



CRTT

The relationship between typing speed and writing processes in multilingual writing

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OVERVIEW

- **OVERVIEW**
- Basic Research Model
 - The Aim
 - Research Questions
- Design
- Procedure
- Data analysis
- Results
- Discussion
- Further research

BASIC RESEARCH MODEL

- General aim of our research project: To investigate the relationship between linguistic knowledge, writing processes (writing fluency, pauses and revisions) and text quality in the first language (L1-French) and second language (L2-English) between/among middle school French students.
- The aim of this study: To look at the relationship between copy task variables and writing processes in the first language (L1-French), the second language (L2-Turkish) and third language (L3-English) of Turkish-French bilingual third-year middle school students (n=15) who are learning English as a Foreign Language.

Research Questions

1. Is there a correlation between copy task measures within and between languages (French, English and Turkish)?
2. Is there a correlation between copy task measures and writing processes (writing fluency, pauses and revision processes)?
 - 2.1. Is there a correlation between copy task measures and writing fluency (measured as characters per minute)?
 - 2.2. Is there a correlation between copy task measures and pausing (measured as pauses within words and between words)?
 - 2.3. Is there a correlation between copy task measures and revision processes (Revision-burst length)?
3. Is there an interaction effect of copy task measures in writing fluency in Turkish?

DESIGN

- Both a process- and product-oriented study
- Multiple sources of data
 - keystroke loggings (*Inputlog* version 7.1.02)
 - stimulated recall interviews (focus group)
 - pre-/post-writing questionnaires
 - students' texts

Participants

The whole study: 31 (14-15-year-old) 3rd grade middle school French students in two different schools in a small city in France

- L1=French, language of education
- L2=English as a Foreign Language

Participants

This study: 15 (14-15-year-old) 3rd grade middle school French-Turkish bilingual students (part of the whole study)

- L1=French, language of education
- L2= Turkish, home language
 - Turkish literacy skills as part of the ELCO (*Enseignement de la Langue et Culture d'Origine* - Teaching Heritage Language and Culture) Project
- L3= English as a Foreign Language
 - four language skills (speaking, listening, reading and writing) in the EFL courses
 - linguistic knowledge= means of first quarter exam scores (oral and written) of each language

Construction of Turkish Copy Task

- necessity of a standardized typing speed measure as a baseline in the three languages of the study; FR, EN and why not TR?
- lexical database for Turkish language (Zargan) for bigram frequency list, developed by Bosphorus University, Turkey
- QWERTY, AZERTY, Turkish QWERTY keyboard
- three word sets, 18-21 characters each, 30% most frequent in adjacency letter list (Zargan base)
- a word set, 50% least frequent letter adjacency
- a sentence task with short words and three letter repetitions
- the letters in the consonant groups "q,w,x" replaced with "z,c,s" (the adjacent consonants)

Construction of Turkish Copy Task

- a list of more than 100 different word combinations
- Avoiding non-ascii characters (ç,ğ,ı,İ,ö,ş,ü)
- checking frequency, hand combination, adjacency in Turkish Bigram Excel file
- copy task creator tool
- the trial sessions of Turkish copy task by about 15 people (problems and solutions)

Writing Tasks

- two writing tasks (a descriptive task, a narrative task) for each language to control the task effect.
- Descriptive task: different one-page static pictures for each language with comparable thematic/ lexical content
 - Narrative task: The *Edmonton Narrative Norms Instrument* (ENNI), developed by Schneider, Dube and Hayward (2003) story-telling tasks
 - reliable, valid and comparable
 - for all school children, from pre-school to secondary school.
 - a series of pictures based on a model of "Story Grammar"

PROCEDURE

L1=French session (n=31)

- Information about how to use Inputlog and general instructions about how to perform the tasks
- "Student Writing Profile Questionnaire" to assess the student's attitudes towards writing in general (5 minutes)
- [Copy task in French](#) on Inputlog (7-8 minutes)
- French Writing session: a descriptive task on Inputlog (4 minutes)
- French Writing session: a narrative task on Inputlog (8 minutes)
- Post-writing questionnaire (5 minutes)
- Stimulated recall interview with an individual student from the focus group: pause (2000 miliseconds) by watching the Inputlog recorded file of the narrative task (10 minutes)

