.17	-7
	Upper Bound	.12	.13	.09	.04	.21	.30
	MOE_{av}	.195	.196	.195	.192	.196	.194
Arabic English non-cognates	Pearson Correlation	-.06	-.09	-.11	.107	.09	.13
	Sig. (2-tailed)	.50	.36	.26	.28	.35	.18
	Lower Bound	-.25	-.28	-.29	-.09	-10	-.06
	Upper Bound	.13	.10	.08	.29	.28	.31

	MOE_{av}	.196	.195	.194	.194	.195	.193
French English cognates	Pearson Correlation	-.15	-.14	-.20*	.258**	.21*	.35**
	Sig. (2-tailed)	.11	.15	.04	.00	.00	.00
	Lower Bound	-33	-.32	-.38	.05	.01	.16
	Upper Bound	.04	.05	0	.42	.39	.51
	MOE_{av}	.192	.193	.189	.189	.188	.173
French English non-cognates	Pearson Correlation	-.11	-.16	-.18	.21*	.22*	.32**
	Sig. (2-tailed)	.23	.10	.06	.00	.04	.00
	Lower Bound	-.29	-.34	-.36	.01	.02	.13
	Upper Bound	.08	.03	.36	.39	.39	.48
	MOE_{av}	.194	.192	.196	.188	.187	.177

*$p < .05$, **$p<.01$

To investigate the relationship between the cognate status (dependent variables) and the informants' morphological awareness in Arabic and French (the independent variables), the standard multiple regression procedure was used. It aimed at helping first to determine how well the independent variables were able to predict the informants' performance on cognate and non-cognate vocabulary and second to find out which particular independent variable was the best predictor. Because the students in this study had to do two cognate tests, standard multiple regression analyses were conducted to determine the effects of cognate status on the cross-language transfer of Arabic and French morphological awareness. Results are displayed in Table 8.

Table 8. Regression of associations between morphological awareness in French, Arabic and cognate status vocabulary

	Arabic English cognates							**Arabic English non-cognates**						
	R^2	Unstandardized Coefficients		t	Sig.	95,0% CI		R^2	Unstandardized Coefficients		t	Sig.	95,0% CI	
		B	Std. Error			LB	UB		B	Std. Error			LB	UB
AIA	.05			-.60	.54	-.64	.34	.03			-,85		-.10	.43
ADA	.07	-.15	.25			.21	.64	.05	-.33	.38		.39		.33
AMA	.00	-.12	.17	-.73	.46	-.47		.01	-.19	.26	-,72	.47	-.72	
		.02	.31		.94	-.60			-.13	.48		.77		.1.1
				.07							-,28		-.82	
	French English cognates							**French English non-cognates**						
FIA	.15					-.11	.38	.04					-.29	.34
FDA	.10	.13	.12	.10	.28		.33		.02	.16	.15	.88		.42
FMA	.02	.10	.11	.94	.34	-.12	.37	.05	.13	.14	.89	.37	-.16	.56
		.02	.17	.13	.89	-.33		.09	.11	.23	.47	.63	-.34	

AIA = Arabic Inflectional Awareness; ADA=Arabic Derivational Awareness; AMA = Arabic Morphological Awareness; FIA = French Inflectional Awareness; FDA = French Derivational Awareness; FMA = French Morphological Awareness.

The multiple linear regression coefficient (ß= -.15, 95% CI [-.64, .34] p >.05) associated with Arabic inflectional awareness suggests that with each additional increase in this independent variable, Arabic English cognate vocabulary decreased by approximately 15%. Hence, the contribution of Arabic inflectional awareness to Arabic English cognate vocabulary was not significant, which means that 95% of the variation cannot be explained by Arabic inflectional awareness alone. The confidence interval associated with the regression analysis

contains zero, which means the null hypothesis; there is no association between Arabic inflectional awareness and Arabic English cognate vocabulary cannot be rejected. Similar results were found for Arabic derivational awareness. The regression coefficient (ß= -12, 95% CI [-.47, .21] p<.05) associated with Arabic derivational awareness suggests that with each additional increase in this independent variable, Arabic English cognate vocabulary decreased by approximately 12%. Results emanating from the regression analysis revealed that Arabic derivational awareness contributed to explaining 7% of the variance in Arabic English cognate vocabulary. The confidence interval associated with the regression analysis contains zero, which means the null hypothesis, there is no association between Arabic derivational awareness and Arabic English cognate vocabulary cannot be rejected.