Procedure

- **L2/L3= English Session (n=31)**
- The "Student Motivation for English" questionnaire, to evaluate the students' motivation towards learning English as a Foreign Language. (5 minutes)
- [Copy task in English](#) on Inputlog (7-8 minutes)
- English Writing session: descriptive task on Inputlog (4 minutes)
- English Writing session: narrative task on Inputlog (8 minutes)
- Post-writing questionnaire (5 minutes)
- Stimulated recall interview with an individual student from the focus group

Procedure

- **L2= Turkish session (for Turkish-French bilingual students n=15)**
- "Student Motivation for Turkish" questionnaire, to evaluate the students' motivation towards learning English as a Foreign Language. (5 minutes)
- [Copy task in Turkish](#) on Inputlog (7-8 minutes)
- Turkish Writing session: descriptive task on Inputlog (4 minutes)
- Turkish Writing session: narrative task on Inputlog (8 minutes)
- Post-writing questionnaire (5 minutes)
- Stimulated recall interview with an individual student from the focus group while watching the recorded Inputlog file (2000 milliseconds pauses)
- Data collection sessions: one hour for each language, four days apart between French, English and Turkish sessions

DATA ANALYSIS

Pre-processing the data:

- Filtering the data:
 - Recoding the data by segmentation
 - Time-filtering by using initial key and end key
- Recoded and time-filtered new input for the Inputlog analysis

Post-processing the data:

- Merging the copy task data
- Manual coding of writing task data because of the large number of variables

DATA ANALYSIS

Analysing the data:

- ◊ Inputlog analysis of the time-filtered data
- Copy Task analysis
- General analysis
- Summary analysis
- Pause analysis
- Revision analysis

DATA ANALYSIS

◊ Assessment of text quality:

- a 4-point holistic scale adapted from Jacobs et al.'s (1981) ESL (English as a Second Language) Writing Profile
- Content, organization and language use (vocabulary, grammar and spelling).
- the same writing criteria in all three languages for the comparability of the text quality results.

◊ Statistical Analyses:

Descriptive statistics, correlation analysis, ANOVA, linear regression analysis

INPUTLOG VARIABLES

Copy Task Variables:

- Targeted bigrams: Log Mean Trimmed
- Targeted bigrams: Characters Per Minute
- Selected Component Bigrams: Log Mean Trimmed
- Selected Component Bigrams: Characters Per Minute
- High Frequency Bigrams: Log Mean Trimmed
- High Frequency Bigrams: Characters Per Minute

INPUTLOG VARIABLES

Fluency Variables:

- CPM: Mean Number of Characters Per Minute (including spaces)
- TOTALWORDS: Total Words in the main document
- WPM: Mean Number of Words Per Minute in the main document
- RATIO: Product/Process Ratio
- Mean ChaPBursts: Mean Number of Characters Per Pause-Bursts (P-bursts)

INPUTLOG VARIABLES

Pause variables:

- Mean Pause Time (pause threshold level >2000 ms)
- Mean Number of Pauses (pause threshold level >2000 ms)
- Mean Number of Pauses Within Words (pause threshold level >200 ms)
- Mean Number of Pauses Before Words (pause threshold level >200 ms)
- Mean Number of Pauses After Words (pause threshold level >200 ms)
- Mean Number of Pauses Between Words (pause threshold level >200 ms)

Revision Variables:

- Mean Number of Revisions (additions and deletions)
- Mean Number of Characters Per Revision-bursts (R-bursts)

RESULTS

1. Descriptives of copy task measures:

a) Targeted bigrams are all the tasks and bigrams in the Copy Task.

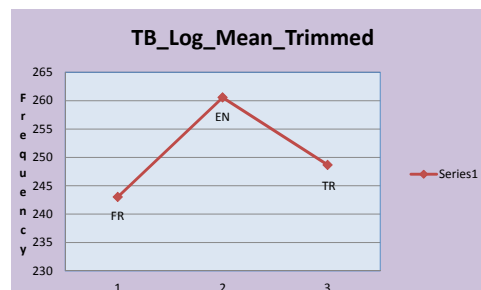


Figure 1: Log_Mean_Trimmed of Targeted Bigrams in French (FR), English (EN) and Turkish (TR)

RESULTS

b) Selected Component Bigrams are composed of sentence and word formation tasks.