The findings from the multiple linear regression analysis indicate that there is not a significant association between Arabic inflectional awareness and Arabic English cognate vocabulary. The regression coefficient suggests that for each additional increase in Arabic inflectional awareness, there is an approximate 15% decrease in Arabic English cognate vocabulary, but this relationship is not statistically significant. The confidence interval for the regression analysis includes zero, indicating that the null hypothesis, which states that there is no association between Arabic inflectional awareness and Arabic English cognate vocabulary, cannot be rejected. Similar results were observed for Arabic derivational awareness, with the regression coefficient suggesting a 12% decrease in Arabic English cognate vocabulary for each additional increase in Arabic derivational awareness, but again, this relationship is not statistically significant. The confidence interval for the regression analysis also includes zero, indicating that the null hypothesis for the association between Arabic derivational awareness and Arabic English cognate vocabulary cannot be rejected. These results suggest that Arabic inflectional and derivational awareness do not significantly contribute to explaining the variance in Arabic English cognate vocabulary.

Second, concerning the dependent variable Arabic English non-cognate vocabulary, the regression coefficient (ß=-.33, 95% CI [-.10, .43] p<.05) associated with Arabic inflectional awareness suggests that with each additional increase in this independent variable, Arabic English non-cognate vocabulary decreased by approximately 33%. The R^2 value of .03 associated with this regression model suggests that Arabic inflectional awareness accounts for 3% of the variation in Arabic English non-cognate vocabulary, which means that 97% of the variation cannot be explained by Arabic inflectional awareness alone. The confidence interval associated with the regression analysis does not contain zero, which means the null hypothesis, there is no association between Arabic inflectional awareness and Arabic English non-cognate vocabulary cannot be rejected. Similar results were found for Arabic derivational awareness. The regression coefficient (ß= -.19, 95% CI [-.72, .33] p<.05) associated with Arabic derivational awareness suggests that with each additional increase in this independent variable, Arabic English non-cognate vocabulary decreased by approximately 19%. Arabic derivational awareness contributed to explaining 5% of the variance in Arabic English non-cognate vocabulary. The Arabic morphological awareness composite was not a significant predictor of both Arabic English cognate and non-cognate vocabulary; it hardly accounted for 1% of the variance.

On the other hand, regression analysis showed that French inflectional awareness explained over 15% of the variance in French English cognate vocabulary, with (ß= .13, 95% CI [-.11, .38] p<.05) suggesting that with each additional increase in this independent variable, French English cognate vocabulary increased by approximately 13%. However, French derivational awareness explained about 10% of the variance in French English cognate vocabulary. The regression coefficient (ß= .10, 95% CI [-.12, 33] p<.05) associated with French derivational awareness suggests that with each additional increase in this independent variable, French English cognate vocabulary increased by approximately 10%.

Concerning the dependent variable French English non-cognate vocabulary, the regression coefficient (ß= .02, 95% CI [-.29, .34] p<.05) associated with French inflectional awareness suggests that with each additional increase in this independent variable, French English non-cognate vocabulary increased by approximately 2%. The R^2 value of .04 associated with this regression model suggests that French inflectional awareness accounts for 4% of the variation in French English non-cognate vocabulary, which means that 96% of the variation cannot be explained by the independent variable alone. The confidence interval associated with the regression analysis does not contain zero, which means the null hypothesis, there is no association between French inflectional awareness and French English non-cognate vocabulary can be rejected. Indeed, similar results were found for French derivational awareness. The regression coefficient (ß= .13, 95% CI [-.16, .42] p<.05) associated with French derivational awareness suggests that with each additional increase in this independent variable, French English non-cognate vocabulary increased by approximately 13%. French derivational awareness contributed to explaining 5% of the variance in French English non-cognate vocabulary. The French morphological awareness composite predicted both French English cognate and non-cognate vocabulary; it accounted for 9% of the variance. Lastly, follow-up analyses were measured by calculating the interactions of cognate vocabulary and non-cognate vocabulary with grades (Grade 8 and Grade 9). Results were different between the two grades. Beta weights ranged from .26 (Grade 8) to .49 (Grade9), with all t's $> |1.641|$ and all p's $\leq .05$.