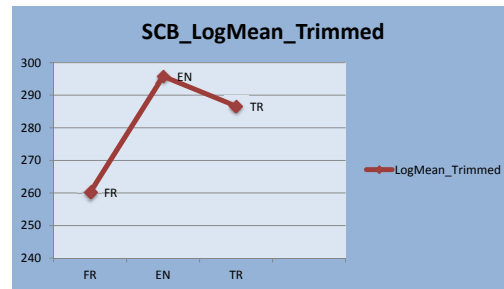


Figure 2: Log_Mean_Trimmed of Selected Component Bigrams in French (FR), English (EN) and Turkish (TR)

RESULTS

c) High Frequency bigrams are the bigrams that are 30% most frequent in adjacency letter list

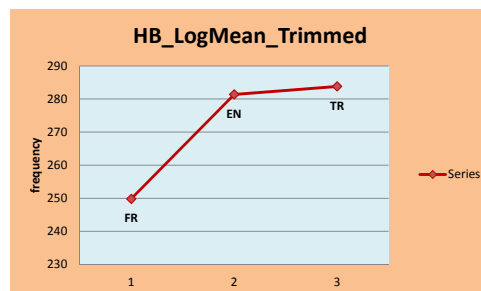


Figure 3: Log_Mean_Trimmed of High Frequency Bigrams in French (FR), English (EN) and Turkish (TR)

RESULTS

2. Relationship of the copy task measures between the languages:

a) Log Mean Trimmed measures

	FR_TB _LogM	FR_HF B_Log M	FR_SC B_Log M	EN_TB _LogM	EN_HF B_Log M	EN_SC B_Log	TR_TB_ _LogM	TR_HFB _LogM	TR_SC B_Log M
FR_TB _LogM	1								
FR_HF B_LogM	.865"	1							
FR_SC B_LogM	.871"	.992"	1						
EN_TB_ LogM	.877"	.890"	.888"	1					
EN_HF B_LogM	.878"	.958"	.967"	.899"	1				
EN_SC B_LogM	.885"	.958"	.965"	.906"	.996"	1			
TR_TB_ LogM	.250	.423	.470	.402	.404	.353	1		
TR_HF B_LogM	.743"	.930"	.934"	.782"	.891"	.882"	.606"	1	
TR_SC B_LogM	.749"	.938"	.944"	.797"	.897"	.888"	.614"	.998"	1

Note. n=15, TB: Targeted Bigrams, SCB:Selected Component Bigrams, HFB: High Frequency Bigrams, LogM:Log Mean Trimmed FR= L1, TR=L2, EN=L3

RESULTS

b) Characters_per_Minute in the Copy Tasks

	FR_SC B	EN_TB	TR_TB	FR_SCB	EN_SCB	TR_SCB	FR_HFB	EN_HFB
FR_TB_C PM	1							
EN_TB_C PM	.887"	1						
TR_TB_C PM	.563'	.649"	1					
FR_SCB_ CPM	.940"	.879"	.619'	1				
EN_SCB_ CPM	.882"	.943"	.577'	.855"	1			
TR_SCB_ CPM	.626'	.729"	.899"	.624'	.606'	1		
FR_HFB_ CP	.942"	.893"	.603'	.987"	.855"	.646"	1	
EN_HFB_ CPM	.553'	.533'	.235	.519'	.658"	.271	.478	1
TR_HFB_ CPM	.810"	.865"	.864"	.845"	.774"	.892"	.867"	.339

Note. n=15, TB: Targeted Bigrams, SCB:Selected Component Bigrams, HFB: High Frequency Bigrams, CPM:Characters per Minute, FR= L1, TR=L2, EN=L3