2. DISCUSSIONS

The findings indicated that the correlations across languages between Arabic and English were not statistically significant (p's > .05), whereas the correlations between assessments of morphological awareness in French and English were statistically significant (p's $\leq .05$). Cross-language positive transfer of Arabic morphological awareness was not possible with the target population. This apparent lack of correlation can be attributed to differences in orthography between the two languages as well as language origin. This is in good agreement with Saiegh-Haddad et al. (2007). Also, results provide evidence that cross-language correlations between measures of morphological awareness in French were significantly correlated with English vocabulary knowledge (p's $\leq .05$), but measures of morphological awareness in Arabic were insignificantly correlated with English vocabulary knowledge (p's $> .05$). Results are consistent with previous cross-language studies, which have shown evidence of links between

morphological awareness and vocabulary knowledge in similar languages or languages that congregate under the same family (Pasquarella et al., 2011; Sihui et al., 2015; Xi et al., 2018). Saiegh-Haddad et al. (2007) who found similar results with English-Arabic bilingual children. In the present study, results reveal that, among Tunisian preparatory school students who were learning English as a foreign language, inflectional awareness in Arabic (First language), did not predict their English vocabulary achievement while inflectional awareness in French (Second language) predicted their English vocabulary. Yet, the evidence of transfer was even less robust with derivational awareness as it explained smaller proportions of the variance in students' English vocabulary.

Most remarkably, the contributions of French inflectional and derivational awareness to English vocabulary remained significant after the autoregressor (Grade) was added to the analysis. This suggests French morphological awareness was uniquely associated with gains in English vocabulary. It was discovered that French derivational awareness assessed in Grade 8 significantly accounted for 3.6% of the variation in Grade 9 English vocabulary. However, once the autoregressor was included in the regression model, both measures of French morphological awareness failed to predict unique variations in English vocabulary beyond what was explained by the variables within the language. In summary, the current results partially support the hypothesis that there would be significant cross-language connections between morphological awareness in Arabic and French and vocabulary in English, beyond substantial controls. The association appears to be distinct in terms of the effect of the first and second languages on the third language. This indicates that students' early French morphological awareness transferred to predict variance in later English vocabulary but Arabic morphological awareness does not appear to significantly influence later English vocabulary among the students. However, when regression analyses among the ninth graders considered the autoregressive effects of the outcome variable, the results indicated that while French morphological awareness was linked to a change in English vocabulary between Grade 8 and Grade 9, Arabic morphological awareness did not predict a change in English vocabulary. This suggests that early French morphological awareness, rather than Arabic morphological awareness, contributes to subsequent English vocabulary development. This could be attributed to the similarity of the orthography system between French and English, aligning with De Angelis and Selinker's 2001 view that cross-linguistic transfer usually occurs from the language that is typologically closer to the target language in terms of writing system, semantics, syntax, and morphology.

In conclusion, the findings from question two indicated that among Tunisian preparatory school students who speak Arabic and are learning English as a foreign language, both French morphological awareness and English morphological awareness are significant in aiding these learners in analyzing and understanding the meaning of complex English words formed by morphemes. Specifically, students with greater morphological awareness and proficiency in manipulating morphemes tend to acquire English vocabulary more effectively. Another noteworthy discovery is that the results suggest that cross-language transfer mirrors the developmental progression of morphological awareness among these students. Consequently, inflectional awareness is the first to transfer from the second language to the foreign language, followed by derivational awareness.

5. CONCLUSIONS

Firstly, Arabic and English measures of morphological awareness were not related (cross-language). This apparent lack of correlation can be attributed to differences in orthography between the two languages as well as language origin. This is in good agreement with Saiegh-Haddad et al. (2007) who found similar results with English- Arabic bilingual children. However, correlations between French and English were significant, and this can be explained by the fact that English and French share the same orthography while Arabic exhibits a divergent one. Secondly, results confirm that students can leverage morphological awareness from their second language (French) to facilitate their vocabulary learning in the foreign language. Indeed, the mental lexicon of a learner is made up of an intertwined system where languages can interact with each other rather than separate entities (e.g. Cenoz, 2013; Szubko-Sitarek, 2015).

The upshot of this is that the factors that affected cross-language transfer in this study were both learner-based as well as language-based. On the one hand, learner-based variables included factors like proficiency level (beginners), educational background, and last language effect, where the language that was acquired most recently (French) was more ready for transfer. Meanwhile, language-related factors such as language typology and morphological transfer played a crucial role in enabling positive cross-language transfer. In summary, the results indicated that cognates are significant for English vocabulary acquisition: Arabic morphological awareness only transferred to account for differences in English cognates, but not non-cognates. However, French morphological awareness transferred to account for differences in both cognates and non-cognates.

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