RESULTS

2.2. Relationship between copy task variables and writing processes

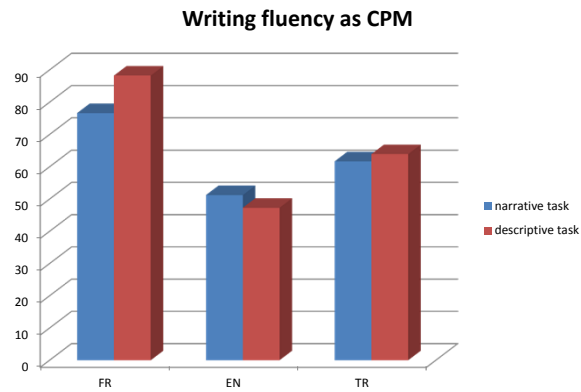


Figure 4: Mean Characters_Per_Minute in narrative and descriptive tasks in three languages

RESULTS

3. Contribution of copy task measures in writing processes (CPM) in Turkish

a) Multiple Regression analysis of the contribution of copy task measures to the variance in writing fluency in the descriptive task in Turkish

	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>	<i>t</i>	<i>.Sig</i>
(Constant)	-299.569	94.183	-	-3.181	.011
TR_TB_CPM	-.318	.255	-.478	-1.247	.244
TR_HFB_LogMean	1.231	.395	2.371	3.115	.012
TR_HFB_CPM	3.474	.997	4.744	3.485	.007
TR_SCB_LogMean	-.687	.357	-1.256	-1.923	.087
TR_SCB_CPM	-1.999	.884	-2.459	-2.263	.050

Table 3: Regression coefficients of copy task measures predicting the writing fluency of descriptive task in L2 (TR) Note. Excluded variable: TR_TB_LogMean__trimmed

RESULTS

b) Results of Multiple Regression analysing the contribution of copy task measures in predicting the writing fluency of narrative task in Turkish language

	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>
(Constant)	-247.095	115.651		-2.137	.061
TR_TB_CPM	-.135	.313	-.191	-.432	.676
TR_HFB_LogMean	1.430	.485	2.591	2.947	.016
TR_HFB_CPM	4.155	1.224	5.339	3.395	.008
TR_SCB_LogMean	-.971	.439	-1.671	-2.215	.054
TR_SCB_CPM	-3.051	1.085	-3.531	-2.812	.020

Table 4: Regression coefficients of copy task measures predicting the writing fluency of narrative task in L2 (TR)
Note.Excluded variable: TR_TB_LogMean__trimmed

DISCUSSION

- These preliminary results suggest that typing speed contributes to writing fluency (as in Alves, Castro, Sousa, and Strömqvist, 2007) in Turkish text production in multilingual writing.
- Our results show that knowledge of High Frequency Bigrams in one language predicts writing fluency in that language in multilingual writing when one language (Turkish) is linguistically distant from the other two (French-English).

ON-GOING AND FURTHER RESEARCH

On-going Research

- **Corpus 1 (n=31)**
- Relationship between EFL learners' typing speed, writing processes and text quality
- Comparison of French middle school students' L1 and L2 writing processes and text quality
- Relationship between linguistic knowledge, writing processes and text quality
- **Corpus 2 (n=15): French-Turkish bilingual students**
- Writing processes in multilingual writing
- Comparison of writing processes and text quality in multilingual writing
- Relationship between linguistic knowledge, writing processes and text quality in multilingual writing
- Effect of typing speed on writing processes and text quality in multilingual writing: (coming soon) on-going analysis of text quality

ON-GOING AND FURTHER RESEARCH

Further Research

- **Corpus 3: Bilinguals (n=18) and French monolingual students (n=13)**
- Comparison of writing processes of monolingual and bilingual students in writing in French
- Comparison of text quality of monolingual and bilingual students in writing in French
- Relationship between writing processes and text quality of French monolingual and bilingual students in L1 writing
- Comparison of writing processes and text quality of French monolingual and bilingual students in L1 and L2 writing
- Further linguistic analysis for the use of lexical (nouns, adjectives etc.) and grammatical patterns in multilingual writing
- Ready-made writing tasks can be inserted in Inputlog tool in different genres such as descriptive, narrative, argumentative, expository writing.



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Questions to be raised?

Thank you very much for your attention!

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